

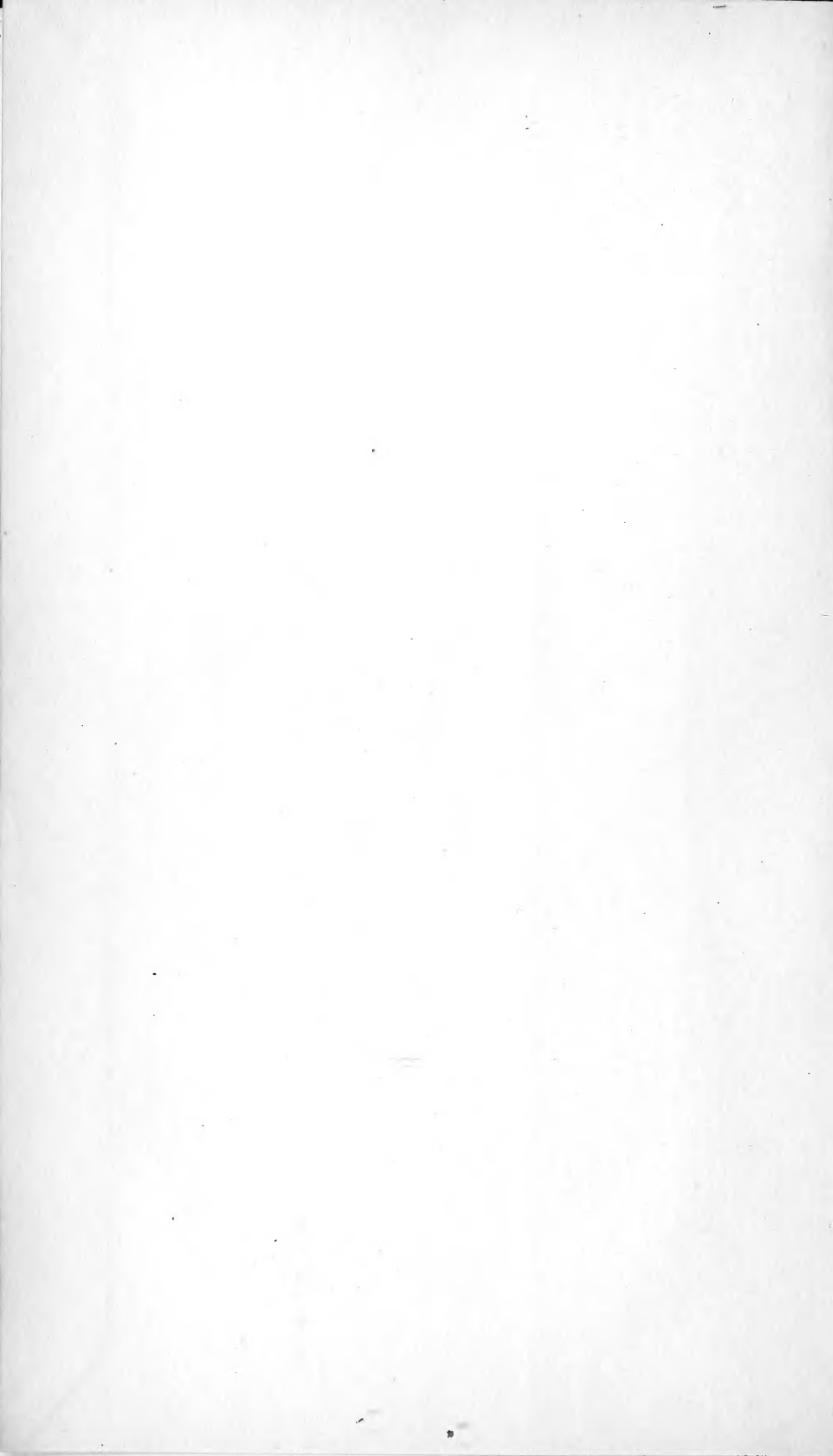
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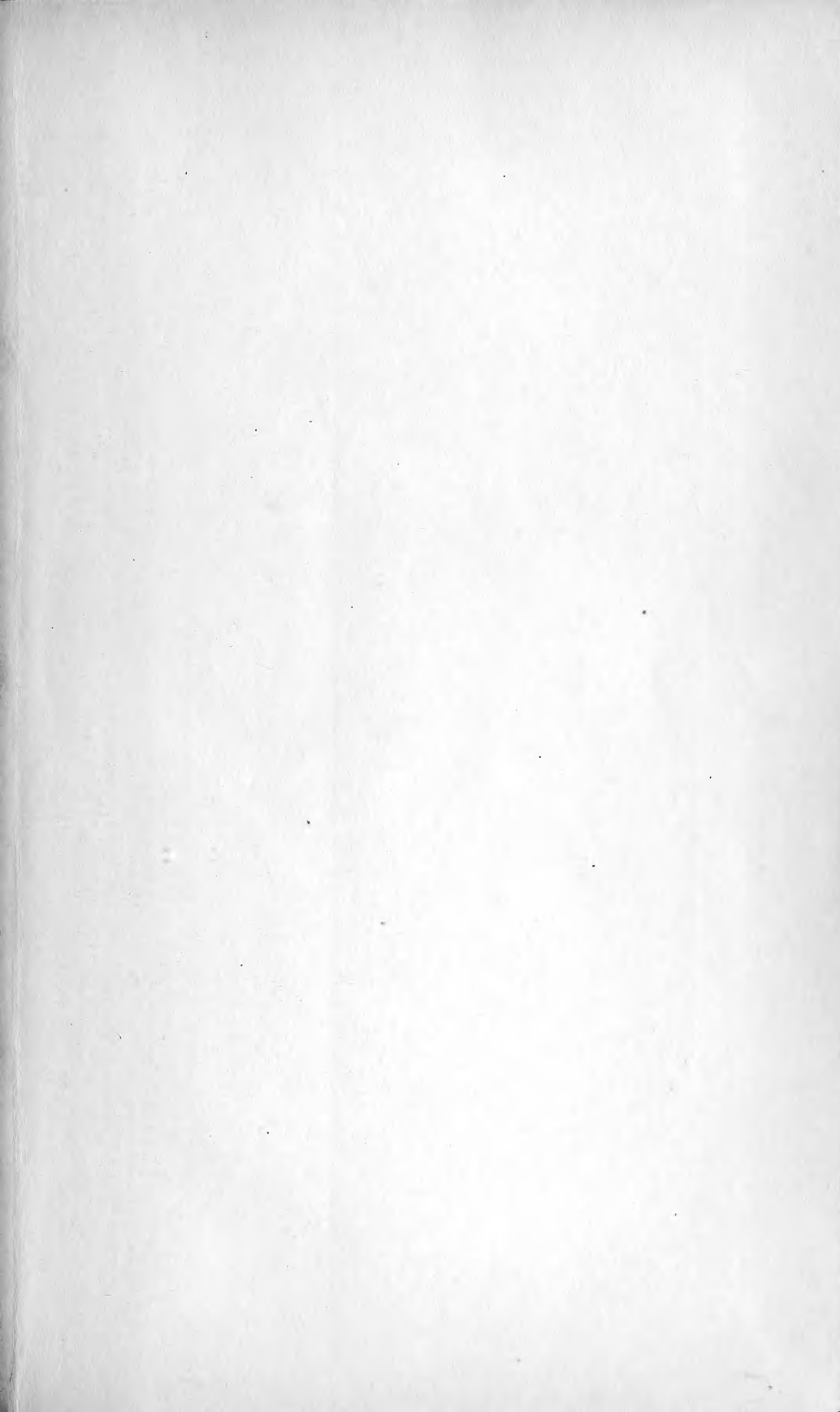
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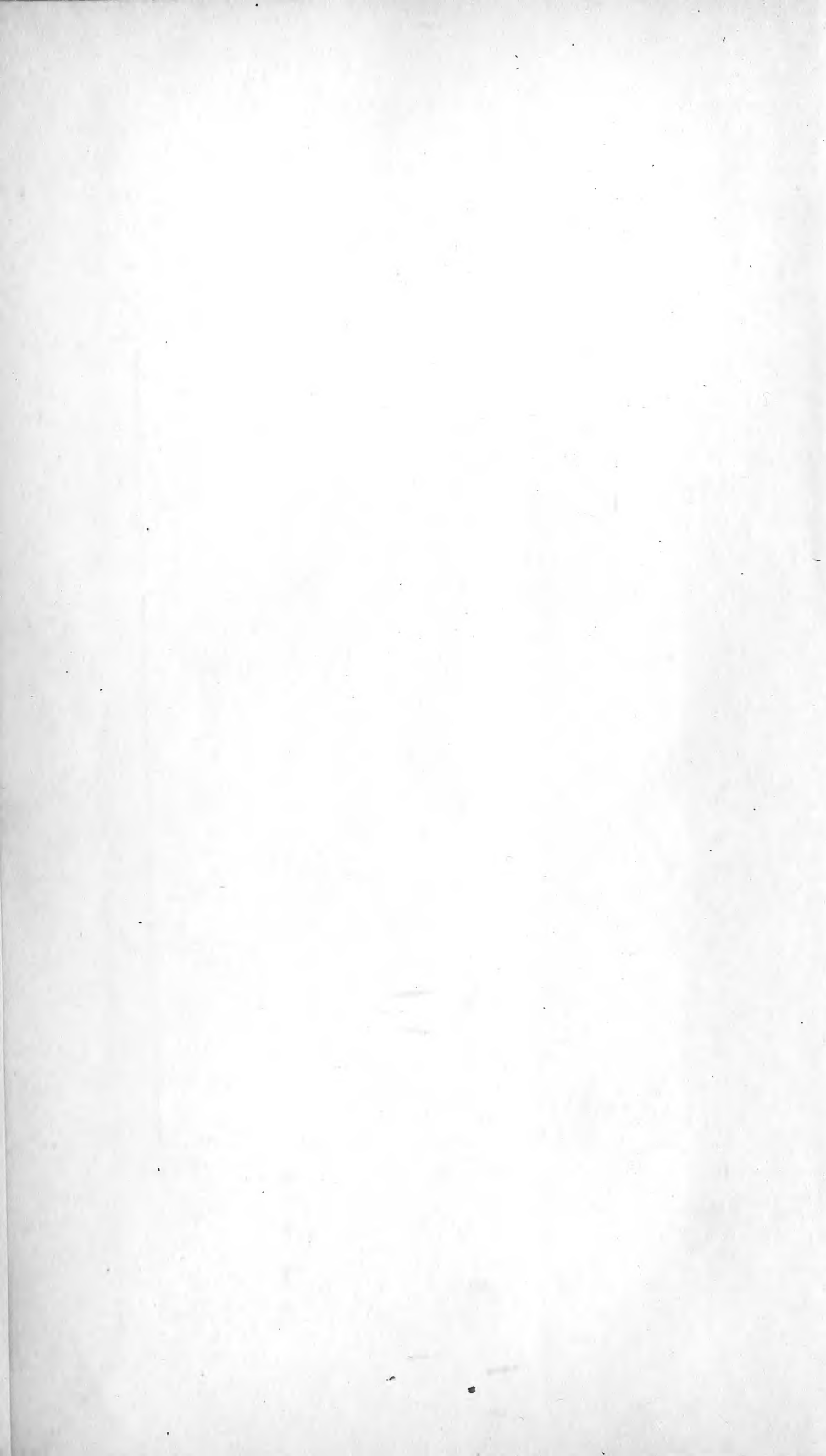
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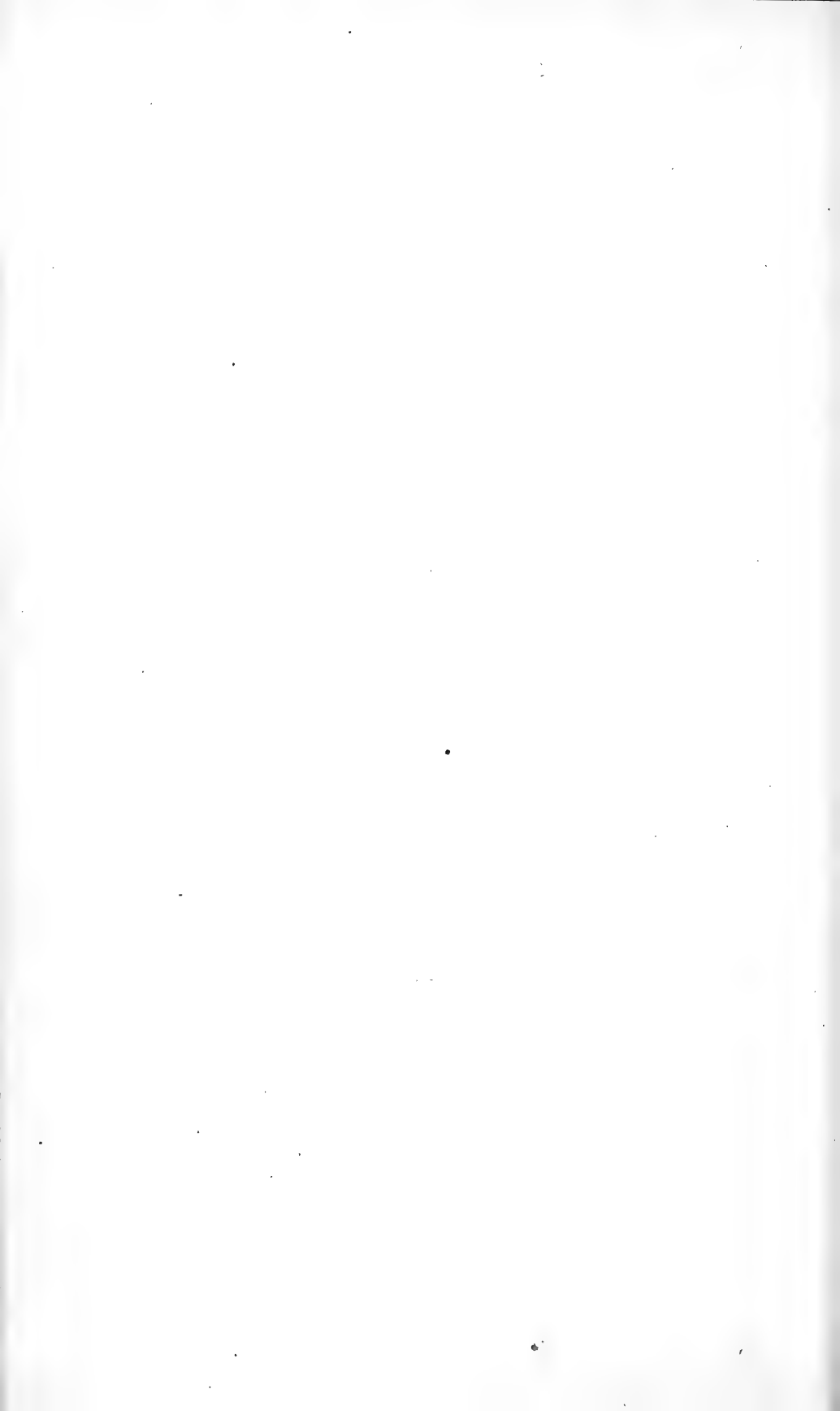
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Occasional Papers
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EGG-CAPSULES OF THE TEN-RIBBED WHELK.

BY CHARLES W. JOHNSON.

AMONG the interesting specimens obtained by Mr. Arthur B. Fuller during his trip on a beam trawler to the Georges Bank, August 6 to 11, 1920, were three clusters of the egg-capsules of the Ten-ribbed Whelk, *Chrysodomus decemcostatus* (Say). This is the *Fusus decemcostatus* of the older authors, and was later referred to the genus *Neptunea* Bolten. By the method of elimination, as pointed out by Dr. William H. Dall,¹ *Chrysodomus* Swainson will now have to stand as the name of this genus.

These egg-capsules are commonly referred to by fishermen as "sea-corn," from their resemblance to kernels of corn. As this term also includes the irregular clusters of egg-capsules of the Common Whelk, *Buccinum undatum* Linn.; some confusion has existed that may account for our lack of a more intimate knowledge of the egg-capsules of this common species. In the Report of the United States Commissioner of Fish and Fisheries for 1879 (1882, p. 787-835), is an interesting "List of collections made by the fishing vessels of Gloucester and other New England sea-ports for the United States Fish Commission, from 1877 to 1880." The Mollusca were determined by Professor A. E. Verrill. In this list "sea-corn (eggs of *Buccinum*)" is mentioned over a dozen times, and in other places it is cited as "sea-corn (eggs of *Buccinum undatum*)." The specimens were collected on all the banks from the Georges to the Grand Bank of Newfoundland, in depths ranging from 30 to 250 fathoms. The following item on page 829 seems of special interest: "Captain D. E. Collins and crew, sch. Gussie Blaisdell. A specimen of branching sea-corn (eggs of *Buccinum*

¹Proc. U. S. Nat. Mus., 1918, vol. 54, p. 207-215.

undatum) 19 inches high, . . . from lat. 46° 40' N., long. 50° W." This would be on the Grand Banks, near the Eastern Shoals, in about 40 fathoms. These large masses of capsules were undoubtedly produced by several individuals. Specimens before me measuring from 5 to 7 inches in length, 4 to 4.5 inches wide, and 3 to 3.5 inches high, and containing probably from 2,000 to 2,500 capsules, seem out of all proportion for a single shell. Mr. Olof O. Nylander says he has seen two and three specimens apparently forming a single bunch. Clusters containing 544 capsules are recorded. The irregular cluster shown on the plate facing page 65 of *The Shell Book* (by Julia E. Rogers, 1908), is probably what would be called "branching." The usual size of the clusters is from 2.5 to 3 inches in diameter, as shown on Plate 1, fig. 1, containing between 300 and 400 capsules. The bunches of capsules form a fairly good substitute for a sponge. "These are called 'sea wash-balls,' being used instead of soap by sailors to wash their hands."

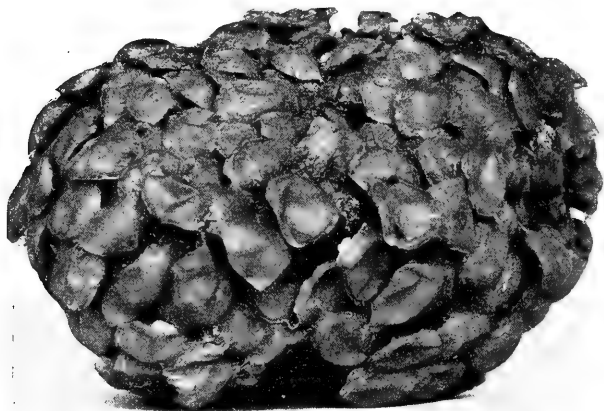
Under *Chrysodomus*, Dr. Dall, in the paper above referred to, says: "Ovicapsules massed, sessile either in a heap as in *Buccinum*, or in a cylindrical erect group." Forbes and Hanley,¹ under *Fusus antiquus* Linn., the type of the genus *Chrysodomus*, say: "The capsules are only half an inch in diameter, are convex outwardly, and concave in the inner side, coarse and corrugated, and piled one upon another in a conical heap, three inches or so high."

Professor A. E. Verrill² under *Buccinum cyaneum* Brug. says: "Numerous examples of clusters of cylindrical, often very much elongated, clusters of egg-capsules have been brought from the Grand Bank by the Gloucester fishermen. These, I suppose, belong to this species, but I have no positive evidence. The clusters are usually about an inch in diameter and 3 to 5 inches long. By the fishermen, these are called 'sea-corn' and 'green-corn.'" Friele³ under *Buccinum terraenovae* Beck. says: "The egg-capsules (fig. 16a, b) have been described by Mörch in *Catal. des Moll. du Spitzb.*, p. 16, without, however, his referring them to any particular species. *Ootheca* is long and cylindrical in form, occurring now as a naked stem now with a projecting branch. Length about 100 mm.; breadth from 16 to 20 mm." These resemble the egg-capsules in question,

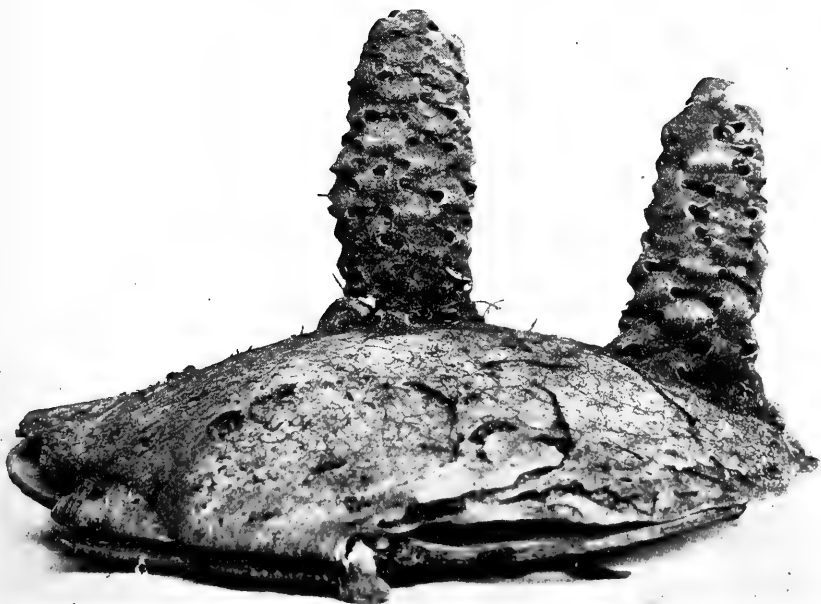
¹History of British Mollusca, 1853, vol. 3, p. 426.

²Trans. Conn. Acad. Arts and Sci., 1882, vol. 5, p. 495.

³Norwegian North Atlantic Exped., 1876-78, vol. 3, Moll. 1, 1882, p. 33.



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but the cluster is much more slender in proportion to their length and the arrangement of the capsules is less regular. "The species is known only from Greenland and the Polar Sea."

That the egg-clusters obtained by Mr. Fuller were those of *C. decemcostatus* was readily proven by finding among some egg-capsules of *B. undatum* in the collection of the Society a small cluster of the former, about one inch in height, from which I took embryonic shells of *C. decemcostatus* about 7 mm. in length; the smooth protoconch of about two whorls was followed by half a whorl, having about nine revolving ridges, the anterior ones poorly defined.

The three cylindrical clusters of egg-capsules were obtained from a depth of about 45 fathoms between the Georges and Nantucket Shoals, attached to living specimens of the Great or Deep-water Scallop (*Pecten magellanicus* Gmelin). Two were attached to one shell about 1.25 inches apart, as shown in the photograph (Plate 1, fig. 2). The length of the clusters varies from 3 to 3.5 inches (75 to 90 mm.) with a diameter at the base of about 1.5 inches (37 mm.) and at the top 1.25 inches (31 mm.). For a better anchorage the attached portion of the base extends on all sides about a quarter of an inch beyond the capsules. There are between 45 and 50 capsules in each cluster, which, when taken from the water, were lemon yellow in color. Each capsule is about half an inch in diameter, convex above and roughened by reticulated lines. As the specimen dries, these lines become more pronounced by the contraction of the interstices, giving the surface a pitted appearance. The attached portion of each capsule is broad, contracted above and then expanded into the broad capsule, which is folded down on the one below; the base of the upper one is usually attached to the upper sides of the two below, thus overlapping like the tiles on a roof and arranged somewhat spirally, the contracted portion serving as a hinge, beneath which are openings through which water can flow and the young escape. As the opening of the capsule is a wide slit at the end just under the top, this portion of the capsule is always free.

There were apparently from three to four eggs in the fresh capsules, but in the old dry capsules there were only one or two young shells. In this connection it might be of interest again to refer to the following paragraph in Dr. Dall's paper. "In many cases, as in *Buccinum* and *Busycon*, it was shown many years ago by Lovèn and others that a single ovicapsule

contains a number of ova fertile and unfertile. The unfertile eggs serve as food for the larvae developed from the fertile ones and there is a certain amount of competition between the larvae in the capsule which results in the most vigorous larvae getting more food and making a larger growth than the more weakly coinhabitants of the capsule. Thus at the time of leaving the capsule and coming into the outer world, it sometimes happens that there will be perceptible differences between the individuals issuing from a single capsule, not only in actual size but in the length of the coil of whorls and the size and compactness of the larval apex."

In the beam trawl only a small percentage of the larger shells that get into the net actually reach the deck of the vessel, most of them going through the coarse-meshed net before reaching the pocket; thus their relative abundance is only problematical. As it was, the number of *Chrysodomus decemcostatus* was about double that of *Buccinum undatum*. In all, some 56 specimens were collected, including some of remarkably large size. One *Chrysodomus* measured 5.5 inches with about 0.25 of an inch broken away, making its total length about 147 mm., with a diameter of 90 mm. Gould gives the length as 3 inches, and Tryon 2.5 to 4 inches. The number of ribs varies somewhat, about one half having ten (counting the subsutural rib), one fourth eleven, and the other fourth nine ribs.

The specimens of *Buccinum* collected were also unusually large for New England waters, one with apex broken measuring nearly 5 inches or about 125 mm. in length, with a diameter of 2.5 inches. Gould gives its length as usually 3 inches, and Tryon 3.25 inches. The specimens also varied greatly in form and sculpture, the spire in many being unusually high, with the longitudinal undulations wanting on the body whorl.

EXPLANATION OF PLATE.

- Fig. 1. Egg-capsules of the Common Whelk (*Buccinum undatum*).
 Fig. 2. Egg-capsules of the Ten-ribbed Whelk (*Chrysodomus decemcostatus*).

Occasional Papers
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EGGS AND YOUNG OF THE RIVER LIMPET,
ANCYLUS FUSCUS C. B. ADAMS.

BY WILLIAM F. CLAPP.

INASMUCH as nothing has hitherto appeared in print concerning the eggs and early stages of American species of *Ancylus*, the following observations seem worth recording.

On April 25th, 1921, several specimens of *Ancylus fuscus* were found in a small pond in Cambridge, Mass. In the few moments devoted to collecting, ten specimens were obtained, all on oak leaves which had fallen into the pond but were not badly decayed. None was found on any other material. Seven of the specimens were placed in a small jar containing about one quart of water. They began copulating at once, one individual crawling partly on top of another, so that the left side and posterior portion of the upper specimen protruded beyond the corresponding portions of the lower. Immediately upon obtaining this position, the penis of the upper individual would suddenly 'bloom' from the left side slightly behind its left tentacle, and bending around the shell edge of the lower, came in contact with the left side of the latter (Plate 2, fig. 1). In the specimens observed, this position was retained for several hours. The penis waved slowly backward and forward, in worm-like fashion, the end prodding various portions of the acting female in the vicinity of the center of the left side, or slightly posterior. No actual insertion of the penis was seen.

In twenty-four hours egg-cases appeared on the sides of the glass jar. These were all laid at night. An hourly examination of the jar during the day failed to reveal a single specimen in the act of depositing eggs. Since a satisfactory observation of the development of the egg through the thick wall of the jar was difficult, a few egg-cases were obtained on microscope slides, by placing the slides as closely as possible to the sides of the jar and near the bottom. A large majority of the egg-cases were placed directly on the sides of the jar, between ten and twenty-five millimeters from the bottom. Those not included in this area

were scattered promiscuously, one or two on the bottom and a few as far as half way to the top of the jar. The animals also appeared to prefer the solid walls of the jar to the microscope slides, in most cases managing to find a passageway between two slides and depositing the egg-case on the jar. Fifty egg-cases were counted and others were undoubtedly overlooked. Since these cases are normally 2.5 mm. in diameter by 1 mm. high, while an average parent is but 7 mm. in length, by 4 mm. in width, and 2.5 mm. high, the average of at least seven egg-cases to every individual is surprisingly large. It is possible that not all of the seven individuals deposited eggs, in which event the average number per specimen would be greatly increased. The egg-case (Plate 2, fig. 2) consists of a hollow, hemispherical, transparent, gelatinous, enveloping layer. It is approximately 0.1 mm. in thickness where fastened to the jar. A thin film of the same material prevents the contents of the case from coming in contact with the object upon which it is deposited. Within are normally seven capsules, apparently quite separated from the outer case by an extremely transparent, jelly-like medium. This is clearly shown when the outer case is injured so that infusoria and other minute animals are allowed to gain entrance to but one of the capsules. The egg and contents of this capsule are then soon devoured, but continuous probing for days by myriads of the small animals fails to reveal any passage for the most minute, between the capsules and the outer casing, or from the injured capsule into the uninjured adjoining one, for the eggs within the uninjured capsules continue to develop normally. Each capsule within the case possesses its own complete, transparent, enveloping wall, is filled with a transparent, colorless, viscous liquid, and contains a single egg. The first egg-cases to appear all contained seven capsules with the exception of one containing nine and one with eight. These two exceptions were otherwise normal, the eggs developed, and the embryos all lived to escape from the case. Those egg-cases which appeared later contained fewer capsules, until, after several days had passed, the few egg-cases laid contained but one capsule each. These single-capsuled cases were likewise normal in other respects, for as large a percentage of the young left the egg-case in apparently healthy condition as in the seven-capsuled cases. It appears that the egg-laying season of this species is of short duration. Thirty-five specimens collected on May 7, and kept under conditions as nearly similar as possible to those of the first lot, deposited less than thirty-five egg-cases,

of which none was seven-capsuled, only two were five-capsuled, and more than three-quarters were single-capsuled.

When first laid the egg is less than 0.1 mm. in diameter. Division may be clearly seen through the transparent case, and within twenty-four hours the egg becomes multicellular. During the fourth day the embryo begins to rotate slowly. Although the cilia were not seen, the result of their motion was plain when small particles in the fluid in which the embryos float, came in contact with, and were cast away from, those portions of the embryo which bore cilia, particularly that portion eventually becoming the mouth. When ciliary motion begins the embryo is still approximately spherical. With the single exception of one egg-case with one capsule containing five eggs, no capsules were seen with more than one egg. In this abnormal case (Plate 2, fig. 7) one of the five eggs broke into several small fragments within twenty-four hours after being laid. The four others continued to increase in size and in four days all were revolving slowly. All were then of approximately the same size and were also as large as embryos of the same age in normal capsules. Only one of the four, however, showed normal division; the others, although rotating in a manner identical with the normal embryo, were very transparent. Abnormal development had not prevented cilia from developing and functioning. The abnormal eggs one by one, broke down within 48 hours after ciliary motion had begun and the fragments were scattered through the fluid of the capsule. The one remaining apparently normal embryo continued to develop, finally reaching the stage where muscular motion begins. After 24 hours of combined ciliary and muscular motion the embryo came to rest in one corner of the capsule. The cilia continued to beat for six hours and then stopped; when the embryo quickly disintegrated.

When ciliary motion begins on the fourth day, the embryo is about 0.2 mm. in diameter. This motion continues steadily, while the embryo increases in size, but continues spherical, until the sixth day when it becomes gradually more elongate. On the seventh day it is very easy to distinguish two well-marked divisions of the foot (Plate 2, fig. 4). During the eighth day muscular motion begins and a twisting and turning of the animal takes place, together with a gradual diminishing of the rotation (Plate 2, fig. 5). The embryo is now 0.5 mm. in length. In a few hours rapid changes occur, protuberances which later become the tentacles are formed, and the viscera are more easily distinguished from the muscular portion of the foot. Soon the foot can be seen

(Plate 2, fig. 6), and a flat dorsal disk appears which later supports the shell. Within a few hours a strong muscular motion may be seen just behind the mouth which has taken the form of a circular hole. This motion is internal and is a slow forward and upward movement of the buccal mass and a sudden backward and downward withdrawing of the same. It is identical with the feeding motion of the radula and buccal mass of the mature animal. Minute, light-brown eye-spots appear during the eighth or ninth day becoming gradually black within 24 hours. At the same time a rhythmic pulsation of the pulmonary chamber may be seen. This chamber (Plate 2, figs. 8, 9) is situated dorsally on the middle of the left side. Ordinarily the pulsations occur at the rate of 50 to 60 per minute, but embryos were observed with a pulmonary pulsation as high as 120 per minute. In these cases, high temperature or lack of fresh water appears to be the cause for the high rate of pulsation; fresh cool water almost immediately restores it to normal.

By the eighth or ninth day the embryos are twisting and turning in every direction, while the buccal mass is being constantly pushed out against the walls of the capsule and quickly withdrawn. This constant prodding of the twisting and turning embryos, assisted by the action of the buccal mass, soon has the effect of weakening the capsule-wall. It loses its rigidity, bending more and more under the struggles of the embryo, and finally ruptures, allowing the embryo to escape into the larger cavity of the egg-case. In those egg-cases containing several capsules, each with normally developing eggs, all of the embryos have escaped from their respective capsules by the tenth day, and continue their development in the common chamber of the egg-case. In some egg-cases one or more of the capsules may contain eggs which have not developed. In this event the capsule-wall retains its rigidity and only those capsules containing normally developed embryos are ruptured, for the struggles of the embryo in an adjoining capsule have apparently no effect on the capsule-wall of an undeveloped egg. The embryos continue to grow and develop for a week or ten days in the egg-case, after having torn down the capsule walls and converted the egg-case into one common chamber. Eventually through constant prodding by the buccal mass, rasping with the rudimentary radula and by the muscular motion of the body, an opening is made in the egg-case where it is fastened to its base, and in a few moments all the inmates have escaped. The embryos from one case deposited during the interval between

May 7, at 6 P.M., and May 8, at 8 A.M., escaped May 25, at 10 A.M., or in seventeen and one half to eighteen days. In other instances observed, twenty-one days passed before the outer case was ruptured and abandoned by the embryos. Eighteen days appears to be the more normal period for the embryo to remain within the case; a longer period is due to adverse conditions.

Embryos twelve and thirteen days old, forcibly removed from the egg-case and allowed to escape into the surrounding water, appear to suffer no ill effects from the premature change. One specimen so treated lived for five days and developed normally.

A very large proportion of the eggs laid develop to the stage where the embryo is ready to escape from the egg-case, even under the most adverse conditions. The majority of the egg-cases observed were laid in very impure water containing great quantities of infusoria and bacteria. Although this water was rarely changed, over 99% of the eggs laid developed into embryos able to escape from the egg-case. The egg-cases deposited on microscope slides were subjected to extremely severe handling. In order to remove diatoms and débris from the outside of the outer case, that the developing embryo might be observed, it was necessary to brush them at frequent intervals with a camel's-hair brush. Occasionally a slide would be removed from the water and the egg-case exposed to the air for fifteen minutes or more. In spite of this treatment nearly all of the eggs on the microscope slides lived to escape from the egg-case.

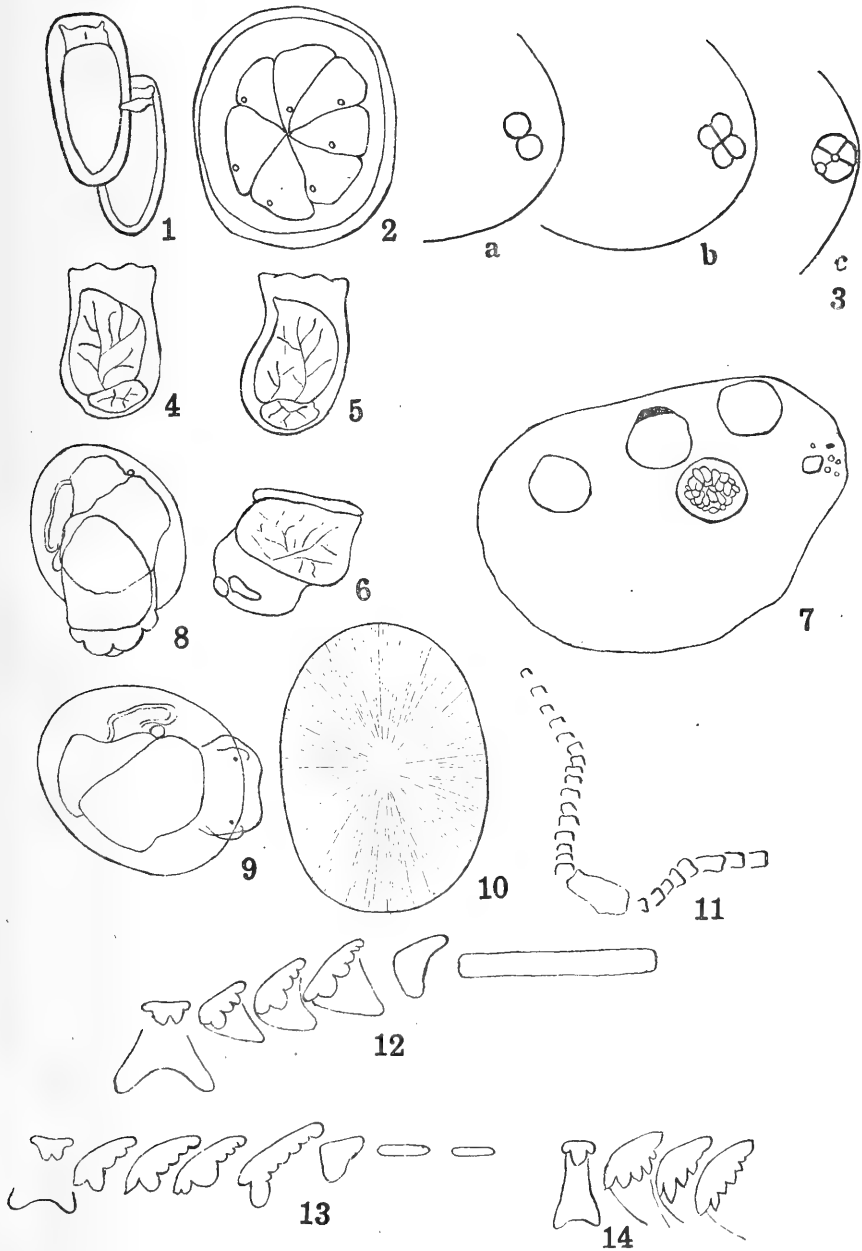
When ready to leave the egg-case the animal is well developed, and able to crawl by means of the foot in any direction. The shell (Plate 2, fig. 10) is perfectly formed and measures 1 mm. in length by 0.7 mm. in width. A small area at the apex of the shell is smooth. The rest of the shell is minutely, densely, radiately sculptured with narrow sharp-incised lines, regularly separating broad raised ridges. The ridges, highly magnified, appear to be formed of low irregular broad scales. No well-defined growth-lines are to be seen at this age, nor any traces of concentric sculpture. The mature shell shows no trace of radiating lines. The jaw (Plate 2, fig. 11) composed of many overlapping plates, is identical with that of a mature specimen excepting in size. The radula (Plate 2, figs. 12, 13) is also well developed. It is 0.3 mm. long by 0.06 mm. wide and contains 95 rows of teeth. In one specimen (Plate 2, fig. 12) each row contained one central, three well-developed laterals, one lateral on which no cusps could be seen, and one long flat plate for an outer tooth. Another (Plate 2,

fig. 13) of the same age (ready to emerge from the egg-case) had one more lateral and two narrow flat marginal plates. The radula of a mature specimen (Plate 2, fig. 14) measures 1.2 mm. in length and 0.3 mm. in width and contains 110 rows of teeth. The radula of the mature specimen is therefore nearly four times as long and five times as broad as that of a specimen ready to leave the egg-case, and the individual teeth are approximately three times as large, although identical in shape. The remarkable difference between the radulae of the mature and the young is in the number of lateral teeth, the mature having 20 to 30 laterals, the young 3 to 4.

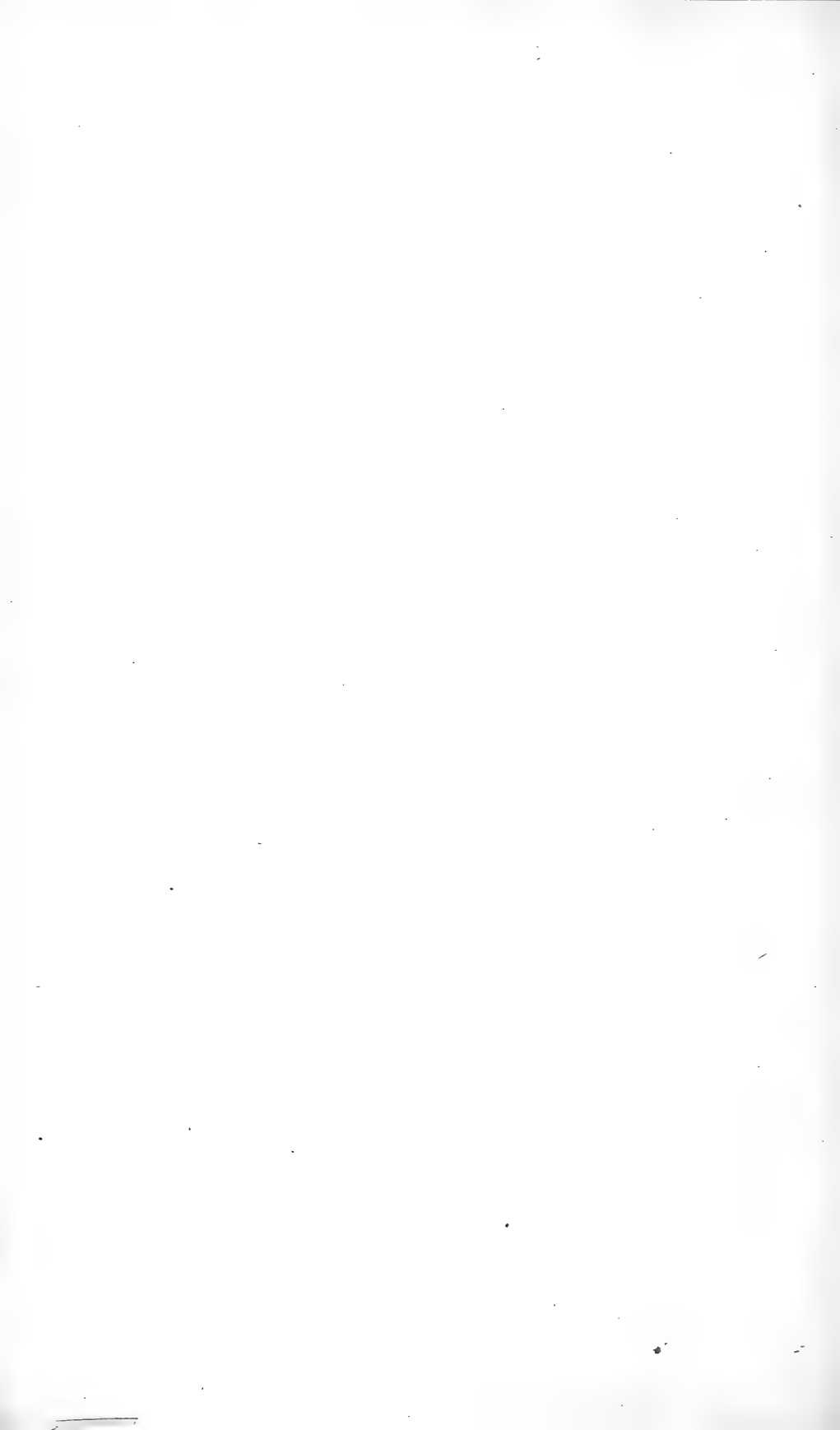
At no stage during the development is there any sign of a spiral twist to the animal or to the shell. That portion of the mantle supporting the shell assumes a flat disk-like shape (Plate 2, fig. 6) early in the development of the embryo and retains that shape and position until the shell is formed and the animal leaves the egg-case.

EXPLANATION OF PLATE 2.

- Fig. 1. Ventral view of two individuals *in coitu*. $\times 3$.
 Fig. 2. Egg-case containing seven capsules, each with a single egg. $\times 12$.
 Fig. 3, a, b, c. Segmentation of the egg. $\times 40$.
 Fig. 4. Embryo on seventh day. $\times 40$.
 Fig. 5. Embryo on eighth day. $\times 40$.
 Fig. 6. Embryo on ninth day, lateral view showing mouth and buccal mass. $\times 40$.
 Fig. 7. Abnormal egg-case containing 5 eggs. $\times 25$.
 Fig. 8. Embryo on tenth day, ventral view. $\times 40$.
 Fig. 9. Embryo on tenth day, dorsal view. $\times 40$.
 Fig. 10. Shell one day after leaving egg-case. $\times 40$.
 Fig. 11. Jaw of animal one day after leaving the egg-case. $\times 350$.
 Figs. 12, 13. Teeth of radula of animal one day after leaving the egg-case. $\times 3000$.
 Fig. 14. Teeth of radula of mature specimen. $\times 1000$.



CLAPP ON ANCYCLUS.



Occasional Papers
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NEW SPECIES OF DIPTERA.

BY CHARLES W. JOHNSON.

THE following new species have accumulated in connection with some faunistic work in course of preparation.

Chaoborus albatrus, sp. nov.

♂.—Head white; around the base of the antennae, the tips of the palpi and proboscis brown; the plumose antennae white, the joints narrowly annulated with black. Thorax white, with long whitish hairs, and three broad brown stripes, the dorsal stripe narrowly divided, the others not extending forward of the suture; two small brown spots in front of the suture and a row of spots on the pleurae, the latter forming an interrupted stripe below the base of the wings; scutellum white, metanotum dark brown. Abdomen white, translucent, with long white hairs; a small brown spot on the anterior angles of each segment; genital appendages yellow, tipped with brown. Halteres white. Legs white, the extreme base of the front femora, a subapical band on all of the femora, and the tips of all the tibiae and tarsal joints brown. Wings whitish-hyaline, with conspicuous brown spots at the tips of the first and second veins but less distinct at the tips of the other veins; distinct spots are also present at the base of the third vein, the cross-vein, and fork of the fifth vein. Length 5 mm.

One male and three females, *holotype* and *allotype*, Brookline, Massachusetts, June 18, and one *paratype*, Mt. Tom, Massachusetts, July 14, 1907 (C. W. J.), in the collection of the Boston Society of Natural History. One *paratype*, Brookline, Massachusetts, in the author's collection.

This resembles *C. punctipennis* Say, but that species has more numerous spots on the wings and the femora and tibiae are finely punctate with black.

Tabanus pemeticus, sp. nov.

♀.—Front brownish pollinose with short black and yellow hairs, frontal and ocelligerous tubercles wanting; cheeks and middle of the face whitish, with the sides yellowish pollinose; hairs on the cheeks long and white. The first and second joints of the antennae yellow with black hairs, third joint reddish brown, with prominent angle above; palpi white with black hairs; eyes pubescent. Thorax, scutellum, and abdomen blackish with golden-yellow tomentum and black hairs, pleura whitish pollinose and with long white hairs, sides of the first and second segments of the abdomen slightly yellow; venter grayish pollinose. Legs yellow with black hairs, coxae and base of the middle

and posterior femora black, the anterior coxae with long white hairs; tips of the front tibiae and tarsi brown, the tips of the middle and posterior tarsal joints annulated with brown. Wings hyaline; costal cell yellow, veins brown; anterior branch of the third vein with a prominent stub. Halteres yellow. Length 13 mm.

The male differs from the female in being grayish pollinose with long grayish hairs, with yellowish tomentum on the sides and posterior margins of the abdominal segments. The femora except the tips, the frontal and middle tibiae and tarsi black. Length 13 mm.

A third specimen (female) has the third antennal joint dark yellow, a very small black shining frontal callous, the branch of the third vein angulate but the stub wanting. Length 13 mm. The stub is also wanting in a general male, length 11 mm. A female from Newfoundland, measuring 11 mm., resembles the type except that the antennae are a dark orange yellow.

Five specimens: *holotype*, ♀, Southwest Harbor, Maine, August 20, 1920 (C. W. J.); *allotype*, ♂, Northeast Harbor, Maine, July 22, 1918 (Dr. C. S. Minot); *paratypes*, ♀, Mt. Cadillac (Green Mt.), Mt. Desert, Maine, August 17, 1920, and ♂, Southwest Harbor, Maine, July 15, 1918 (C. W. J.), in the collection of the Boston Society of Natural History. One ♀, Little River, Newfoundland, July 23, 1905 (Percy G. Bolster) in the author's collection.

The name is derived from Pemetic, the Indian name for Mt. Desert, where four of the specimens were collected. The species belongs to the group comprising *T. bicolor* Wied, *T. ohioensis*, and *T. thoracicus* Hine, and may prove to be only a large maritime form of the last. The larger size, the marked difference in the color of the pilosity of the dorsal and ventral surfaces, the dark-brown veins, and the prominent stub or angle to the branch of the third vein seem (with the material at hand) to separate it from that species.

***Dipalta banksi*, sp. nov.**

D. serpentina Osten Sacken, West. Dipt., 1877, p. 237 (in part); Johnson, Bull. Amer. Mus. Nat. Hist., 1913, vol. 32, p. 57.

Front black, with yellow tomentum and black hairs, face brown, with black and yellow hairs; first and second joint of the antenna brown, third black, the third joint and style less attenuated than in *D. serpentina*. Thorax black covered with a dark-yellow tomentum, pile on the sides yellow and black, on the pleura light yellow. Abdomen black with yellow tomentum, pile on the sides of the first and second segments light yellow, pile on the posterior and remaining segments black. Legs brown with yellow tomentum and black spines. Halteres brown. The markings on the wings are dark brown and more diffused than in *D. serpentina*, but the chief difference is in the venation, the second longitudinal vein being less sinuous, as shown in Fig. 2. It is also smaller, 7 to 9 mm.

Holotype: Great Falls, Virginia, September 12; *paratypes*, Fall Church, Virginia, September 7, Great Falls, Virginia, July 8, all in the Banks Coll. (Mus. Comp. Zool.). St. Augustine, Florida, in the author's collection.

When preparing my List of Florida Diptera, I noticed that this fly differed from the typical form, but having only one specimen, I refrained from describing it. Through the kindness of Mr. Nathan

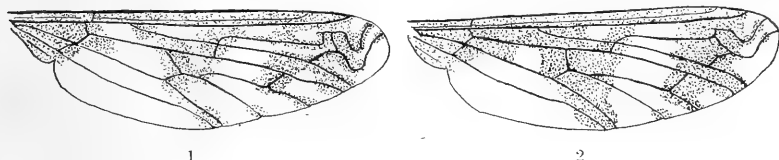


FIG. 1.—*Dipalta serpentina* O. S.

FIG. 2.—*Dipalta banksi* Johns.

Banks I am able to study some additional material from Virginia and find that the characters referred to by Osten Sacken are constant and readily separate it from the western species.

***Thinophilus bimaculatus*, sp. nov.**

♂.—Front, face, and occiput covered with a silvery-white pollen; palpi white, broad; antennae yellow, the third joint brownish on the outer margin. Thorax and pleura with a whitish pollen; two narrow abbreviated subdorsal lines and the scutellum brown. Abdomen with a whitish pollen. Legs yellow, the basal half of the femora and the outer half of the tarsi blackish, the tarsi slender and of even width. Halteres light yellow. Wings whitish-hyaline, veins brown with a distinct clouding at the posterior cross-vein, and on the fourth vein midway between the cross-vein and the tip; there is also a slight clouding at the junction of the third and fourth veins. Length 2.5 mm.

The female is similar except that the front and face are broader, the pollen of the vertex and the dorsum of the thorax are more yellowish, and the clouding on the wings is more diffused. Length 3 mm.

Six specimens collected on the white sand near the South Beach, Anastasia Island, St. Augustine, Florida, April 19 and 21, 1919. Types, in the author's collection.

This species resembles *T. neglectus* Wheeler from Cape May, New Jersey, but is readily separated by its narrow, not broadened tarsi, the more conspicuous cloudings on the wings, and much lighter color.

***Thinophilus prasinus*, sp. nov.**

♂.—Front, face, and occiput a light, dull green covered with a grayish pollen, the broad palpi white, the occiput bearing long white hairs; antennae yellow, the upper part of the third joint brown, the thickened basal portion of the arista black, the remainder white. Thorax dull green, the dorsum brownish- and the pleura whitish-pollinose; six dorso-centrals. Abdomen blue-green dulled by a whitish-pruinose covering. Front coxae yellow, dark at the base; the others dark, covered with a white pollen. Legs yellow, tips of the

tarsi brown, pulvilli white. Halteres light yellow. Wings hyaline, veins brown. Length ♂, 3.5 mm.; ♀, 4 mm.

Twelve specimens: *holotype* and *allotype*, Chatham, Massachusetts, June 30, 1904, and four *paratypes*, Chatham and Edgartown, Massachusetts, June 29, 1910, in the collection of the Boston Society of Natural History. *Paratypes* from Chatham, Massachusetts, and St. Augustine, Florida, April 18, 1919, in the collection of the Museum of Comparative Zoölogy, the American Museum of Natural History, and the author's collection.

Some of the Florida specimens have the antennae, palpi, front coxae, and the tarsi slightly darker than those from Massachusetts.

***Psila longula*, sp. nov.**

Front, face, inferior orbits and antennae yellow; arista and mouth-parts brown; vertex and occiput black, shining; frontal and vertical bristles and hairs on the lower part of the occiput light yellow. Thorax black, with short yellow hairs; pleura, metanotum and scutellum shining black, the last with two apical bristles. Abdomen black with yellow hairs. Legs yellow, tips of the posterior femora brown. Halteres white. Wings hyaline, veins brown, the apex slightly brownish, with fainter tinge of brown near the posterior cross-vein. Length ♂, 5 mm.; ♀, 6 mm. In some specimens of the female the black encroaches upon the front.

Fifteen specimens: *holotype* and *allotype*, Chester, Massachusetts, August 6, and July 25 (*C. W. J.*) and the following *paratypes*: Northeast Harbor, July 16 (*Dr. C. S. Minot*), Bar Harbor, July 24, and Fort Kent, Maine, August 17; Mt. Washington, New Hampshire, 3000 ft., July 28; Norwich, July 7, and Dummerston, Vermont, July 14 (*C. W. J.*), in the collection of the Boston Society of Natural History. Other *paratypes* from the above localities are in the U. S. National Museum, Museum of Comparative Zoölogy, Academy of Natural Sciences, Philadelphia, and the author's collection.

This has probably been confused with *P. levis* Loew, but the dark veins and clouding on the wings and the dark tips to the posterior femora readily distinguish it from that species.

***Chyliza nubecula*, sp. nov.**

♀.—Face and inferior orbits white; the lower two-thirds of the front yellow; upper parts of the front, vertex and occiput black, subshining; antennae and arista brown. Thorax and abdomen black with piligerous punctures, the pile of the thorax black, and of the abdomen whitish; scutellum black, shining. Legs black; front coxae, the outer half of the tibia, and all the metatarsi, yellowish. Halteres and calyptrae white. Wings hyaline; veins, stigma, and the apex forward of the third vein brown. Length 4.5 mm.

Three specimens: *holotype*, Northeast Harbor, Maine, July 6, 1909 (*Dr. C. S. Minot*) in the collection of the Boston Society of Natural History. *Paratypes*: Edmonton, Alberta, July 12, 1916 (*F. S. Carr*) in the National Museum, Ottawa, Canada; and High River, Alberta, July 15, 1921, collected by Mr. Owen Bryant, in the author's collection.

This species resembles *C. leguminicola* Melander, from Oregon, but the entirely black scutellum, darker and the small apical clouding on the wings separate it from that species.

***Pseudotephritis vau* Say, var. *approximata* Banks.**

P. approximata Banks, Proc. Ent. Soc. Wash., 1914, vol. 14, p. 138, corrected to *approximata* in the index, p. 185.

P. metzi Johnson, Psyche, 1915, vol. 22, p. 49.

In the types of *P. approximata* and *P. metzi* the spots on the cross-veins are widely separated and the sub-basal clouding is interrupted at the fourth vein. I now have before me two other specimens. One from the Delaware Water Gap, Pennsylvania, collected by Mrs. Annie T. Slosson, has the spots on the cross-veins separated by only one-third the distance of that in the type of *metzi*; the second, from Brookline, Massachusetts, September, 1920, collected by C. E. White, Jr., has the spot on the cross-vein very narrowly separated and of a yellowish color as in the typical *P. vau*, and the sub-basal clouding is not interrupted at the fourth vein. The two specimens show very clearly that this is undoubtedly only a variation of Say's species.

***Pseudotephritis vau* Say, var. *conjuncta*, var. nov.**

Another striking variety of this species was collected by the writer on an old log near the Beaver Dam Pond, Bar Harbor, Maine, August 10, 1920. In this the pre-apical costal spot is connected with the spots in the posterior cross-vein, forming a quite regular band of even width, and widely separated from the marking on the anterior cross-vein. The clouding is not interrupted at the fourth vein. Length 6.5 mm.

Type, in the collection of the Boston Society of Natural History.

Seioptera dubiosa, sp. nov.

♀.—Head yellow, the orbits whitish; antennae and palpi yellow; length of the third joint about double its width; ocellar triangle black. The upper part of the occiput on the sides, brown. Thorax brownish black, shining, with two subdorsal pruinose stripes; humeri yellow. Abdomen black, shining; base and the long fifth segment yellowish; terminal segment whitish; ovipositor brown. Legs yellow, the last two joints of all the tarsi brown. Halteres and calyptrae white. Wings hyaline, the subcostal cell, base, and tip of the marginal, tip of the submarginal, and part of the tip of the posterior cell brown. Length 5 mm.

One specimen, *type*, Northeast Harbor, Maine, July 16, 1909 (*Dr. C. S. Minot*), in the collection of the Boston Society of Natural History.

Chaetopsis apicalis Johnson, var. **duplicata**, var. nov.

This species is common in the salt marshes from Florida to Machias, Maine. The typical form is found from New Jersey southward. In the marshes of Massachusetts, however, the species shows considerable variation and indications of a pre-apical band become more and more prominent as the species extends northward. In the marshes along the north shore of Mt. Desert and the marshes of the Machias River, below Machias, Maine, the pre-apical band becomes permanent, with little variation, while the typical form is absent. To this extreme form I am applying the above name.

The *holotype* and *allotype*, "Narrows," Mt. Desert, Maine, August 13, 1920, and four *paratypes* from the same place, June 9, 1921, and Machias, Maine, July 17, 1909, are in the collection of the Boston Society of Natural History; other *paratypes* are in the Museum of Comparative Zoölogy, U. S. National Museum, Academy of Natural Sciences, Philadelphia, and the author's collection.

In the typical *apicalis* the stigma is not colored, but in the *duplicata* it is slightly brownish, with sometimes a faint suggestion of a band, pointing to a possible relationship with *C. fulvifrons* Macq. in the north, and *C. debilis* Loew in the south. *C. aenea* Wied and *C. apicalis* Johns. are confined to the salt and brackish marshes and have not been found inland. The *C. aenea* of authors that is said to injure corn, sugar-cane, onions, etc., is the *C. fulvifrons* Macq. In my paper on the Diptera of Florida¹ the difference between the two species was pointed out, a view later endorsed by Mr. E. T. Cresson, Jr.² Say described two forms as *trifasciata*: the first is *C. aenea* and the second *C. fulvifrons* so that the name is not available. *C. massyla* Walker is a valid species with black legs and with broad, dark, continuous bands on the wings. It is locally common in fresh-water marshes. The species of *Chaetopsis* of the eastern United States would form an exceedingly interesting group for biological study, their abundance throughout the entire summer and the ease with which one species (and no doubt the others) can be raised, would aid greatly in the work.

The marked variations in the maritime species at the more extreme limits of their range, or the inland species when breeding in the salt or brackish marshes, are not uncommon. The specimens of *Chrysops fuliginosus* Wied (*C. plangens* Wied), from Florida and Georgia are quite different from those of the Maine coast. From the latter place

¹ Bull. Amer. Mus. Nat. Hist., March 1913, vol. 24, p. 83.

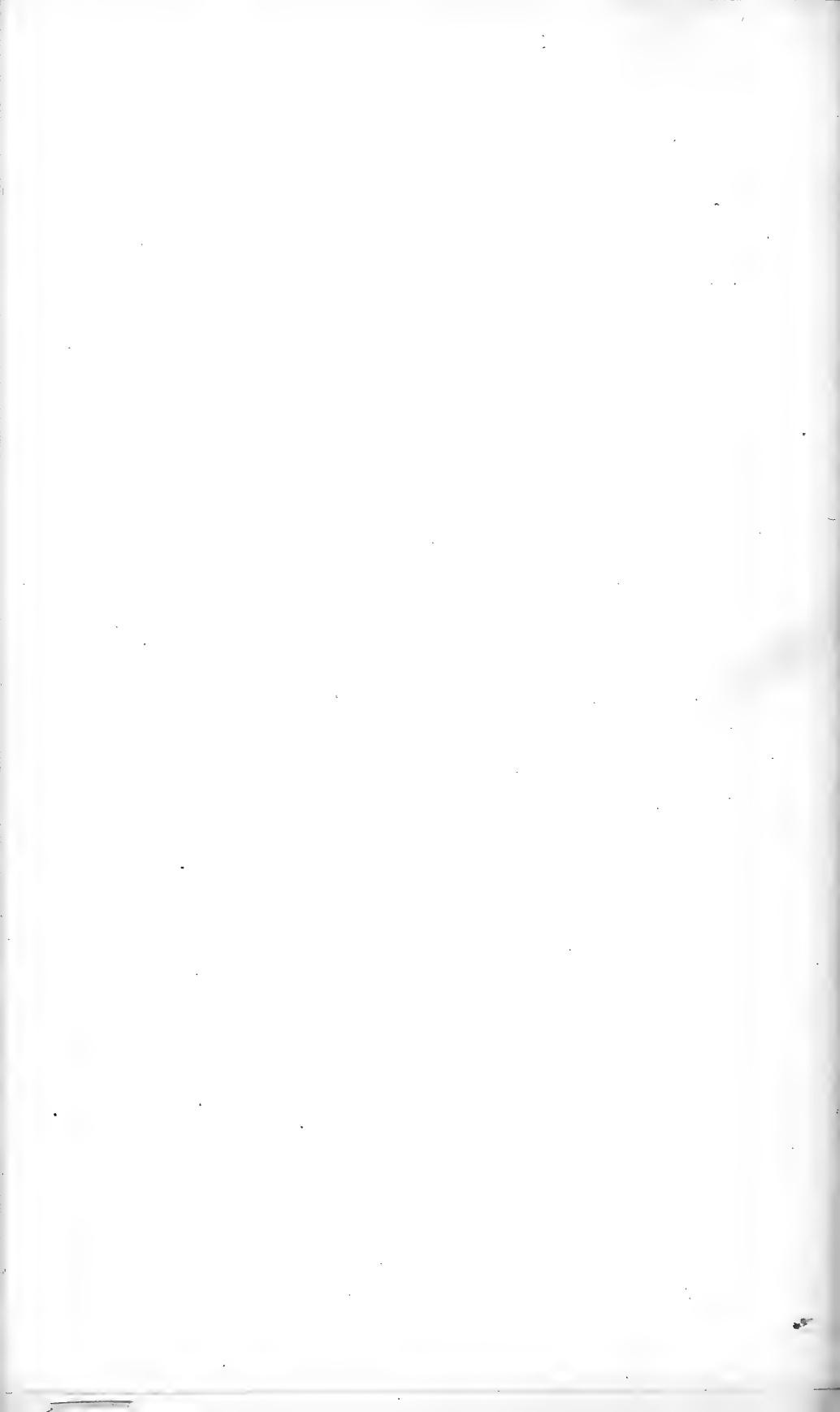
² Ent. News, July 1913, vol. 24, p. 317.

the males and females are similar, for the distinct grayish markings on the abdomen and the subhyaline of the wings in the southern specimens of the female become obsolete in the more northern specimens. The common green-head, *Tabanus nigrovitta* Macq., of the Atlantic coast from Maine to Florida varies greatly in size in different localities. When attaining a length of 12 to 14 mm. it is the *T. conterminus* Walker. *Tabanus atratus* when breeding in the saline marshes, assumes a form known as *nantuckensis* Hine.

Since the following generic names are being used, it might be well to call attention to the fact that they are both preoccupied.

Pandora Haliday, 1833, was used by Hendel (Wiener Ent. Zeit., 1910) and adopted by Melander (Wash. Agric. Exp. Sta., Bull. 143, 1917) in place of *Saltella* Robineau-Desvoidy, 1830, although the latter has been used prior to 1910 without question. It is preoccupied in Mollusca by *Pandora* Bruguière, 1792.

Melina Robineau-Desvoidy, 1830 (Myodaires, p. 695) is used by both Cresson (Trans. Amer. Ent. Soc., 1920, vol. 46, p. 41) and Melander (Ann. Ent. Soc. Amer., 1920, vol. 13, p. 313) for the *Sciomyza* of authors, not Fallen. A second name by Robineau-Desvoidy, *Pherbellia* (Myodaires, 1830, p. 695) will have to be substituted as *Melina* was used in Mollusca by Retzius in 1788.



Occasional Papers
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A NEW DRAGONFLY FROM NEW ENGLAND.

BY R. HEBER HOWE, JR.

THE male specimen on which this species is based, was collected at Squam Lake, New Hampshire, by Dr. G. M. Allen on June 22, 1907, and was given me for determination by Mr. C. W. Johnson of the Boston Society of Natural History. After a careful study of the specimen I was unable to name it, and with the aid of Mr. Nathan Banks compared it with the gomphine material in the entomological collections of the Museum of Comparative Zoölogy, Cambridge, without taxonomic success. I therefore suggested to Mr. Johnson that he send it to Mr. E. B. Williamson of Bluffton, Indiana, for his opinion. Writing to Mr. Johnson under date of October 8, 1921, Mr. Williamson replied: "I studied the specimen this noon hour and I don't know it, and I believe it is undescribed." Dr. P. P. Calvert has also kindly studied the specimen and agrees with me that it is new. I am therefore describing it, naming it after my friend, and its collector, whose odonate captures in New Hampshire have added many valuable distributional records. Dr. Allen now recalls nothing about the capture of this particular gomphine, though it was probably caught near the Harvard Engineering Camp.

Gomphus alleni, sp. nov.

Male: total length of abdomen 34 mm.; length of hind wing 26 mm. *Colors* dark brown, black, and yellow. *Head* yellow except vertex, antennae, hind edge of occiput, rear base of frons, tips of mandibles, fronto-nasal suture, and back of head (except for a patch on either side) which are brown or black. Post-ocellary ridge tuberculate, occiput without spine, hind margin nearly straight. *Prothorax* brown with yellow spot at either end of median lobe, and geminate median spot; a median spot on hind lobe. *Mesothorax* dorsally brown, with the mesothoracic semicollar yellow, slightly broken at mid-dorsal carina, which has a short, central (1 mm.) yellow line; a pair of yellow dorsal stripes (0.5 mm. wide) divergent anteriorly, joining with the external ends of the semicollar; a short, narrow, yellow ante-humeral stripe widely separated from a posterior spot which is almost confluent with posterior ends of dorsal stripes. Lobes between wings yellow. *Meso-* and *metathorax* laterally yellow except for lateral suture stripes. Ventrally yellow. *Legs* dark brown, more or less spinous and villous, coxae and first and second femora yellow basally. *Wings* hyaline, veins brown or black, pterostigma membranule pale brown, costal margin 2 mm. long. Two cells between A1 and A2 at their origin with

three cells at the wing margin. Antenodal cells 14; postnodal cells 10. *Abdomen* black or dark brown with yellow as follows: on segments 1 to 8 a mid-dorsal stripe never as long as the segment, and becoming shorter and less prominent posteriorly, almost disappearing on 8, and widening on 1 and 2 to a blotch. Laterally blotched on segments 1 and 2, with a latero-proximal spot on 3 to 7, and on 8 and 9 with the lower lateral half yellow, 10 ventrally yellow. Segments 7 to 9 moderately expanded (2.5 mm.). *Superior appendages* dark brown and black, as long as segment 10, acute apically, and bearing two ventral teeth near apex, the anterior one more prominent. Ventrally viewed these teeth are on the inturned inner margin. *Inferior appendage* dark brown and black, villous, reaching posterior tooth of superior appendages, and with ends upturned at apex. *Accessory genitalia* of segment 2: anterior hamule black, posterior hamule yellowish, vesicle black.

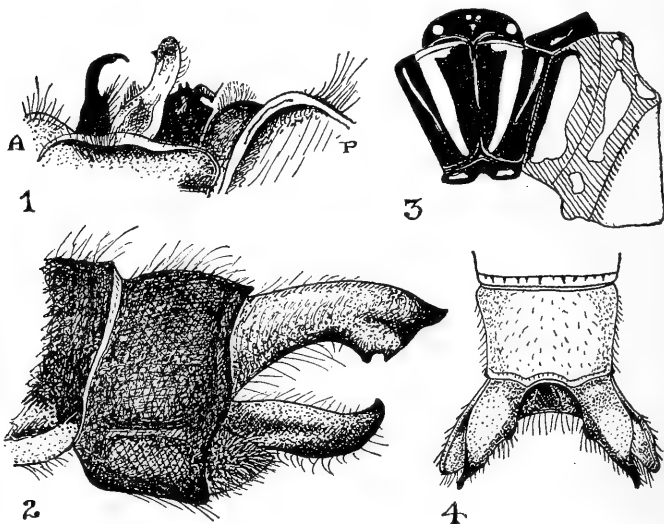


FIG. 1.— Accessory genitalia.

FIG. 3.— Color pattern of thoracic markings.

FIG. 2.— Abdominal appendages, lateral view.

FIG. 4.— Abdominal appendages, dorsal view.

Type locality: Squam Lake, New Hampshire.

Type: in the entomological collection of the Boston Society of Natural History, Boston, Massachusetts.

This species is evidently a near relative of *Gomphus abbreviatus*. It makes the twenty-second species of this genus known from New England of which all but two are rare. It differs materially from *G. cavillaris* Need., *G. brimleyi* Mutt., *G. parvidens* Currie, *G. viridifrons* Hine, and *G. brevis* Hag., in many respects as shown by a comparison of the abdominal appendages. It is also unlike *G. abditus* Butler described from Chicopee, Massachusetts (Can. Ent., 46 : 347-348, 1914). This latter was overlooked in the author's Manual of Odonata of New England; it makes 166 species now known from these States.

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NEW GENERA AND SPECIES OF DIPTERA.

BY CHARLES W. JOHNSON.

Macrocera nobilis, sp. nov. FIG. 10.

Face and front yellow, vertex black; antennae brownish, base yellow, length about 20 mm.; palpi brown. Thorax yellow with fine black hairs and three broad, shining, dark-brown stripes, the dorsal stripe not reaching the scutellum, and the subdorsal stripes ending some distance back of the humeri; a narrow lateral stripe is also present. Scutellum yellow, base brown, pleura and metanotum brownish, shining. Abdomen yellow with lateral stripes of dark brown, slightly interrupted at the base of each segment; seventh and eighth segments entirely dark; hypopygium brown, base yellow; the entire abdomen with moderately long, black, hairs. Legs yellow, the tarsi somewhat brownish in appearance due to the greater density of the fine black hairs. The front coxae are striped with brown and the middle and hind coxae have a brown spot at their base and apex. Wings hyaline, slightly tinged with yellow; tip of R 1 moderately thickened. At the base of R 5 and M 1 and 2 there is a small clouding of brown; toward the base from this is a whitish spot on each side of which the veins are thicker and of a darker brown. Length of ♂ 9 mm.; length of ♀ 10 mm.

The male was taken on the carriage road, Mt. Washington, New Hampshire, July 24, 1915, at about 2,000 feet; the female on Mt. Monadnock, New Hampshire, June 22, 1917. Types in the Society's Collection.

Macrocera trivittata, sp. nov.

Similar in appearance to *M. nobilis*. The pleura is entirely yellow, and the apex of the scutellum dark brown, base yellow. The longer hairs of the thorax are arranged in four regular rows above the upper edges of the subdorsal stripes and between the stripes and the base of the wings. The abdomen has in addition to the lateral stripes a prominent dorsal stripe interrupted at the posterior margin of the segments. The hypopygium is darker and more hairy and the knobs of the halteres are brown. Length 7 mm.

One male, Farewell Creek, southern Saskatchewan, Canada, August, 1887 (Mrs. Varah A. Armstrong). Type in the author's collection.

Dicranota eucera O. S. and **D. noveboracensis** Alexander.

Four specimens taken in Tuckerman's Ravine, and the "Alpine Garden," Mt. Washington, New Hampshire, July 8 and 21, show a remarkable variation of the venation. One is a typical *D. noveboracensis*, having cell M1 present in both wings (fig. 1). In two specimens this is present in one wing only, which would make the specimen referable to either *D. eucera* or *D. noveboracensis*. The other specimen has not only cell M1, but cell 1st M2 (or discal cell) is also present in both wings. With a large series this might prove a rival to the variable *Tricyphona inconstans* O.S.

Apinops atra Coquillett. FIG. 2.

This is apparently quite a rare Tachinid; only two have been seen by the writer. The first was collected at Southwest Harbor, Mt. Desert, Maine, August 20, 1920, and the second was received from Jos. Ouellet, who collected it at Oka, Prov. Quebec, May 24, 1921. The type was from southern Illinois. The specimen from Quebec is especially interesting on account of its abnormal venation, a supernumerary cross-vein being present on each wing in the middle of the first posterior cell. The left wing also has a stump on the second vein just beyond the tip of the first vein. While supernumerary veins are common in the Tipulidae, they are rarely present in the Muscoid Diptera.

EUGENACEPHALA, gen. nov.

Eyes oblong, longer than high, cheeks about two-thirds the height of the head; occiput large, facial plate triangular, terminating in a point between the base of the antennae with a deep triangular fovea below the base of the antennae. Sternopleural bristles are wanting — while there is a large bristle near the edge of the sternopleura it is distinctly on the hypopleura.

Genotype, *E. salsa*, sp. nov.

Eugenacephala salsa, sp. nov. FIGS. 3, 4.

♂, ♀ — Face and cheeks brown; front black, opaque, with fine hairs in irregular transverse rows; three large facial, three frontal-orbital, four vertical, two post-vertical, and two ocellar bristles; first and second joints of the antennae reddish, with numerous bristle-like hairs, the third joint black, rounded and relatively small; arista and palpi blackish. Thorax and scutellum black, opaque and covered with even, short hairs; one anterior and two

posterior dorso-centrals, a humeral, post-humeral, presuteral, one post-alar and two supra-alar bristles; scutellum with four marginal bristles. Abdomen black, opaque, with black hairs, which are larger along the lateral and posterior margins. In the female the third segment is nearly double the length of the second while in the male they are about equal. Genitalia of the male rounded, with two long projections which extend along the venter to the posterior margin of the third segment. Legs dark brown, in the female light brown; the anterior femora thickened, shining, the middle and posterior femora but slightly thickened. All of the femora with prominent rows of flexor and extensor bristles; tibial spurs large. Wings brownish, the venation typical of the Scatomyzidae. Length: ♂, 6 mm.; ♀ 6.5 mm.

Five specimens: holotype, Essex, Massachusetts, May 7, 1920 (A. B. Fuller). Allotype, "Narrows," Mt. Desert, Maine, August 13, 1920 (C. W. J.). Paratypes, (♀) Cohasset, Massachusetts, May 16, 1904 (Owen Bryant), and two (♂, ♀) Hampton Beach, New Hampshire, May 3, 1922 (C. E. White, Jr.). Types, four in the collection of the Boston Society of Natural History and one (Hampton Beach, New Hampshire) in the author's collection.

The flattened mesonotum and scutellum, and the stout legs suggest the genus *Coelopa*, but the smooth face, shape of the head, more numerous thoracic bristles, the rounded abdomen and shape of the genitalia, clearly show that it belongs to the family Scatophagidae.

The species seems to be confined to the salt marshes of our coast. At Mt. Desert it was associated with *Ceratinostoma ostiarum* Haliday, *Cirrula gigantea* Cresson, and other maritime species. Another interesting species taken at the same time was *Clanoneurum cimiciformis* Haliday.

***Micropselapha* (?) *albifacies*, sp. nov. FIG. 5.**

♂.—Head pointed, frontal stripe depressed, dark brown and about one-half of the total width of the front; orbits grayish pruinose, bearing three bristles of equal size; two ocellar bristles, and two large vertical bristles back of the upper angle of the eye; face white, strongly receding; cheeks and vibrissae white; palpi light yellow; occiput nearly as wide as the eye, black, grayish pollinose; antennae black, third joint about four times as long as the second, with a whitish pubescence and a dull yellowish base; arista black, with a short, sparse plumosity. Thorax black, grayish pollinose, dorso-centrals 1-3, scutellum with two long bristles; bristles of the pleura white. Abdomen black, grayish pollinose, hairs white. Genitalia light yellow; the V-shaped process extends beneath to the posterior margin of the third segment. Legs including the coxae light yellow; hairs, bristles and tarsi blackish. Halteres yellow. Wings hyaline, with very fine hairs, veins brown. Length 2.5 mm.

One specimen, Fort Kent, Maine, August 17, 1920. Type in the collection of the Boston Society of Natural History. I am placing this provisionally in the above genus until more material is available.

Amphicnephes pullus (Wiedemann). FIG. 8.

In the Genera Insectorum, Diptera, family Muscaridae, subfamily Platystominae, p. 133, tab. 12, figs. 223, 224, 1914, Hendel figures this species as the genotype, presumably from the type, which is in the Museum at Vienna. Recently in studying some specimens from Florida, in connection with those from the more northern States, I find that those from Florida have the antennae as figured by Hendel, the third joint being about six times as long as the second (fig. 8), narrow, of even width and slightly concave above, with the end bluntly rounded. In the more northern specimens ranging from North Carolina to Massachusetts, which represent the *A. pertusus* Loew, the third joint is only three times as long as the second (fig. 9), rounded below and straight above and ending with a blunt point at the upper edge. The Florida specimens are also larger, measuring 4 mm., while the northern specimens are 3 mm.

Loew's genus *Amphicnephes* was based on *A. pertusus* and being monotypic, that species becomes the genotype instead of *A. pullus*.

RHYNENCINA, gen. nov.

Front broad, with two pairs of inclinate fronto-orbital bristles; two large vertical bristles with a small orbital in front opposite the ocelli. The third joint of the antennae is rounded and less than twice the length of the second. Face, palpi and proboscis greatly protruding, the latter bent backward and longer than the head. The anterior cross-vein is midway between the base and the outer end of the discal cell; basal cells of equal length.

Genotype, *R. longirostris*, sp. nov.

Rhynencina longirostris, sp. nov. FIGS. 6, 7.

♂. — Front bright yellow, opaque; ocellar triangle small, blackish, with two bristles; antennae dull yellow, arista black, pubescent; face yellow, shining, protruding, the prominent palpi about one-half the length of the head; proboscis yellow, very long and extending backward from the bend to the tip, longer than the head; occiput yellow, with two black spots in the middle. Thorax dark yellow, opaque, with numerous fine black hairs, a

small black spot between the scutellum and the base of the wing; humeri, a triangular spot in front of the wings, and the scutellum light yellow, the latter with four bristles. There are one post-acrostical, dorso-central, post-humeral, notopleural and superalar, two post-alar and one sterno-pleural, bristles. Abdomen dark yellow, shining, with fine black hairs. Halteres and legs yellow. Wings hyaline, clouded as follows:—apex, an irregular band extending from the costa across the posterior cross-vein, a second band from the tip of the first vein across the anterior cross-vein, but not reaching the margin; there is a short band or spot at the costa midway between these, which does not extend beyond the third vein; stigma and base of the wings yellow. Length 3 mm.

♀.—Similar to the male, except that the ovipositor which is nearly one-half the length of the abdomen, is dark red with the base and tip black; the lateral margins of the second and third segments are also narrowly margined with black. Length 5 mm.

Three specimens from Mt. Alto, Pennsylvania, July 22, 1921, collected by T. T. Guyton, were received from A. B. Champlain. Types in the collections of the author and Bureau of Plant Industry, Harrisburg, Pennsylvania.

The shape of the head resembles somewhat that of *Gonyglossum wiedemanni* Meig. as figured by Dr. Bezzi (Boll. del Lab. di Zool. Gen. e Agraria, Portici, 1910, p. 5, fig. 1). The fewer frontal bristles, shape of the eyes, shorter third antennal joint, pubescent arista, longer palpi and proboscis, and the basal cells of equal length seem to separate it widely from that genus. Except for the position of the anterior cross-veins and the longer palpi and proboscis, it is near to *Encina*,—hence the generic name.

***Geomyza subdola*, sp. nov. FIG. 11.**

♂, ♀.—Head, antennae, palpi and proboscis yellow; arista brown, pubescent; face yellow; a second pair of small, frontal orbital bristles is present. Thorax yellow, subshining, with fine black hairs and three pairs of dorso-centrals; scutellum yellow, with four bristles; abdomen dark brown, the first and second segments with a very narrow, lighter posterior margin. Legs yellow, halteres white. Wings hyaline, with a brown spot at the end of the second vein, extending from the costa to the third vein; beyond this at the tip of the wing is a whitish spot; costal cells yellow. Length, 2.5 mm.

Four specimens: holotype, Manomet, Massachusetts, July 27, 1905; paratypes, Auburndale, Massachusetts, August 16; Rutland, Massachusetts, July 9, and Dummerston, Vermont, July 14. All collected by the writer and in the collection of the Society.

This species of *Geomyza* is quite distinct, in that it lacks the cloudings on the cross-veins.

Agromyza diversa, sp. nov.

♂, ♀—Front and occiput black, face brown, epistoma and a median raised line yellow; palpi, proboscis and antennae yellow, arista brown and slightly pubescent. Four frontal orbital bristles. Thorax dark yellow, somewhat shining with numerous fine black hairs; the humeri and scutellum light yellow; three dorso-central and one post-acrostical; scutellum with four long bristles. Abdomen yellow or reddish yellow, hypopygium yellow, ovipositor black. Legs and halteres entirely yellow. Wings hyaline. Length 2.5 mm.

Five specimens: holotype and allotype, Chester, Massachusetts, August 9, 1912, and two paratypes, Dummerston, Vermont, July 14, 1908, in the collection of the Boston Society of Natural History; one paratype, Lafayette, Indiana, in the J. M. Aldrich collection, U. S. National Museum.

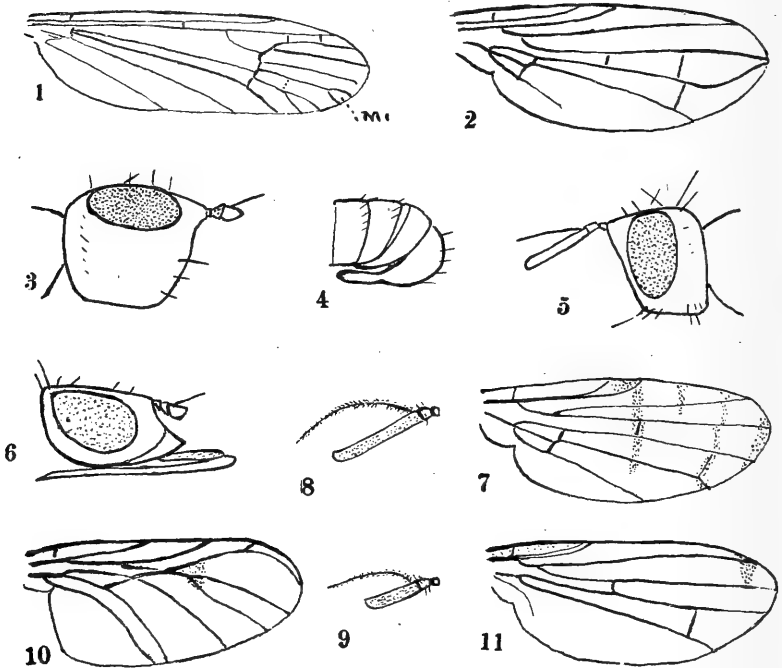


Fig. 1.—Right wing of *Dicranota eucera* O. S., with cell M 1 present.

Fig. 2.—Wing of *Apindps atra* Coq., with a supernumerary cross-vein.

Fig. 3.—Head of *Eugenacephala salsa*, sp. nov.

Fig. 4.—Hypopygium of *E. salsa*, sp. nov.

Fig. 5.—Head of *Micropsetapha* (?) *albifacies*, sp. nov.

Fig. 6.—Head of *Rhynencina longirostris*, sp. nov.

Fig. 7.—Wing of *R. longirostris*, sp. nov.

Fig. 8.—Antenna of *Amphicnephes pullus* Wied.

Fig. 9.—Antenna of *A. pertusus* Loew.

Fig. 10.—Wing of *Macrocera nobilis*, sp. nov.

Fig. 11.—Wing of *Geomyza subdola*, sp. nov.

Occasional Papers
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**THE ASCIDIAN *AMAROUCIUM CONSTELLATUM*
A VALID SPECIES.**

By CASWELL GRAVE.

THE conclusion is reached by Van Name (1910) as the result of his study of *Amaroucium pellucidum* (Leidy, 1855) and *A. constellatum* (Verrill, 1871) (compound ascidians), that they constitute a single species to which Leidy's name, *pellucidum* should be applied. He proposes, however, since the species regularly occurs in two dissimilar forms, that Verrill's species be distinguished as *A. pellucidum*, form *constellatum*.

This conclusion is accepted as valid by Sumner, Osburn and Cole (1913) but, in their report, they list and treat Verrill's species independently of *A. pellucidum* although under the name proposed by Van Name, *A. pellucidum*, form *constellatum*.

In the course of my studies of the tadpole larvae of the ascidians of the Woods Hole region, however, it was noted that the larvae of *A. pellucidum* and of *A. constellatum* differ consistently in size, structure, and behavior and that the differences between them are of a nature and magnitude such as to give them specific value.

The object of this paper is to call attention to these differences in the larval forms of the two species; to differences also in the adult forms; to show that the species *A. constellatum* of Verrill should not be merged with Leidy's *A. pellucidum*; and to emphasize the fact that no species can be completely or satisfactorily described in the absence of a knowledge of its complete life history, especially if a larval form is present. The larval form is just as truly the species as is the adult and in many cases, as in tunicates, parasitic copepods, barnacles and other forms considered to be degenerate, it attains a higher grade of organization than is found in the adult condition.

The observation made by Van Name and by Sumner, Osburn and Cole, that led them to consider *A. constellatum* (Verrill) as a

form only of *A. pellucidum* (Leidy), is that mixed colonies of these two ascidians, such as those shown in the photographs, Plate 3, in which a part of each colony has the appearance characteristic of *A. pellucidum*, the remaining part, or parts, the appearance characteristic of *A. constellatum*, are very frequently taken in the dredge from the sandy and rocky bottoms of Vineyard Sound. Van Name states, (1910, p. 404), "This species [*Amaroucium pellucidum*] exists in two very dissimilar forms, which have been considered distinct species (the typical *A. pellucidum*, and *A. constellatum* Verrill), but which are in reality not even true subspecies, as is shown by some colonies which in one part have the typical *pellucidum* characters, while in the remainder of the colony the *constellatum* characters are equally well developed. There are also specimens in which the whole colony has characters intermediate between the two." "Where the coating of sand is abraded or wanting, the test is seen to be translucent and gelatinous. In such cases, there is a tendency of the lobules to be more or less fused or united, and the specimen then approaches the form *stellatum* . . . in its characters" (*ibid.*, p. 405). "*Amaroucium pellucidum* develops into the typical sand-incrusted form on a sandy bottom only. Where it grows on rocks or piles of wharves, the *constellatum* form develops" (*ibid.*, p. 348).

Having found that typical *A. constellatum* colonies liberate tadpole larvae that are strikingly different from those set free by typical *A. pellucidum* colonies, careful dissections of the two types of lobules present in the mixed colonies were made and, in every case, typical *constellatum* tadpole larvae (Fig. 1, B), were found in the *constellatum* lobules even in cases in which a single lobule only, surrounded by hundreds of *pellucidum* lobules, was present; and typical *pellucidum* tadpole larvae (Fig. 1, A), were invariably found in *pellucidum* lobules. In no case were tadpoles of intermediate characters found and, in this connection, it may be stated that colonies which had characters intermediate between the two species, such as are referred to by Van Name, (1910, p. 404), have not come to my attention although hundreds of colonies of both species have been handled each season for several years. In practically all colonies composed of both *pellucidum* and *constellatum* lobules, the *pellucidum* type predominates, indicating that the *pellucidum* colony is the first to become established and that it forms an object to which *constellatum* tadpole larvae subsequently find place for attachment. In the dissection of mixed

colonies, a continuity of adjacent *pellucidum* lobules can usually be made out, but such continuity between adjacent lobules of the *pellucidum* and *constellatum* types is significantly wanting.

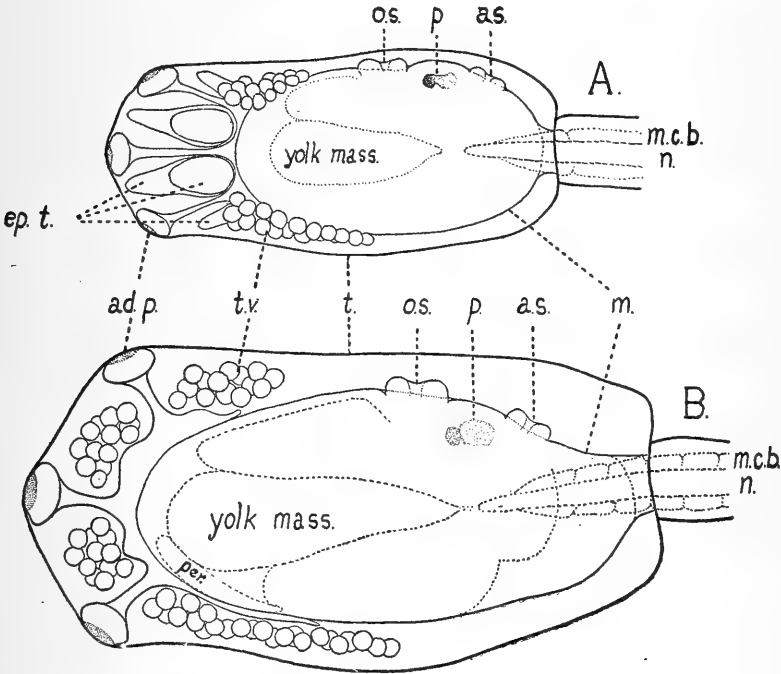


FIG. 1.—Outline sketches of the body portion of the tadpole larvae of *A. pellucidum* (A) and *A. constellatum* (B), drawn to scale with the camera lucida, as seen from the right side, to show differences in size and structure. *a.s.*, atrial siphon; *ad.p.*, adhesive papillae; *ep.t.*, epidermal tubes; *m.*, mantle; *m.c.b.*, muscle-cell bands; *n.*, notocord; *o.s.*, oral siphon; *p.*, pigment spots in sensory vesicle; *per.*, pericardium; *t.*, tunic; *t.v.*, test vesicles.

A considerable number of characters in which there is diversity between the two species are enumerated and contrasted in parallel columns in the tables which follow. Table 1 lists characters peculiar to the larval form. These characters, as differentiated in the larva of *A. constellatum*, have been described and discussed in two papers (Grave, 1920, 1921). The activities and structures of the tadpole larva of *A. pellucidum* form the subject of a paper now in the course of preparation. Table 2 lists characters of the adult colony or ascidio-zooids, as compiled from data published by Verrill, Van Name, and Sumner, Osburn and Cole. In addition to the characters of the two species, enumerated in Table 2, I have

found them to be diverse also in the time at which they liberate free-swimming larvae. In both species a periodicity in this act is manifested (under laboratory conditions) which is more marked and definite in *A. pellucidum* than in *A. constellatum*. Tadpole larvae in great numbers are set free by colonies of both species at, or shortly after sunrise each day during the summer months, but the "daylight swarm" appears definitely later by a few minutes from colonies of *A. pellucidum* than from *A. constellatum*. Colonies of *A. pellucidum* continue, during all hours of the day, to set larvae free in considerable abundance, but colonies of *A. constellatum* liberate very few after the initial swarm at daylight.

Differences of a structural and physiological nature, such as are found not only in the larval, but also in the adult forms of these two species, cannot be regarded as expressions of a dimorphism of a single species, induced by slight imaginable differences in the environment. They are rather to be regarded as the expression of specific differences in genetic constitution. *A. pellucidum* and *A. constellatum* although very nearly related, are both valid species.

TABLE 1.

Characters in which the Tadpole Larvae of A. pellucidum and A. constellatum are Diverse, listed in Parallel Columns.

<i>Character</i>	<i>Amaroucium pellucidum</i>	<i>Amaroucium constellatum</i>
Size of tadpole	1.50 to 1.74 mm. total length 0.48 to 0.54 mm. body length 0.21 to 0.23 mm. body depth	2.25 mm. total length 0.74 to 0.78 mm. body length 0.36 to 0.44 mm. body depth
Color	Pale straw color.	Pale to orange. Varies directly with the color of the parent zoöid.
Test vesicles	Differentiated at two points at beginning of metamorphosis.	Differentiated at four points before liberation from the parent zoöid.
Epidermal tubes	Eight in number, large, conspicuously developed, persistent in the primary zoöid.	None present.
Muscle cells of tail	About 42 muscle cells present, two series (dorsal and ventral) each made up of three longitudinal rows of about seven cells each.	About 160 muscle cells present; two series, each made up of four longitudinal rows of about twenty cells each.
Duration of free-swimming period	30 minutes to 4½ hours or longer.	10 minutes to 100 minutes.
Per cent which undergo metamorphosis, (under laboratory conditions)	46 per cent to 86 per cent (based upon observations of four lots aggregating 857 tadpole larvae).	100 per cent.

TABLE 2.

Characters in which the Colony or Ascidio-zoöid of *A. pellucidum* and *A. constellatum* are Diverse, listed in Parallel Columns.

Character	<i>Amaroucium pellucidum</i>	<i>Amaroucium constellatum</i>
External appearance of colony	Gelatinous test densely and evenly coated with sand.	Gelatinous test smooth and clean.
Size of colonies	160 to 200 mm. in diameter. 70 to 90 mm. in height.	Occasionally 80 mm. in diameter and 30 to 50 mm. in height. Usually 10 to 25 mm. in diameter and 10 to 25 mm. in height.
Lobules	Lobules entirely separate except at bases. Each lobule with a single circular or oval system of zoöids and with a cloacal orifice in the center. 5 to 10 mm. in diameter at the end.	Lobules fused. Systems of zoöids occasionally circular or oval but usually irregular and extensive, their limits difficult to make out.
Size of zoöids	Frequently attaining a length of about 20 to 25 mm. Longer and slenderer than those of <i>A. constellatum</i> .	Average length of about 14 mm.
Color of zoöids	Stomach bright orange-red, other parts inconspicuously colored.	Zoöids orange-yellow. Orifices, siphons and upper part of mantle bright orange or lemon-yellow, branchial sac flesh-colored or pale yellow, sometimes bright orange. Stomach with bright orange-red longitudinal ribs. Intestine light orange.
No. of stigmata	12 to 14 transverse rows.	9 to 11 transverse rows.
Habitat	Not found on piles of wharves.	Common on piles of wharves.
Range	Vineyard Sound to North Carolina.	Gloucester, Massachusetts, to Cold Spring Harbor, New York.

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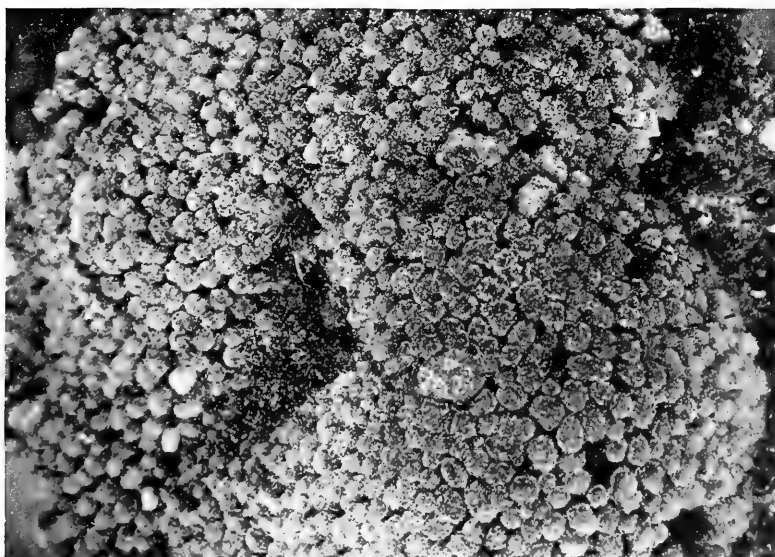
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EXPLANATION OF PLATE 3.

Photographs of mixed colonies of *Amaroucium pellucidum* and *A. constellatum*. Among the sand-encrusted *pellucidum* lobules which make up the general field, *constellatum* masses of various sizes and shapes are found, the position of some of the latter indicated by dotted lines.

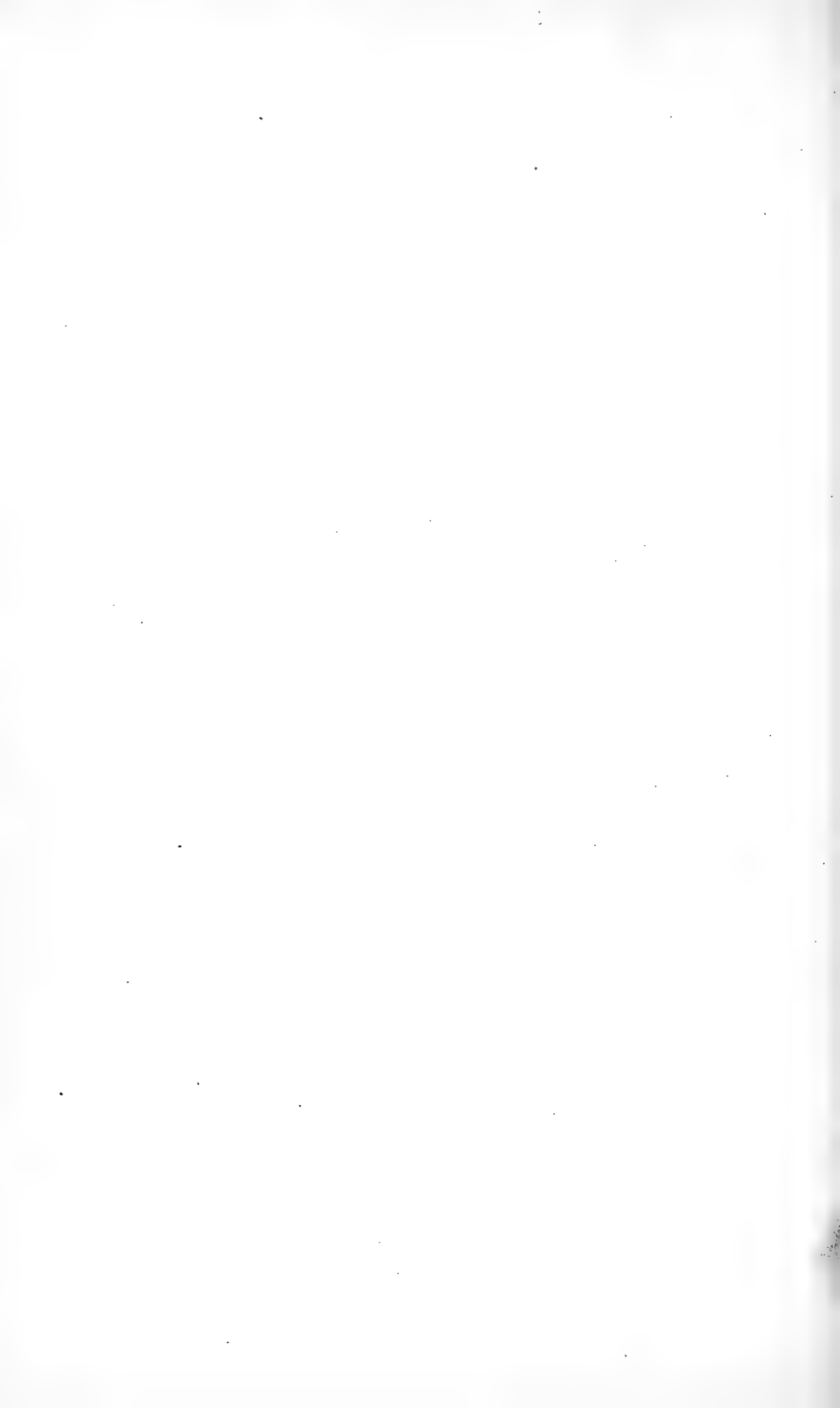


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GRAVE ON AMAROUCIUM.



Occasional Papers

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NEW BEES OF THE GENUS *ANDRENA*.

BY HENRY L. VIERECK.
U. S. Biological Survey.

IN ORDER, at this time, to identify some species of *Andrena* for my friend, Mr. Charles W. Johnson, I submit the following descriptions and drawings in advance of my still uncompleted monograph of Pan-American *Andrena*.

Andrena (Andrena) tumida, new species.

Type. — Boston Society of Natural History.

Type locality. — Echo Lake, Mt. Desert, Maine, July 12, 1918 (C. W. Johnson).

Has characters in common with *A. (A.) bisalicis* Viereck.

Female. — Length 9 mm.; body black, mostly covered with pale-ochreous hairs; head with its facial line : transfacial line :: 56 : 65; axial line : temporal line :: 29 : 17; malar line : joint 3 of antennae :: 2 : 9; elevated portion of malar space distinctly shorter than the depressed portion; ocellocipital line : greatest diameter of lateral ocellus :: 3 : 5; head covered with pale-ochreous hairs, front distinctly longitudinally striate, not elevated into a welt along the fovea; fovea at most : ocellocular line :: 8 : 12; distance between fovea and ocelli : ocellocular line :: 3 : 12; foveal band at upper end of inner eye-margin represented by a shiny line, fovea attenuated below and continued to a point apparently a little below the antennal line; fovea filled with golden hairs that in some lights appear whitish, face nearly polished, indistinctly reticulate, with shallow punctures that are as many as four puncture-widths apart; clypeus distinctly elevated above the apical margin, abnormally convex, partly polished, its punctures larger, well defined and closer; clypearea present on the lower half, wide, clypeus thinly hairy, its sculpture not at all hidden by hairs; labrarea truncate, its width at base : length down the middle :: 12 : 5; width at apex : length down the middle :: 4 : 5; labrarea at base : distance between lower corners of clypeus :: 12 : 20; labrum with a fringe of dark-golden hairs, labrum without a median longitudinal crista between its apical edge and the labrarea; joint 3 of antennae : 4+5 :: 8.5 : 8; joints 4 and 5 thicker than long, the succeeding joints from as long as thick to a little longer than thick except joint 12 which is distinctly longer than thick; antennae blackish throughout; mandibles atypical, robust, extending to the outer edge of the labrarea, black except for the apical fourth and inner edge which are more or less reddish; palpi nearly typical; thorax covered with an abundance of pale-ochreous hairs which are shorter on the dorsulum than on the mesopleurae, dorsulum shiny, finely reticulated and punctured much like the face but denser; notauli represented by an impressed shining line; hairs of mesopleurae and dorsulum concolorous, mesopleurae sculptured somewhat like the dorsulum but not so closely or distinctly punctured; scutell hairy and sculptured much like the dorsulum but more shiny, its punctures sparse laterally, dense down the middle; metanotum hairy like the dorsulum,

densely sculptured; tegulae dark stramineous, polished, wing base partly blackish brown; subcosta blackish brown, stigma brownish stramineous, rest of veins dull stramineous, membrane with a uniform brownish tinge; legs blackish except for small joints of the tarsi and hind metatarsi which are more or less dark brown; legs covered with golden hairs; scopa typical, its hairs concolorous, pale golden, hairs at base above decidedly darkened; hind metatarsi at most apparently a little wider than mid-metatarsi; propodeum with its enclosure poorly defined, shiny and finely reticulated, except for a basal triangular portion which is wrinkled; rest of upper face of propodeum finely reticulated and with rather closely arranged shallow punctures, and covered with fine, pale, ochreous hair; propodeal pleurae shiny, finely reticulated and with sparse shallow punctures; abdomen with its tergum shining and sculptured much like the propodeal pleurae but with smaller, better-defined, closer punctures, the punctures from three to six or more puncture-widths apart on the first tergite, the punctures hardly closer on the succeeding tergites; second, third and fourth tergites with a thin apical, whitish hair-band that is interrupted in the middle; apical edge of first, second, third and fourth tergites with a stramineous border; second tergite with its elevated portion down the middle : depressed portion presumably :: 20 : 10; fifth tergite shining, reticulate, its punctures closer and larger than on the other tergites; pygidium nearly pointed at apex; tergum with inconspicuous, pale, nearly erect hairs in addition to the hair-bands; fimbria dark brown, appearing blackish.

Male. — Length 8 mm.; body black, mostly covered with whitish hair; head with its facial line : transfacial line :: 56 : 64; axial line : temporal line :: 29 : 12; temples rounded, nearly trapezoidal; malar line : joint 3 of antennae :: 2 : 8; elevated portion of malar space down its middle much shorter than the depressed portion, head covered with hairs that are concolorous with the remaining body hairs; front striato-punctate, shiny except below where it is not striate but dullish punctate to the shiny, hairless near-fovea along the eye-margin; ocellular line : ocelloccipital line :: 12 : 5; face as in the female, clypeo-antennal area finely wrinkled, supraclypeal area shallowly striato-punctate; clypeus convex and sculptured nearly as in the female, sculpture of the clypeus not hidden by the moustache; labrarea broad, truncate, polished; its width at base : greatest length :: 7 : 4; width at apex : length down the middle :: 5 : 4; labrarea at base : distance between lower corners of clypeus :: 7 : 15; labrum with a fringe of pale hairs laterally; joint 3 of antennae : joint 4 :: 9 : 5; joint 4 and following joints from a little more than one and one-half times as long as thick to nearly twice as long as thick up to the ninth joint, the succeeding joints shorter than the eighth joint; antennae dullish; flagel almost straight in outline; antennae blackish throughout; mandible atypical, rather heavy, extending to the outer edge of the labrum and nearly to end of the basal half of its fellow, black except for the apical fourth which is mostly dull, dark reddish; palpi nearly typical; thorax covered with an abundance of whitish hairs; hairs of dorsulum not much shorter than hair of mesopleurae; dorsulum shiny, finely reticulated and closely punctured, the punctures distinct and from nearly adjoining to three puncture-widths apart, mostly nearly adjoining or not more than two puncture-widths apart; notauli represented by a shining line; mesopleurae shiny, with whitish hairs throughout, finely reticulated and mostly covered with adjoining or nearly adjoining shallow pits; scutel hairy and sculptured much like the dorsulum; metanotum hairy and sculptured much like the dorsulum except that the sculpture is denser; tegulae brownish stramineous, partly polished, mostly closely punctured; wing base mostly pale stramineous, partly blackish, subcosta blackish, stigma brownish stramineous, membrane uniformly tinged with brown; legs blackish brown, excepting the tarsi which are rather dark brown; legs mostly covered with whitish hairs; hind metatarsi at most hardly wider than mid-metatarsi and nearly half as wide as hind tibiae at apex of the latter; propodeum with its enclosure poorly defined,

with irregular rugae on basal half, finely reticulated on apical half, rounded off at apex, rest of upper face sculptured somewhat like the mesopleurae but with smaller pits and covered with concolorous hair; propodeal pleurae finely reticulate, sparsely indistinctly punctured, propodeal floccus whitish; abdomen with its tergum shining, almost polished, partly finely reticulated, distinctly punctured, the punctures mostly three or four puncture-widths apart; first tergite with erect whitish hairs, second and third tergites with shorter, reclinate, whitish hairs; second tergite with its elevated portion down the middle : depressed portion presumably :: 21 : 6; third and fourth tergites with whitish reclinate hairs on the elevated portion; exposed portion of sixth and seventh tergites with a stramineous margin; seventh and eighth sternites as in the figures of these parts; tergum not conspicuously banded, appearing bandless, with rather inconspicuous hairs that are supplemented on the sides of the second, third and fourth tergites by thin ochreous hair; hair at apex of abdomen whitish or pale ochreous; cardo finely reticulated; hypopygium mostly dark brownish; lingam and end of stipes pale stramineous.

Other localities. — One female, Colebrook, Connecticut, June 8 to 11, 1911 (W. M. Wheeler). One female, Bretton Woods, New Hampshire, June 24, 1913 (C. W. Johnson).

Allotopotype. — Boston Society of Natural History, with the same data as the type.

Presumably related to *A. (A.) fragariana* Graenicher.

***Andrena (Andrena) adelae*, new species.**

Type locality. — Chevy Chase, Maryland, April 22, 1919 (Pearce Davis). Related to *A. (A.) tumida* Viereck.

Female. — Length 9 mm.; body black, mostly covered with pale-ochreous, almost white hairs; head with its facial line : transfacial line :: 52 : 64; axial line : temporal line :: 26 : 15; elevated portion of malar space shorter than depressed portion; malar line : joint 3 of antennae :: 2 : 8; ocelloccipital line : greatest diameter of lateral ocellus :: 4 : 4; head covered with whitish hairs, front rather longitudinally sculptured, almost reticulate, not elevated into a welt along the fovea; fovea at most : ocellocular line :: 7 : 12; distance between fovea and ocelli : ocellocular line :: 5 : 12; foveal band poorly developed, not present at upper end of the inner eye-margin; fovea attenuated toward its lower end which is apparently a little below the clypeal line, fovea filled with pale-ochreous hairs; face mostly shiny, partly finely reticulate, with rather indefinite punctures that are apparently well separated; clypeus convex, sculptured like the face except that the punctures are larger and well defined; clypearea represented by sparser puncturation down the middle of the clypeus, the latter thinly hairy, its sculpture not at all hidden by hairs; labrarea truncate, its width at base : length down the middle :: 10 : 3; width at apex : length down the middle :: 5 : 3; labrum with a fringe of golden hairs and with a poorly developed median longitudinal elevated line between the labrarea and apical edge of labrum; joint 3 of antennae : 4+5 :: 8 : 9; joints 4 and 5 thicker than long, the succeeding joints as thick as long or little longer than thick except joint 12 which is distinctly longer than thick; antennae blackish throughout; mandibles atypical, robust, extending to the outer edge of the labrarea, black except for the apical fourth and inner edge which are clear dark reddish; palpi nearly typical; thorax covered with an abundance of pale-ochreous, almost white hairs which are shorter on the dorsulum than on the mesopleurae; dorsulum dullish, finely reticulated and punctured like the face but more distinctly so and not so shiny; notauli represented by a shining line; mesopleurae with almost whitish hairs, sculptured somewhat like the dorsulum but not so closely or distinctly punctured; scutel hairy and sculptured much like the dorsulum, except that its disc is more shiny; metanotum hairy and sculptured like the dorsulum except that the sculpture

is denser and less distinct; tegulae pale brownish, polished; wing base partly blackish brown; subcosta brownish, stigma and rest of veins yellowish stramineous, membrane nearly colorless; legs blackish except for the tarsi and hind tibiae which are more or less dark brown, legs covered with pale golden hairs; scopa typical, its hairs uniformly yellowish golden even at base above; hind metatarsi at most, apparently, a little narrower than mid-metatarsi; propodeum with its enclosure defined, dullish and finely reticulated, rest of upper face of propodeum sculptured somewhat like the mesopleurae but with smaller punctures, and covered with finer pale-ochreous hair; propodeal pleurae with sparse shallow punctures, floccus ochreous; abdomen with its tergum shining and sculptured much like the face, the punctures poorly defined and wide apart; second, third and fourth tergites without an apical, whitish hair-band but with a thin fringe of pale hairs; apical edge of first, second, third and fourth tergites with a brownish stramineous border; second tergite with its elevated portion down the middle : depressed portion :: 14 : 7; fifth tergite shining, reticulate, its punctures coarse and closer together than on the other tergites; pygidium with a finely sculptured, triangular embossed area bounded by flat margin, nearly pointed at apex; tergum with inconspicuous, pale, nearly erect hairs; fimbria and end of abdomen with brownish-golden hair.

***Andrena (Andrena) albisigna*, new species.**

Type. — Boston Society of Natural History.

Type locality. — Mt. Washington, New Hampshire, 2,000 to 4,000 feet, July 6, 1914 (C. W. Johnson).

Could be confused with *A. (A.) adela*e Viereck, and closely resembles *A. (A.) novae angliae* Viereck.

Female. — Length 9 mm.; body black, abdomen seemingly tinged with green, mostly covered with pale-ochreous, almost white hairs; head with its facial line : transfacial line :: 50 : 57; axial line : temporal line :: 23 : 15; malar line : joint 3 of antennae :: 2 : 8; elevated portion of malar space distinctly shorter than depressed portion; ocelloccipital line : greatest diameter of lateral ocellus :: 3 : 4; head covered with pale-ochreous hairs, front rather definitely, longitudinally sculptured, not elevated into a welt along the fovea; fovea at most : ocellocular line :: 7 : 10; distance between fovea and ocelli : ocellocular line :: 3 : 10; foveal band present and at upper end of the inner eye-margin : ocellocular line nearly :: 1 : 10; fovea attenuated toward its lower end which is at a point apparently half-way between the clypeal line and the antennal line; fovea filled with pale yellowish-golden hairs; face nearly polished, indistinctly reticulate, with distinct punctures that are as many as four puncture-widths apart; clypeus slightly elevated above the apical margin, convex, sculptured like the face except that the disc is polished and the punctures are larger and better defined; clypearea present but poorly defined, clypeus thinly hairy, its sculpture not at all hidden by hairs; labrarea truncate, its width at base : length down the middle :: 12 : 5; width at apex : greatest length :: 4 : 5; labrarea at base : distance between lower corners of clypeus :: 12 : 18; labrum with a fringe of golden hairs, labrum without a suggestion of a median longitudinal crista but polished between the labrarea and apical edge of labrum; joint 3 of antennae : 4+5 :: 8 : 6; joints 4 and 5 thicker than long, the succeeding joints from a little longer than thick to nearly twice as long as thick in the end joint; antennae blackish throughout; mandibles atypical, robust, extending to the outer edge of the labrarea, black except for the apical fourth and inner edge which are clear dark reddish; palpi nearly typical; thorax covered with an abundance of pale-ochreous, almost white hairs which are shorter on the dorsulum than the hairs on the mesopleurae; dorsulum dullish, finely reticulated and punctured like the face but more distinctly and closely; notauli represented by a shining line; mesopleurae sculptured somewhat like the dorsulum but not so closely or distinctly punctured; scutel, except on its edges, hairy and sculptured much like the dorsulum but more shiny and partly almost polished; metanotum

hairy like the mesopleurae, its sculpture denser and less distinct than that of the dorsulum; tegulae brownish stramineous, almost polished, wing-base partly blackish brown; subcosta blackish brown, stigma and other veins pale brownish stramineous, membrane uniformly yellowish; legs blackish except for the small joints of the tarsi which are more or less stramineous, legs covered with brownish-golden and ochreous hairs; scopa typical, its hairs pale yellowish golden except at base above where they are brownish, hairs at base above decidedly darkened; hind metatarsi at most apparently a little narrower than mid-metatarsi; propodeum with its enclosure poorly defined, dullish and finely reticulated, its basal half with rather distinct rugae; rest of upper face of propodeum sculptured somewhat like the mesopleurae and covered with finer pale-ochreous hair; propodeal pleurae finely reticulated and with sparse shallow punctures; abdomen with its tergum shining, finely reticulated and sparsely, indistinctly punctured, the punctures from two to six or more puncture-widths apart on the first tergite, the punctures hardly closer on the succeeding tergites; second, third and fourth tergites subfasciate laterally, apical edge of first, second, third and fourth tergites with a stramineous border; second tergite with its elevated portion down the middle: depressed portion :: 17 : 6; fifth tergite shining, reticulate, its punctures more distinct than on the other tergites; pygidium convex at the end where it is nearly pointed; tergum with inconspicuous pale hairs; fimbria brownish golden.

***Andrena (Andrena) lata*, new species.**

Type. — Boston Society of Natural History.

Type locality. — Bar Harbor, Maine, June 8 (C. W. Johnson).

Has characters in common with *A. (A.) xanthostigmā* Viereck. Named *lata* on account of the broad foveae. In the sculpture of the clypeus, shape of the labrarea, sculpture of propodeum and abdomen there is so much resemblance between this species and *A. vulgaris* Viereck that I would not be surprised if they should prove to be sexes of the same species.

Female. — Length 9 mm.; body black, mostly covered with pale-ochreous, almost white hairs; head with its facial line : transfacial line :: 55 : 67; axial line : temporal line :: 27 : 18; malar line : joint 3 of antennae :: 2 : 9; elevated portion of malar space virtually wanting; ocellocipital line : greatest diameter of lateral ocellus :: 4 : 4; head covered with pale-ochreous hairs, front rather indistinctly longitudinally sculptured, not elevated into a welt along the fovea; fovea at most : ocellocular line :: 10 : 14; distance between fovea and ocelli : ocellocular line :: 4 : 14; foveal band wanting at upper end of the inner eye-margin, fovea typical, attenuated below its middle, and continued to a point apparently on the clypeal line; fovea filled with pale-ochreous hairs; hairs of vertex and temples along the upper edge of the eye ochreous; face mostly finely reticulate, with rather indistinct punctures that are as many as three or more puncture-widths apart; clypeus slightly elevated above the apical margin, convex, sculptured like the face except that the punctures are larger, better defined and closer together; clypearea wanting; clypeus thinly hairy, its sculpture not at all hidden by hairs; labrarea sub-emarginate, its width at base : length down the middle :: 12 : 3; width at apex : greatest length :: 6 : 4; labrarea at base : distance between lower corners of clypeus :: 12 : 20; labrum with a fringe of brownish-golden hairs, but with barely a suggestion of a median longitudinal crista between the labrarea and apical edge of labrum; joint 3 of antennae : 4+5 :: 9 : 8; joints 4 and 5 thicker than long, the succeeding joints as thick as long or longer than thick except joint 12 which is nearly twice as long as thick; antennae blackish throughout; mandibles atypical, robust, extending to the outer edge of the labrarea, black except for the apical fourth and inner edge which are clear dark reddish; palpi nearly typical; thorax covered with an abundance of pale-ochreous, almost white hairs which are shorter on the dorsulum where they are darker than the almost whitish hairs on the mesopleurae; anterior

edge of pronotum black; dorsulum dullish, finely reticulated, its punctures larger and sparser than on the face; notauli represented by a shining line; mesopleurae sculptured somewhat like the dorsulum but not so sparsely or distinctly punctured; scutel hairy and sculptured much like the dorsulum, except that the hairs are longer and coarser on the edges; metanotum hairy like the hind edge of the scutel, its sculpture dense and rather indefinite; tegulae brownish, nearly polished, wing-base partly dark brownish, subcosta blackish brown, stigma and other veins brownish stramineous, membrane uniformly tinged with brown; legs blackish except for the small tarsi beyond the metatarsi which are more or less dark brown, legs covered with brownish-golden and ochreous hairs; scopa typical, its hairs pale golden except at base above where they are dark brownish; hind metatarsi at most apparently a little narrower than mid-metatarsi; propodeum, with its enclosure, distinguishable from the adjoining region only by its hairlessness, dullish and finely reticulated, rest of upper face of propodeum sculptured somewhat like the metanotum but not so densely, and covered with finer pale-ochreous hair; propodeal pleurae finely reticulated and with sparse shallow punctures; floccus pale ochreous; abdomen with its tergum shining, faintly greenish, nearly polished, finely reticulate and with sparse, fine, inconspicuous punctures from two to six or more puncture-widths apart on the first tergite, the punctures hardly closer on the succeeding tergites; second, third and fourth tergites without an apical, whitish hair-band; apical edge of first, second, third and fourth tergites with a stramineous border; second tergite with its elevated portion down the middle : depressed portion :: 15:8; fifth tergite dullish reticulate, its punctures coarser, more sharply defined and closer together than on the other tergites; pygidium nearly planate, with a slightly elevated, triangular embossed area, the end of which is flush with the elevated end of the pygidium; tergum with inconspicuous hairs that are ochreous on the first and second tergites and brownish on the third and fourth tergites except for a fringe of pale hairs at base and apex of the usually exposed parts of the third and fourth tergites; anal fimbria pale brownish golden; end of tergite with a dense brush of darker brownish hairs on each side.

In a paratopotype caught June 14 by C. W. Johnson the enclosure is defined on one side by a delicate raised line.

***Andrena (Andrena) vulgaris*, new species.**

Type. — Boston Society of Natural History.

Type locality. — Halfway House, Mt. Washington, New Hampshire, June 13, 1917 (C. W. Johnson).

Related to *A. (A.) wheeleri* Graenicher.

Male. — Length 7 mm.; body black, mostly covered with whitish hair; head with its facial line : transfacial line :: 42 : 54; axial line : temporal line :: 23 : 13; temples rounded, almost trapezoidal in outline; malar line : joint 3 of antennae :: 1 : 6; elevated portion of malar space down its middle shorter than the depressed portion, virtually wanting; head covered with white hairs throughout; front indistinctly punctured, dullish, reticulated and with fine, longitudinal carinae; ocellular line : ocelloccipital line :: 12 : 4; face shining, distinctly punctured, its punctures from one to three puncture-widths apart; clypeus convex, elevated above the apical margin, more distinctly and closely punctured than the face; clypearea wanting, barely represented by sparser puncturation down the middle; sculpture of the clypeus not hidden by the moustache; labrarea with a broad, rounded, shallow emargination, polished, its width at base : greatest length :: 8 : 2; width at apex : length down the middle :: 6 : 1.5; labrarea at base : distance between lower corners of clypeus :: 8 : 14; labrum with a fringe of whitish hairs; joint 3 of antennae : 4 :: 6 : 5; joint 4 and following joints from as long as thick to one and one-half times as long as thick, dullish; flagel almost straight in outline; antennae blackish throughout; mandibles atypical, robust, extending barely beyond

the outer edge of the labrarea and nearly to end of the middle of its fellow, black except for the apical fourth which is dull dark reddish; palpi nearly typical; thorax covered with an abundance of pale-ochreous or what could be called whitish hairs, hairs of dorsulum seemingly shorter than hair of mesopleurae; dorsulum dullish, finely reticulated and sparsely punctured, the punctures indistinct and from two to five or more puncture-widths apart, mostly the latter; notauli represented by a shining line; mesopleurae dullish with pale-ochreous, virtually whitish hairs throughout, finely reticulated and mostly covered with ill-defined shallow pits, that are mostly two or more pit-widths apart; scutell hairy and sculptured much like the dorsulum except that the sculpture is not so dense and the hairs are apparently as long as on the mesopleurae; metanotum hairy and sculptured like the dorsulum except that the sculpture is denser; tegulae dark brownish, polished; wing-base partly dark brownish, subcosta blackish, stigma and remaining veins yellowish stramineous, membrane yellowish; legs blackish excepting most of the small joints of the tarsi which are brownish stramineous, legs covered with pale-ochreous, almost whitish hairs; hind metatarsi at most hardly wider than mid-metatarsi and nearly half as wide as hind tibiae at apex of the latter; propodeum with its enclosure defined by a fine raised line, with irregular rugae on basal half, finely reticulated on apical half, rounded off at apex, rest of upper face sculptured somewhat like the mesopleurae but with smaller pits and covered with pale-ochreous hair; propodeal pleurae finely reticulated, their pits far apart; floccus pale ochreous; abdomen with its tergum shining, finely reticulated and indistinctly punctured, the punctures indistinct and mostly many puncture-widths apart; first tergite with erect pale-ochreous, virtually whitish hairs; second and third tergites with inconspicuous, sparse, appressed, ochreous hairs, second tergite with its elevated portion down the middle: depressed portion :: 13 : 6; apical margin of second tergite on left side near the middle abnormally slightly emarginate; third and fourth tergites sculptured and hairy much like the second tergite; fifth tergite sculptured and hairy much like the preceding tergite; tergites with an apical, pale, stramineous edge; seventh and eighth sternites as in the figures of these parts; tergum without well-defined hair-bands; hair at apex of abdomen of a golden hue; cardo shiny, finely reticulated, apically depressed; stipes at base near the middle of the cardo beveled; stipes polished, partly dark brownish, apical half of stipes and all of exposed portion of lingam nearly concolorous and pale stramineous.

***Andrena (Andrena) media*, new species.**

Type. — Boston Society of Natural History.

Type locality. — Glen House, Green Grant, New Hampshire, June 14, 1916 (C. W. Johnson).

Has characters in common with *A. (A.) hemileuca* Viereck and is closely related to *A. (A.) durangoensis* V. & C. as is evident through a comparison of the heads, hypopygia, lingams and seventh and eighth sternites.

Male. — Length 8.5 mm.; body black, mostly covered with ochreous hair; head with its facial line : transfacial line :: 50 : 61; axial line : temporal line :: 20 : 29; temples produced, as in the accompanying figure; malar line : joint 3 of antennae :: 3 : 7; elevated portion of malar space down its middle shorter than the depressed portion; head covered with ochreous hairs throughout, and on front indistinctly punctured, dullish, finely reticulated and with fine longitudinal carinae; front along eye-margin nearly sculptureless; ocellular line : ocellocapital line :: 15 : 5; face shining, distinctly punctured, its punctures from adjoining to three puncture-widths apart and in part, nearly hidden by the hairs; clypeus nearly convex except for being flattened down the middle, not elevated above the middle of the apical margin; clypearea virtually wanting, represented by sparser puncturation down the middle of the clypeus, sculpture of the clypeus not hidden by the moustache; labrarea with a broad rounded emargination, polished, its width at base : greatest

length : : 9 : 2; width at apex : length down the middle : : 6 : 1.5; labrarea at base : distance between lower corners of clypeus : : 9 : 15; labrum with a fringe of pale-golden hairs; joint 3 of antennae : 4 : : 7 : 7; joint 4 and following joints from twice as long as thick to, in the penultimate joint, nearly twice as long as thick; end joint a little more than twice as long as thick; flagel dullish, almost straight in outline; antennae blackish throughout; mandible nearly typical, rather slender, extending beyond the outer edge of the labrum, and nearly to end of the basal third of its fellow, black except for the apical fourth which is dull, dark reddish; palpi nearly typical; thorax covered with an abundance of darker ochreous hairs than head; hairs of dorsulum shorter than hair of mesopleurae; dorsulum dullish, finely reticulated and sparsely punctured, the punctures indistinct and from two to five or more puncture-widths apart, mostly the latter; notauli represented by a shining line; mesopleurae dullish with pale-ochreous hairs throughout, finely reticulated and mostly covered with shallow pits, that are mostly three or more pit-widths apart; scutel with longer hair and sparser sculpture than the dorsulum; metanotum hairy like the scutel, more densely sculptured than the dorsulum; tegulae dark brown, polished; wing-base mostly pale stramineous, subcosta blackish, stigma and other veins pale stramineous, membrane uniformly tinged with brown; legs blackish excepting the tarsi which are rather dark brown, legs covered with ochreous hairs; hind metatarsi at most hardly wider than mid-metatarsi and nearly half as wide as hind tibiae at apex of the latter; propodeum with its enclosure poorly defined, with irregular weak rugae at basal edge, finely reticulated elsewhere, rounded off at apex, rest of upper face sculptured somewhat like the mesopleurae but dullish and with closer pits and covered with ochreous hair; propodeal pleurae sculptured apparently like the remainder of the propodeum outside of the enclosure; abdomen with its tergum shining, almost polished, finely reticulated and indistinctly punctured, the punctures mostly four or more puncture-widths apart; first tergite with erect pale-ochreous hairs, second and following tergites with appressed sparsely distributed ochreous hairs; second tergite with its elevated portion down the middle : depressed portion : : 17 : 6; fifth tergite with its basal blackish portion covered with poorly defined punctures that are as many as four or more puncture-widths apart, rest of fifth tergite and exposed portion of sixth and seventh tergites with a stramineous margin; seventh and eighth sternites as in the figures of these parts; tergum with rather inconspicuous hairs that are not supplemented by conspicuous hair-bands; hair at apex of abdomen of a golden hue; cardo finely sculptured; rest of hypopygium mostly polished; apical half of stipes mostly pale stramineous.

In a male paratype from Mt. Washington, New Hampshire, Tuckerman's Ravine, July 8, 1914 (C. W. Johnson), the cheeks are simpler so that the production found in the type is barely outlined; otherwise this paratype seems to agree throughout with the type.

***Andrena* (*Scrapteropsis*) *fenningeri*, new species.**

Andrena imitatrix fenningeri Pierce, *nomen nudum*, Proc. U. S. Nat. Mus., vol. 54, p. 492, 1918.

Type locality. — Mount Vernon, Virginia, April 16, 1916, *Salix sericea* (A. Wetmore).

Related to *A. (S.) imitatrix* Cresson.

Female. — Length 10 mm.; body black, mostly covered with pale-ochreous almost white hairs; head with its facial line : transfacial line : : 55 : 73; axial line : temporal line : : 29 : 17; malar line : joint 3 of antennae : : 1 : 7; ocell-occipital line : greatest diameter of lateral ocellus : : 3 : 5; elevated portion of malar space nearly as long as depressed portion; head covered with whitish hairs; front rather distinctly longitudinally striate, not elevated into a welt

along the fovea; fovea at most : ocellocular line : : 12 : 13; foveal band wanting; distance between fovea and ocelli : ocellocular line : : 3 : 13; fovea attenuated below its middle where it is apparently only one-half or a little more than half as wide as the greatest width of the fovea, the latter continued to a point apparently on the clypeal line; fovea filled with pale-ochreous hairs; hairs of vertex and temples concolorous with those of the face, face mostly polished, partly indistinctly reticulate, with distinct punctures that are mostly adjoining or nearly so and at most three puncture-widths apart; clypeus slightly elevated above the apical margin, convex, sculptured like the face except that the punctures are larger; clypearea present and well defined though narrow; clypeus thinly hairy, its sculpture not at all hidden by hairs; labrarea truncate, its width at base : length down the middle : : 9 : 4; width at apex : length down the middle : : 4 : 4; labrum with a fringe of golden hairs, labrum without a median longitudinal crista between the labrarea and apical edge of labrum; joint 3 of antennae : 4 + 5 : : 7 : 8; joints 4 and 5 thicker than long, the succeeding joints as thick as long or little longer than thick except joint 12 which is distinctly longer than thick; antennae blackish throughout; mandibles atypical, robust, extending to the outer edge of the labrarea, black except for the apical fourth and inner edge which are at least partly clear dark reddish; palpi nearly typical; thorax covered with an abundance of pale-ochreous almost white hairs which are shorter on the dorsulum than on the mesopleurae; dorsulum dullish, finely reticulated and more distinctly punctured than the face; notauli represented by an impressed shining line; mesopleurae with whitish hairs, appearing rugulose, its punctures adjoining; scutel hairy, polished but punctured much like the dorsulum; metanotum with whitish hairs sculptured differently from the rest of the thorax, densely punctured; tegulae brownish stramineous, polished; wing-base partly dark brown; subcosta blackish brown, stigma dark brownish stramineous, rest of veins not as dark as the stigma, membrane with a uniform brownish tinge; legs blackish except for the small joints of the tarsi and hind metatarsi which are more or less dark brown, legs covered with brownish and whitish hairs; scopa typical, its hairs almost white, except at base above where they are dark brownish; hind metatarsi at most apparently as wide as the mid-metatarsi; propodeum with its enclosure well defined, shiny, finely reticulated and coarsely irregularly ridged; rest of upper face of propodeum sculptured somewhat like the mesopleurae and covered with similar whitish hair; propodeal pleurae partly dullish, partly shiny, finely reticulated and with rather indistinct scattered shallow punctures; flocus whitish; abdomen not banded, with its tergum shining, finely reticulated, punctured, its punctures smaller and closer on the elevated portion than on the depressed portion, the punctures adjoining or nearly adjoining on the first tergite, hardly closer on the elevated portion of the succeeding tergite; third and fourth tergites with the elevated portion less closely punctured, apical edge of first, second, third and fourth tergites with a brownish border; second tergite with its elevated portion down the middle : depressed portion : : 15 : 11; fifth tergite shining, sculptured much like the propodeal pleurae except that the punctures are more obvious and closer; pygidium with an embossed, reticulated, triangular area bounded by a smooth depressed margin, truncate at apex; tergum with inconspicuous, pale, nearly erect hairs; fimbria dull golden.

Allotopotype. — April 22, 1917, plum flowers (W. L. McAtee).

Related to *A. (S.) alleghaniensis* Viereck.

Male. — Length 8 mm.; body black, mostly covered with whitish hair; head with its facial line : transfacial line : : 48 : 61; axial line : temporal line : : 26 : 16; temples simple, rounded; malar line : joint 3 of antennae : : 1 : 5; elevated portion of malar space wanting; hairs of head concolorous; front indistinctly punctured, shiny and finely longitudinally striate; ocellocular line : ocellocephal line : : 13 : 4; face shining, distinctly punctured, its

punctures adjoining or nearly so; clypeus convex, more shining and more distinctly punctured than the face, slightly elevated directly above the apical margin; clypearea wanting; sculpture of the clypeus not hidden by the moustache; labraea with a broad rounded emargination, polished, its width at base : greatest length : : 9 : 4; width at apex : length down the middle : : 5 : 3; labrum with a fringe of pale-ochreous almost white hairs; joint 3 of antennae : 4 : : 5 : 6; joint 5 and succeeding joints from a little longer than thick to as long as thick except for the apical joint which is nearly twice as long as thick, dullish; flagel almost moniliform in outline; antennae blackish throughout; mandible atypical, rather robust, extending beyond the outer edge of the labrum and nearly to end of the basal third of its fellow, black except for the apical fourth which is dull reddish; palpi nearly typical; thorax covered with an abundance of whitish hairs; hairs of dorsulum shorter than hairs of mesopleurae; dorsulum dullish, finely reticulated and sparsely punctured, the punctures shallow and from two to five or more puncture-widths apart; notauli represented by an impressed shining line; mesopleurae dullish with whitish hairs throughout, finely reticulated and covered with shallow pits that are close together and poorly defined; scutel hairy and sculptured like the dorsulum; metanotum hairy and sculptured like the dorsulum except that the sculpture is not so dense, anterior edge nearly polished; tegulae brownish stramineous; subcosta brownish, concolorous with the stigma, membrane uniformly tinged with brown; legs blackish except the small joints of the tarsi and hind metatarsi which are rather dark brown; legs covered with whitish hairs; hind metatarsi wider than mid-metatarsi and a little more than half as wide as hind tibiae at apex of the latter; propodeum with its enclosure well defined, with irregular ridges, finely reticulated, rounded off at apex, rest of upper face densely sculptured and with poorly developed rugae and covered with whitish hair; propodeal pleurae sculptured apparently as in the female, uniformly covered with whitish hairs; abdomen not fasciate, with its tergum shining, almost polished, finely reticulated and distinctly punctured, the punctures mostly three or four puncture-widths apart; first tergite with some erect whitish hairs, second and third tergites with nearly appressed whitish hairs; second tergite with its elevated portion down the middle : depressed portion : : 14 : 9; third and fourth tergites hairy like the second and third tergites; fifth tergite with its basal blackish portion covered with poorly defined punctures that are as many as four puncture-widths apart; rest of fifth tergite and exposed portion of sixth and seventh tergites with a brownish-stramineous margin; seventh and eighth sternites as in the figures of these parts; rest of tergum with longer hairs than the preceding; hair at apex of abdomen of a pale golden hue; sixth sternite reflexed at apex, seventh and eighth sternites as in the figures of these parts herewith and nearly as in *claytoniae*; genitalia tangibly different from the latter; cardo faintly sculptured, nearly polished, apically depressed much as in *A. vulgaris* Viereck; stipes basally beveled much as in the preceding species; cardo pale stramineous; lingam virtually concolorous with cardo; ends of stipes paler stramineous than cardo; rest of hypopygium mostly dark brownish.

The following records are from the paratypes.

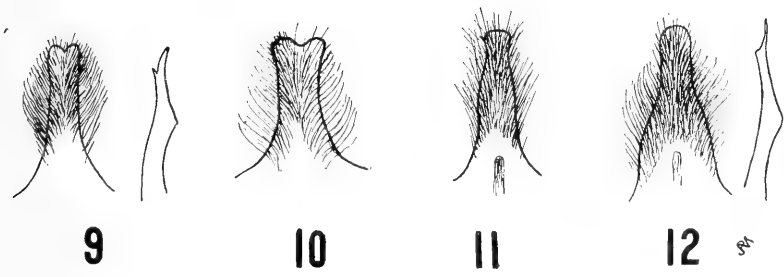
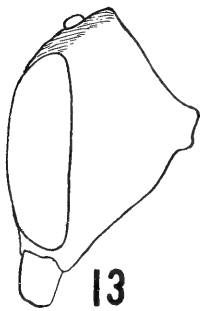
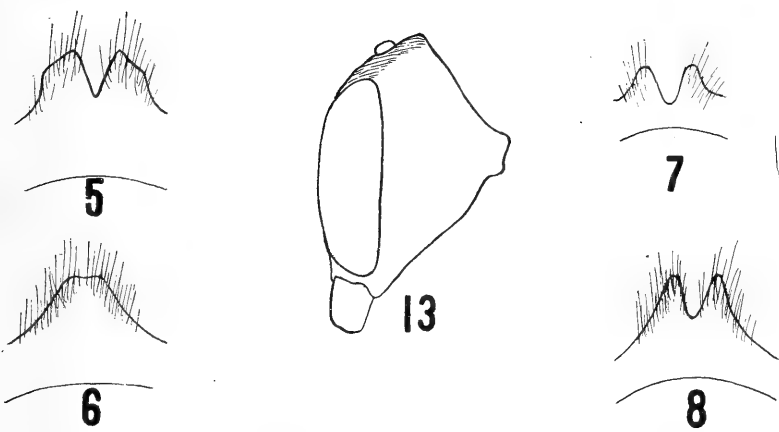
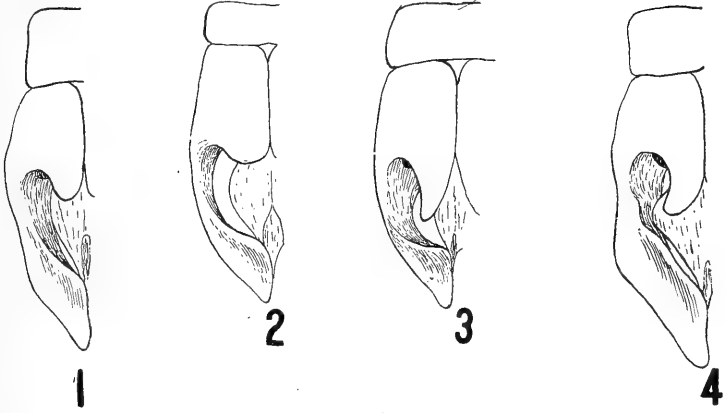
Females. — Philadelphia, Pennsylvania, May 9, 1875 (W. M. Davis); May 2, 1897 (H. L. Viereck) [A. N. S. P.]. Falls Church, Virginia, April. Great Falls, Virginia, March 20. Ithaca, New York (N. Banks) [M. C. Z.]. Central Park, Long Island, New York, June 27, 1920, *Cornus candidissima*, [Jos. Bequaert Collection]. Colebrook, Connecticut, June 8 to 11, 1911, W. M. Wheeler. Mount Vernon, Virginia, April 16, 1916, *Prunus avium* (A. Wetmore), *Stellaria media* (W. L. McAtee); April 22, 1917, plum, cherry, *Salix sericea*; April 19, 1917, plum (W. L. McAtee). Great

Falls, Virginia, April 20, 1916, *Amelanchier*, *Salix sericea* (W. L. McAtee); May 23, 1918, *Opulaster opulifolius* (W. L. McAtee). Falls Church, Virginia, March 31, 1918, *Prunus* (L. O. Jackson). Dyke, Fairfax Co., Virginia, April 11, 1915 (A. Wetmore). East Falls Church, Virginia, April 22, 1917, cherry (I. N. Gabrielson). Vienna, Virginia, April 18, 1915, *Amygdalis persica* (W. L. McAtee). Washington, D. C., June 6, 1912 (W. L. McAtee). Maryland near Plummer Island, April 20, 1919, plum (W. L. McAtee).

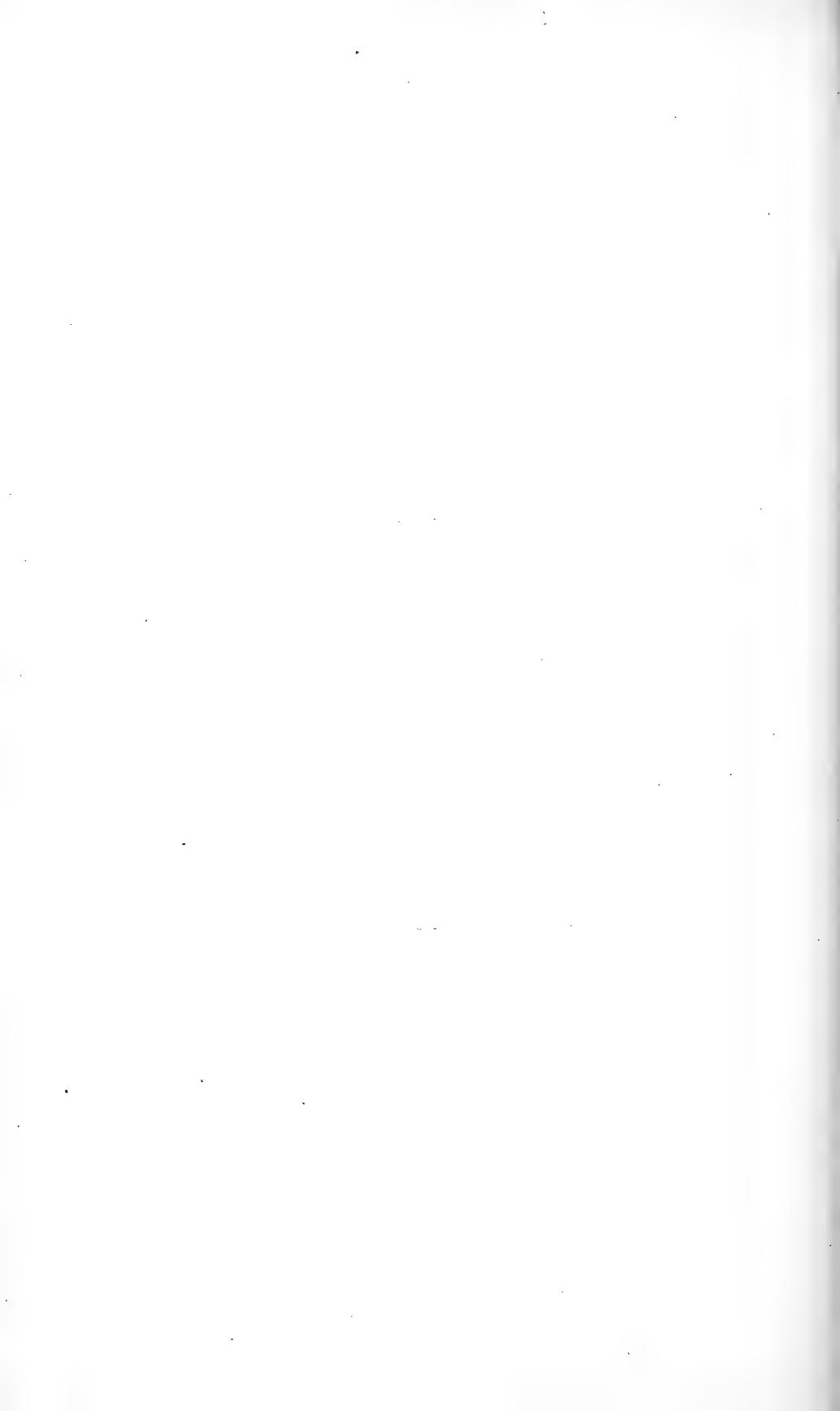
Males. — Mount. Vernon, Virginia, April 16, 1916, *Salix sericea* (A. Wetmore and W. L. McAtee); March 31, 1917, *Salix sericea* (W. L. McAtee). Arlington, Virginia, March 31, 1917 (J. Silver).

EXPLANATION OF PLATE 4.

- | | |
|--|--|
| Fig. 1. Hypopygium, <i>Andrena vulgaris</i> , type. | Fig. 7. Seventh sternite, <i>A. tumida</i> , allotype. |
| Fig. 2. Hypopygium, <i>A. tumida</i> , allotype. | Fig. 8. Seventh sternite, <i>A. vulgaris</i> , type. |
| Fig. 3. Hypopygium, <i>A. fenningeri</i> , allotype. | Fig. 9. Eighth sternite, <i>A. vulgaris</i> , type. |
| Fig. 4. Hypopygium, <i>A. media</i> , type. | Fig. 10. Eighth sternite, <i>A. tumida</i> , allotype. |
| Fig. 5. Seventh sternite, <i>A. fenningeri</i> , type. | Fig. 11. Eighth sternite, <i>A. fenningeri</i> , allotype. |
| Fig. 6. Seventh sternite, <i>A. media</i> , type. | Fig. 12. Eighth sternite, <i>A. media</i> , type. |
- Fig. 13. Side view, head of *A. media*, type



VIERECK ON NEW BEES.



Occasional Papers

OF THE

Boston Society of Natural History.

NOTES ON CLUSIODIDAE (DIPTERA).

BY JOHN R. MALLOCH.

SINCE the appearance of my revision of this family in the Proceedings of the Entomological Society of Washington, in 1918, I have collected many more specimens and have elucidated some points that necessitate the publication of additional notes on two genera.

The generic characters used in the family are rather trivial in some cases and a strict application of these throughout the group would result in the erection of several more genera, a course which seems to me inadvisable in a group as homogeneous as this. I present a key to the species of the genus *Clusiodes* known to me to occur in the eastern United States and indicate characters for the subdivision of the genus into three subgenera.

The type specimens of the species taken by Mr. C. W. Johnson are in the collection of the Boston Society of Natural History.

Key to Subgenera and Species of Clusiodes.

1. Postvertical bristles present 2.
 Postvertical bristles absent (Subgenus *Columbiella*) 15.
2. Thorax with three long strong pairs of dorso-central bristles, the anterior pair in front of suture (Subgenus *Clusiodes* Coq.) 3.
 Thorax with two strong pairs of dorso-centrals and usually one or two pairs of weak setulae behind suture (Subgenus *Clusiaria*) 4.
3. Anterior margin of mesonotum black between the humeri; each orbit with three bristles, the upper one weak; fore metatarsus black; palpi black apically *albimana* Meigen.
 Anterior margin of mesonotum between humeri yellow; each orbit with two bristles, the upper one absent; fore metatarsus black, white at tip; palpi black *americana*, sp. n.
4. Males 5.
 Females 10.
5. Two very long strong vibrissae on each side of mouth; face and cheeks almost entirely black; each orbit with two bristles *duplicata*, sp. n.
 Only one strong vibrissa on each side of mouth; each orbit with three bristles, the upper one weak 6.
6. Face deep black except below antennae, cheeks blackened anteriorly; upper orbital bristle very weak and yellow; dorsum of thorax rufous *melanostoma* Loew.
 Face not deep black; upper orbital of moderate strength, black 7.

7. Apical three or four segments of fore tarsi black; infuscation of wings confined to apical half or less of wing. *pictipes* Zetterstedt.
Fore tarsi entirely yellow. 8.
8. Thorax shining rufous, with slight gray pruinescence, lateral margins white, the dorsum with two submedian black vittae. *ruficollis* Meigen.
Thoracic dorsum black, with dense gray pruinescence, not vittate. 9.
9. Infuscation of wing extending from apex of first vein to apex of wing. *geomyzina* Fallen.
Infuscation of wing confined to apical half or less. *apicalis* Zetterstedt.
10. Dorsum of thorax shining rufous, without gray pruinescence. 11.
Dorsum of thorax black, with dense gray pruinescence. 14.
11. Each orbit with two bristles, the upper one absent; dorsum of thorax not vittate, the sides narrowly white. *duplicata*, sp. n.
Each orbit with three bristles, the upper one weak. 12.
12. Fore tarsi black. *pictipes* Zetterstedt.
Fore tarsi yellow. 13.
13. Thoracic dorsum not vittate. *melanostoma* Loew.
Thoracic dorsum with two black vittae posteriorly. *ruficollis* Meigen.
14. Infuscation of wing extending from apex of first vein to apex of wing. *geomyzina* Fallen.
Infuscation of wing confined to apical half or less. *apicalis* Zetterstedt.
15. Thorax with two pairs of strong postsutural dorso-centrals, no presutural dorso-central present; upper orbital bristle present, of moderate length; palpi of female yellow; infuscation of wing extending from apex of first vein to apex of wing; fore tarsi fuscous. *orbitalis*, sp. n.
Thorax with three pairs of strong dorso-centrals, the anterior pair in front of suture; upper orbital bristle absent; infuscation of wing in the form of two large clouds, one over the cross-veins and the other on apical half; basal segment of fore tarsi in female deep black; in male the basal or basal and second segments infuscated, remainder white. 16.
16. Palpi yellow; third segment almost entirely yellow. 17.
Palpi and third antennal segment largely or entirely black. 18.
17. Thoracic dorsum black; basal segment of fore tarsi black, second segment faintly browned at base in male; fore femur yellow; hypopygial claspers long, drawn out into a long narrow strap-like tip. *apiculata*, sp. n.
Thoracic dorsum yellowish brown, with two or four darker vittae, the lateral margins white; male with basal and second segments of fore tarsi fuscous; fore femur with a dark-brown mark at apex on anterior side; hypopygial claspers short, rounded apically. *johnsoni*, sp. n.
18. A large mark on anterior side of fore femur near apex; the fore tibia, and basal two segments of fore tarsus black. *nigripalpis*, sp. n. ♂.
Fore tibia fuscous, basal segment of fore tarsus black. *nigripalpis*, sp. n. ♀?

***Clusiodes americana*, sp. n.**

Male and female.—Very similar to *albimana*, differing as stated in the key, and in having the first posterior cell on wing more narrowed apically, as well as in being slightly smaller.

Length, 4 mm.

Type, male, and allotype, Beltsville, Maryland, May 21, 1922 (J. R. Malloch). Paratypes, females, Mt. Cadillac, Mt. Desert, Maine, July 25, 1919; Mt. Ascutney, Vermont, July 11, 1908 (C. W. Johnson); and Intervale, New Hampshire, August 23 (G. M. Allen).

CLUSIARIA, subgen. n.

Characters as stated in key.
Genotype, the following species.

Clusiodes (Clusiaria) duplicata, sp. n.

Similar to *melanostoma* (Loew) to which it will run in my revision of the family already referred to, differing as stated in the key in this paper. The male has the face and cheeks more extensively blackened than in *melanostoma*, the arista brown, third antennal segment slightly browned at insertion of arista, and the frontal bristles black instead of brown as in that species. The females may be distinguished by the orbital bristling, and the color of arista and third antennal segment as in males.

Length, 4 to 4.5 mm.

Type, male, allotype, and two male and two female paratypes, Glen Echo, Maryland, July 2, 23, and August 8, 1922 (J. R. Malloch). Taken on a rotten tree trunk overhanging a stream.

Paratypes in collection of Boston Society of Natural History.

COLUMBIELLA, subgen. n.

Characters as stated in key.
Genotype, the following species.

Clusiodes (Columbiella) apiculata, sp. n.

Male.— Very similar to *albimana* in color and habitus. Dorsum of thorax, upper half of pleura, and abdomen brownish black. Third antennal segment with a very small brownish mark at insertion of arista. Other characters as stated in key.

Length, 3 mm.

Type, Milford, New Hampshire, June 23, 1914. Paratype male, Manchester, Vermont, June 4, 1910 (C. W. Johnson).

Clusiodes (Columbiella) johnsoni, sp. n.

Male.— Very similar to the foregoing species; differs as stated in key. The cloud over discal cell is less distinct. The hypopygial claspers are very small, and like those of the preceding, furnished with short black hairs.

Length, 3 mm.

Type, Echo Lake, Mt. Desert, Maine, July 12, 1918. Paratype, Burlington, Vermont, June 23, 1906 (C. W. Johnson).

Clusiodes (Columbiella) nigripalpis, sp. n.

Male.— A larger and darker species than the last but the thoracic dorsum is similarly colored. Third antennal segment

black, yellow basally, head fuscous, whitish on orbits and margins of eyes below and behind. Fuscous markings of wings not so clearly limited as in *johnsoni*. Bases of hind tibiae brown. Hypopygial claspers as in *johnsoni*.

Length, 4 mm.

Type, Glen Echo, Maryland, August 22, 1922 (J. R. Malloch).

Four females before me differ from the above male as stated in the key and also in having the dorsum of thorax including the lateral margins black, third antennal segment less broadly blackened, face paler, and wings more conspicuously blackened; hind tibiae largely brown. It is possible that this is not *nigripalpis*, but there is sexual dimorphism in many species of the family so that it may be the female of this species or of *apiculata*.

Localities, Bar Harbor, Maine, June 17, 1922; Mt. Desert, Maine, June 10, 1921; Bashbish Falls, Massachusetts, June 27, 1912; Milford, New Hampshire, June 23 (C. W. Johnson).

***Clusiodes (Columbiella) orbitalis*, sp. n.**

Female. — Head yellow, frons darker, occiput blackish above, antennae and palpi yellow, arista brown. Thorax brownish yellow, anterior margin of disc, two submedian vittae, disc of scutellum, and a line along upper margin of pleura blackish, lateral margins of mesonotum whitish. Abdomen black. Legs yellow, apices of fore and hind tibiae and entire fore tarsi infuscated. Wings as stated in key.

The fore femora have the ventral setulae longer and the series is more extensive than in the female above described.

Length, 4 mm.

Type, Bar Harbor, Maine, June 13, 1921 (C. W. Johnson).

***Heteromeriugia convergens*, sp. n.**

Male and female. — Entirely yellow, the face whitish, and the apices of wings very slightly clouded. Bristles yellow.

Differs from *flaviseta* Johnson and its allies in having the frons very much narrowed above, the others having it either parallel-sided or but slightly narrowed. The male hypopygial claspers are slightly tapered apically and a little longer than wide.

Length, 3.5 to 4 mm.

Type, male, Urbana, Illinois, July 13, 1916 (J. R. Malloch). Allotype, Lafayette, Indiana, July 27 (J. M. Aldrich). Paratypes, one male, Chain Bridge, Virginia, August 20, 1922 (J. R. Malloch); one female, Atherton, Missouri, July 2, 1922 (C. F. Adams); and a large series in the collection of Illinois Natural History Survey, standing as *flaviseta*, which I used as the basis of my work already referred to but erroneously described the immature stages as those of *flaviseta*. Missouri specimen in collection of Boston Society of Natural History.

Occasional Papers
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A REVIEW OF THE PLATYPEZIDAE OF EASTERN NORTH
 AMERICA.

BY CHARLES W. JOHNSON.

THIS family comprises an interesting group of little flies, the larvae of which, as far as known, live in various species of decaying fungi. Most of the species are by no means common and it has taken several years to get sufficient material of the genus *Platypeza* to warrant an attempt at a revision. The species of *Agathomyia* and *Callimyia* were reviewed by the writer in 1916 (*Psyche*, vol. 23, p. 27-33). The table of the species of *Agathomyia* has been revised so as to include the three new species here described. In the genus *Callimyia* no additions of importance have been obtained and the table is therefore not reprinted in this paper.

The two sexes of a species in the genus *Platypeza* often differ so greatly, both in color and in the form of the hind tarsi, that it is difficult at first to correlate them specifically. The third tarsal joint which is elongated and flattened below in the female, is not thus differentiated in the male and when a study of the tarsi is confined to one sex, the differences are so slight that they are of little value even for separating species. Thus we find that the female of *P. pallipes* is in every way, a typical *Platypeza*. Color is also a feature that has led to some confusion, and which I shall again refer to under the several species here discussed. The most valuable character to depend on is the venation, and when studied carefully and with some discretion, the species can be separated and the sexes correlated. The relative length of the costal and first basal cells, the position of the posterior cross-vein and the form of the anal cell are subject to but little variation specifically. The following notes on the species of *Platypeza* are based on a study of over 250 specimens, many of which were bred from fungi.

Table of the Species of Platypeza.

MALES.

- | | |
|--|----|
| 1. Hind tarsi greatly enlarged, first and third joints with clubbed appendages | |
|(<i>Calotarsa ornatipes</i> auct.) <i>pallipes</i> Loew. | |
| Hind tarsi somewhat enlarged, without appendages. | 2. |

2. Abdomen black, the last segment usually grayish 3.
Abdomen black, marked with gray 6.
3. Posterior cross-vein less than its length from the hind margin 4.
Posterior cross-vein more than its length from the hind margin 5.
4. Costal and first basal cells subequal *anthrax* Loew.
Costal cell much longer than the first basal cell *velutina* Loew.
5. Third section of the fourth vein much longer than the fourth, antennae usually yellowish *flavicornis* Loew.
Third and fourth sections of the fourth vein subequal, antennae usually dark brown *minorata* Banks.
6. Abdominal bands continuous 7.
Abdominal bands interrupted, costal and first basal cells equal, halteres black *banksi*, sp. n.
7. Costal and first basal cells subequal, halteres yellow *taeniata* Snow.
Costal cell longer than the first basal cell, halteres black. *infumata* Haliday.

FEMALES.

1. Posterior cross-vein less than its length from the hind margin, costal cell much longer than the first basal cell 2.
Posterior cross-vein less than its length from the hind margin, costal and first basal cell subequal 3.
Posterior cross-vein more than its length from the hind margin, costal and first basal cell subequal 4.
Posterior cross-vein about its length from the hind margin, costal cell much longer than the first basal cell, abdomen with broad continuous gray bands, antennae and legs yellow *pallipes* Loew.
2. Abdomen opaque black, legs and halteres black *obscura* Loew.
Abdomen with gray spots on the sides of the segments *obscura* Loew.
Abdomen with the gray bands wanting on the second segment and on the third broadly interrupted, thorax with a tridentate black mark, halteres black *infumata* Haliday.
3. Abdominal bands not interrupted, legs black *anthrax* Loew.
Abdominal bands not interrupted, legs brown *taeniata* Snow.
Abdominal bands on the second, third and fourth segments broadly interrupted *banksi*, sp. n.
4. Third section of the fourth vein much longer than the fourth, antennae yellowish *flavicornis* Loew.
Third and fourth sections of the fourth vein subequal, antennae brownish *minorata* Banks.

PLATYPEZA TAENIATA SNOW.

P. taeniata Banks, Journ. N. Y. Ent. Soc., vol. 23, p. 214, pl. 17, f. 8 (female only), 1915.

This species is based on a female collected in Illinois. Snow says that it must be near *P. boletina* Fallen of Europe, whose black abdominal bands are widened in their middle. In the male the bands are not widened or but very slightly in a few specimens. In the female, however, this character is extremely variable and in a number of specimens the bands are considerably wider in the middle as figured by Banks. It resembles the female of *P. anthrax* Loew but is distinguished by its yellowish legs and margin of the humeri. I am inclined to think that it may prove to be the same as *P. boletina* Fallen.

The male figured by Banks represents a new species which I am calling *P. banksi*.

In the series before me are twelve males and over thirty females, six males and eleven females of which were taken at the same time—Newton and Brookline (near Hammond's Pond), Massachusetts, September 18, and Center Harbor, New Hampshire, September 10. Specimens have also been collected at Bridgton, Maine, August 25; Liberty, Maine, September 16 (J. A. Cushman); Killington Peak, Vermont, August 26 (C. W. J.); New Bedford, Massachusetts (Dr. Hough); West Gloucester, Massachusetts, October 12, from a fungus *Armillaria mellea* (J. H. Emerton); Chester, Massachusetts, August 6 (C. W. J.); Colebrook, Connecticut, September 10 (W. M. Wheeler).

Platypeza banski, sp. nov.

Plate 5, figs. 5, 9, 10.

♂.—Face and antennae black. Thorax brownish black with a wide obscure dorsal stripe, with a narrow median black line; pleura and scutellum brownish black. Abdomen black with wide light-grayish bands on the third, fourth and fifth segments, the band on the third interrupted by about one-third of its length, on the fourth by one-fifth and on the fifth by a narrow dorsal line; the sixth segment entirely grayish. Legs black, bases of the front and middle tibiae and tarsi yellowish; hind tarsi moderately flattened. Halteres black. Wings hyaline, costal and first basal cell of about equal length; the posterior cross-vein less than its length from the hind margin at the end of the fifth vein. Length 3 mm.

♀.—Face light gray, front brown, antennae black, the row of black hairs on the occiput prominent. Thorax brownish with a slightly darker dorsal stripe and conspicuous row of dorso-central hairs; humeri, sides, pleura and scutellum grayish. Abdomen black with bands of grayish white, the first segment with a wide posterior margin, the second with a basal band narrowly interrupted; the third widely interrupted, the fourth narrowly interrupted and the fifth and sixth continuous. Legs brown, the femora blackish. Halteres yellow. Length 2.5 mm.

Holotype, Falls Church, Virginia, November 15; and a paratype, Great Falls, Virginia, October 26 (N. Banks), Museum of Comparative Zoölogy, Cambridge, Massachusetts. Allotype and paratypes, Forest Hills, Boston, October 5 (H. M. Parshley); Brookline (Chestnut Hill), August 31, and Auburndale, Massachusetts, September 13; Killington Peak, Vermont, August 28 (C. W. Johnson) in the collection of the Boston Society of Natural History and the author's collection. The males taken near Boston are smaller (2.5 mm.) and the abdominal bands slightly narrower.

PLATYPEZA ANTHRAX Loew.

Plate 5, fig. 4.

P. elongata Banks, Journ. N. Y. Ent. Soc., vol. 23, p. 215, 1915.

Loew's description which is based on a male is somewhat misleading, as the very narrow, reddish posterior margins on the second and third abdominal segments are often obsolete or wanting. The female agrees well with the description of *P. fasciata* Fabr. of Europe and the male and female as described and figured

by Verrall (British Flies, vol. 8, p. 49, 1901 only strengthen the supposition that this may prove to be the same species. In the absence of European material, however, I will still retain the name applied to the American form.

Some forty males and thirty-five females are before me and of these twenty-two males and twenty-four females were taken at the same time and place—Newton and Brookline (woods near Hammond's Pond), September 18, and Auburndale, Massachusetts, September 4, 22; Center Harbor, New Hampshire, September 11; and Mt. Desert, Maine, September 7 (C. W. Johnson); on a schooner five miles off the Isles of Shoals, September 5, and Bolton Mt., Vermont, August 30–September 10 (Owen Bryant); Orono, Maine, August 12, bred from fungus (Dr. O. A. Johannsen). One male from Mt. Desert has the halteres yellow as in the female. The species has been recorded from New York, Pennsylvania and Virginia.

PLATYPEZA INFUMATA Haliday.

Plate 5, fig. 11.

P. infumata Haliday, Ann. Mag. Nat. Hist., ser. 1, vol. 2, p. 184, 1838.

I have before me some sixteen specimens that agree with the original description and the description and figures given by Verrall. The female is readily recognized by the disk of the thorax being black with a tridentate margin behind. The lateral spot on the third abdominal segment varies in size, in some specimens reaching the posterior margin, but the majority are typical. The males that undoubtedly belong to this species have an indistinct band at the base of the third abdominal segment in addition to those on the fourth and fifth segments; the base of the sixth is also brown, with a grayish-white tip, bearing a row of yellow bristle-like hairs.

It has a wide distribution, being represented from the following localities:—Mt. Washington carriage road, at about 2,500 feet, July 24 and 28, and "Glen" (Osgood Trail), New Hampshire, July 15, 1915; Hampton, New Hampshire, May 15 (S. A. Shaw); Waltham, Norwood (Ellis Station), May 24, and Chester, Massachusetts, August 6, 1914; Buttonwoods, Rhode Island, June 18; Pottstown, Pennsylvania, June 15 (C. W. Johnson); East Aurora, Colden, and Gowanda, New York, May 18–June 7; Berkeley, California, May 16 (M. C. Van Duzee).

PLATYPEZA OBSCURA Loew.

The type, a female from Pennsylvania, is the only specimen I have seen of this species, although it has been recorded from Mt. Washington, New Hampshire, by Mrs. A. T. Slosson. It has the venation of *P. velutina*, but the abdomen is marked with small whitish triangles at the anterior angle of each segment; legs and halteres yellowish.

PLATYPEZA FLAVICORNIS Loew.

P. submacula Banks, Journ. N. Y. Ent. Soc., vol. 23, p. 214, 1915.

P. mediana Banks, Journ. N. Y. Ent. Soc., vol. 23, p. 215, 1915.

The typical form is readily separated from the following species by the third section of the fourth vein being noticeably longer than the fourth section,—almost two-thirds in some specimens. However, this difference is often much less and to define the limits of "subequal" becomes quite difficult, especially in the females, but with discretion it can be used to separate the two forms. In the females the gray lateral spots on the abdominal segments are usually much smaller than in *P. minorata* Banks. I have been unable to use the hind tarsi in defining the species and the antennae vary from yellow to dark brown in both.

In the large series before me of those species in which the males are an opaque velvety black, there is apt to be more or less discoloration of the abdomen, either owing to the specimens coming in contact with moisture in the cyanide bottle or by being injured during capture, and the fluids of the abdomen spreading over it, gives it a somewhat grayish-black color, and in some cases shining black. Again, we have the grayish spots thus formed apparently disappearing in time and the specimen again assuming a uniform velvety black. This is what has undoubtedly occurred in the case of *P. submaculata* Banks. In the type the three spots described and figured have almost disappeared, there being only the faintest trace of one, and that has not the original shape or exact position. In *P. mediana* Banks the abdomen is grayish somewhat shining and the irregularity of the velvety-black spots would also indicate that they were accidental. I have a similar specimen with the venation of *P. minorata*. A specimen of *P. velutina* also has as highly polished an abdomen as that of the type of *P. nitida* Banks. It has undoubtedly been caused by the abdomen being injured.

This species has been bred from mushrooms (*Agaricus campestris*) by Professor Roland Thaxter at Belmont, Massachusetts. It has also been collected at Franconia, New Hampshire (Mrs. A. T. Slosson); Brookline, Auburndale, and Chester, Massachusetts, August 13–September 24; Riverton, New Jersey, and Delaware Co., Pennsylvania, August 28 and 29 (C. W. Johnson); Colden, Elma, East Aurora and Niagara Falls, New York, August 9–September 20 (M. C. Van Duzee); Falls Church, Virginia, August 24–September 24 (N. Banks); Ridgeway, Ontario, August 12 (M. C. Van Duzee).

PLATYPEZA MINORATA Banks.

Plate 5, fig. 1.

P. minorata Banks, Journ. N. Y. Ent. Soc., vol. 23, p. 214, 1915.

P. nitida Banks, Journ. N. Y. Ent. Soc., vol. 23, p. 215, 1915.

The type of this species is from Falls Church, Virginia. It is closely related to *P. flavicornis* and can only be separated by the

characters given in the table. As stated under *P. flavicornis* I can only consider the polished abdomen of *P. nitida* as accidental. The type of *P. nitida* has the base of the abdomen opaque.

This species has been bred by the writer from mushrooms (*Agaricus campestris*), Newton, Massachusetts, September 17-26, and by Mr. C. A. Frost, Framingham, Massachusetts, October 2.

Platyezoides, gen. nov.

This genus has in part the characteristics of *Callimya*: short third antennal joint and the same-shaped hind metatarsi. The wing venation, however, is nearer that of *Platyezopa*. The fourth vein branches near the posterior cross-vein, all the veins reaching the posterior margin; the second and third posterior cells are about equal. The eyes are divided by a transverse groove on a line with the base of the antennae. Type, the following species.

Platyezoides diversa, sp. nov.

Plate 5, fig. 6-8.

♂, ♀.—Face and antennae black, proboscis dark brown, the cheeks and occiput with numerous prominent hairs, the facets of the lower portion of the eyes minute. Thorax and scutellum black, the latter with four marginal bristles. Abdomen black, venter brownish. Legs brown, the hind femora and tibiae somewhat enlarged and the hind metatarsi much enlarged, about twice as wide as long and as long as all the other joints of the tarsi together. In the female, the hind femora, tibiae and metatarsi are not enlarged. Halteres black, calypters with whitish hairs. Wings brownish, with a darker oblong clouding at the end of the first vein; the costal cell is about one-third longer than the first basal cell; anal cell acute and as long as the first basal cell. Length 3.5 mm.

Holotype, Mt. Washington, New Hampshire (Mrs. A. T. Slosson); allotype and three paratypes, Center Harbor, New Hampshire, September 11, 1914 (one 2.5 mm. long) and Bar Harbor ("Witch Hole Pond"), Maine, September 11, 1922 (C. W. Johnson); in the collection of the Boston Society of Natural History. One paratype, Niagara Falls, New York, September 9, 1910 (M. C. Van Duzee) in the author's collection.

Table of the Species of *Agathomyia*.

MALES.

- | | |
|---|-----------------------------|
| 1. Thorax and abdomen largely yellow | 2. |
| Thorax and abdomen largely black | 3. |
| 2. The last two segments of the abdomen and halteres black | <i>perplexa</i> Johnson. |
| The last two segments of the abdomen, pleura and metanotum black, halteres yellow | <i>dubia</i> Johnson. |
| 3. Abdomen broadly banded with yellow | 4. |
| Abdomen not banded with yellow | 7. |
| 4. Scutellum yellow | 5. |
| Scutellum black | 6. |
| 5. Thorax opaque black (2 mm.) | <i>pulchella</i> Johnson. |
| Thorax opaque black, with a large square of yellow in front of the scutellum | <i>brooksi</i> , sp. nov. |
| Thorax shiny black, subcostal cell yellowish | <i>monticola</i> , sp. nov. |

6. Thorax dull black, with three narrow pruinose lines, halteres yellow
 *cushmani* Johnson.
 Thorax dark brown, with a dorsal line and area of black, halteres brown
 *vanduzeei* Johnson.
 Thorax velvety black, halteres black *canadensis*, sp. nov.
7. Thorax and abdomen both maculated with opalescent greenish white,
 halteres black *notata* Loew.
 Thorax only maculated with greenish white, halteres yellow. *divergens* Loew.
 Thorax and abdomen without maculation, knobs of the halteres black
 *talpula* Loew.

FEMALES.

1. Thorax and abdomen yellow 2.
 Thorax and abdomen partly black 3.
 Thorax and abdomen partly cinereous 5.
2. Head black, antennae entirely yellow *fulva* Johnson.
 Head, third joint of the antennae and spots on the sides of the last two
 abdominal segments black *perplexa* Johnson.
3. Abdomen broadly banded with yellow, cinereous or yellowish in front of the
 yellow scutellum, the black of the pronotum usually vittate
 *pulchella* Johnson.
 Abdomen not banded with yellow 4.
4. Thorax, front and abdomen marked with an opalescent greenish white,
 halteres black *notata* Loew.
 Thorax only marked with greenish white, halteres yellow . . . *divergens* Loew.
 Thorax and abdomen entirely black, knobs of the halteres black
 *talpula* Loew.
5. Abdomen cinereous on a yellow ground, with broad black dorsal triangles on
 the third and fourth segments, two first joints of the antennae yellow
 *vanduzeei* Johnson.
 Abdomen cinereous on a black ground, with black band on the third and
 fourth and a spot on the fifth segment, antennae entirely black
 *obscura* Johnson.

Agathomyia brooksi, sp. nov.

♂.—Front and face dull black, proboscis yellow, antennae black. Thorax velvety black, with a large almost square yellow mark in front of the scutellum extending almost to the middle of the thorax, with the anterior margin tridentate; there is also a small obscure yellow spot above the base of the wing. Pleura dull black, scutellum bright yellow, with four black marginal bristles. Abdomen with the first three segments yellow, the hind legs brown, the hind femora and tibiae slightly enlarged with a row of fine hairs above, the metatarsi about twice as long as wide. Halteres black. Wings hyaline. Length 2.5 mm.

One specimen, Manomet, Massachusetts, May 31, 1919. Obtained in sweeping for small insects, by Mr. Winthrop Sprague Brooks. *Type* in the collection of the Boston Society of Natural History.

Agathomyia monticola, sp. nov.

♂.—Head and antennae black. Thorax black, shining, pleura dull black, scutellum yellow, metanotum black. The first three segments of the abdomen yellow, base of the first segment blackish, segments four to six black, shining. Legs brown, the hind femora and tibiae but slightly enlarged, with rows of bristle-like hairs above; hind metatarsi about three times as long as wide. Halteres black. Wings hyaline, with a slight yellow tinge, subcostal cell yellow.

One specimen, Mt. Washington carriage road, between the one- and two-mile post, elevation about 2,500 feet, July 24, 1915 (C. W. Johnson). *Type* in the collection of the Boston Society of Natural History.

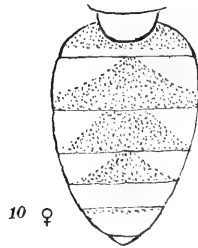
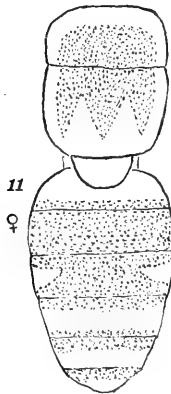
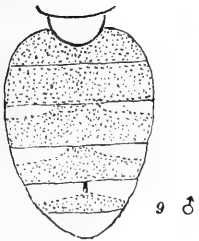
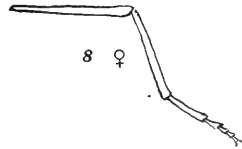
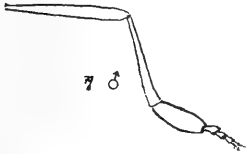
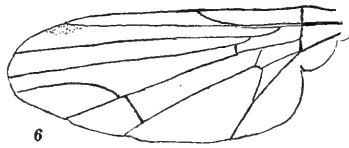
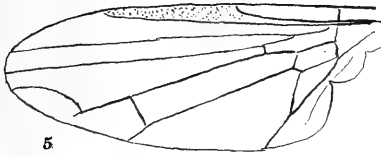
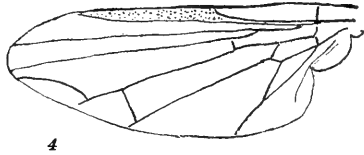
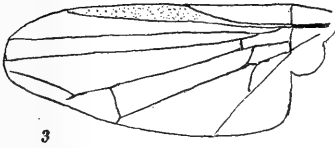
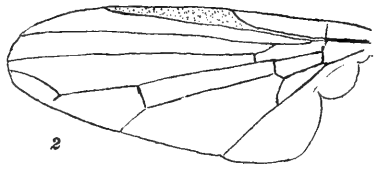
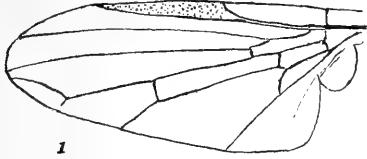
***Agathomyia canadensis*, sp. nov.**

♂.—Face dull black, proboscis yellow, antennae black. Thorax and scutellum velvety black, base of the scutellum and a small spot in front shining black, pleura dull black. Abdomen with the first three segments yellow, the third with a black dorsal spot at the posterior margin, the other segments velvety black. Front and middle legs yellow, hind legs dark brown, the hind femora and tibiae enlarged, with a row of bristle-like hairs above; the hind metatarsi about twice as long as wide. Halteres black. Wings hyaline. Length 3 mm.

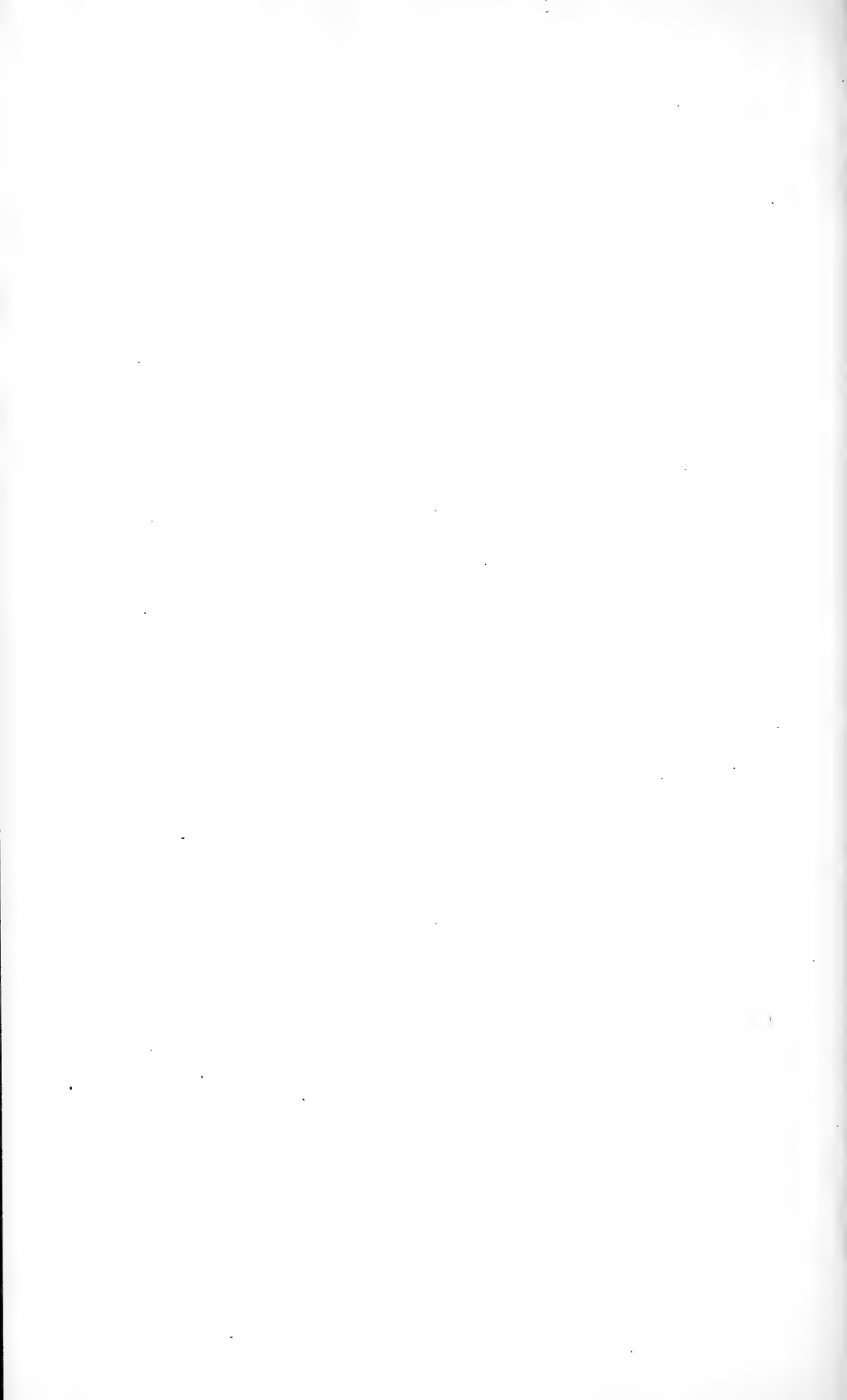
One specimen, Norway Point, Lake of Bays, Ontario, Canada, August 1, 1919 (Dr. J. McDunnough). *Type* in the collection of the National Museum, Ottawa, Canada.

EXPLANATION OF PLATE 5.

- Fig. 1. Wing of *Platypeza minorata* Banks.
- Fig. 2. Wing of *Platypeza flavicornis* Loew.
- Fig. 3. Wing of *Platypeza velutina* Loew.
- Fig. 4. Wing of *Platypeza anthrax* Loew.
- Fig. 5. Wing of *Platypeza banksi*, sp. nov.
- Fig. 6. Wing of *Platypezoides diversa*, sp. nov.
- Fig. 7. Hind leg of *Platypezoides diversa*, sp. nov. (male).
- Fig. 8. Hind leg of *Platypezoides diversa*, sp. nov. (female).
- Fig. 9. Abdomen of *Platypeza banksi*, sp. nov. (male).
- Fig. 10. Abdomen of *Platypeza banksi*, sp. nov. (female).
- Fig. 11. Thorax and abdomen of *Platypeza infumata* Haliday (female).



JOHNSON ON PLATYPEZIDAE.



Occasional Papers
OF THE
Boston Society of Natural History.

TWO NEW NORTH AMERICAN DIPTERA.

BY C. HOWARD CURRAN.

ASILIDAE.

Cyrtopogon laphriformis, new species.

SIMILAR to *Laphria* in form, the abdomen long and slender, longer than the wings, with orange pile except basally; pleura entirely white-haired.

Male. — Length, 15 mm. Face moderately gibbose, rather flat above, grayish-white pollinose, the mystax pallidly yellowish in the middle, the hairs elsewhere stouter, black. Front very thinly pollinose, shining, with evident, abundant small punctures and not very long, rather abundant hair, which is of intermediate texture. Occiput grayish-white pollinose, more yellowish toward the vertex; hairs all black, the beard composed of fine white hair which does not quite reach the eye-margin. First antennal joint one and one-fourth times as long as wide, gradually increasing in width from the base; second joint slightly shorter than the first, but not as wide, as it is about one and one-half times as long as wide, both bearing black hairs; third joint somewhat longer than the two first combined, not half as wide as the second joint, the sides sub-parallel, but still a little concave on the basal half below, scarcely so above; style as long as the second antennal joint, of moderate width, slightly tapering, its spine short and not well differentiated.

Thorax black, the sides of the mesonotum and pleura grayish-white or yellowish pollinose, but I am unable to make out the pattern on the disk. Pile on pleura, humeri and a narrow band on the posterior margin of the mesonotum, fine, white; on the disk, stouter, black, not abundant nor long; bristles slender, black. Scutellum very gently convex, its base narrowly thinly gray pollinose, its pile whitish, becoming longer apically; no bristles.

Legs shining black, the extreme apices of the femora, basal fourth of the tibiae and the bases of all the tarsal joints, reddish or deep orange, strongly contrasting with the black. Pile on posterior four femora fine, white, except several apical bristly hairs and a few additional hairs on the middle ones above. Front femora black-haired. Tibiae black-haired, the hairs beneath the front four conspicuously long. Tarsi all black-haired. Bristles all black.

Wings rather peculiar as they are beset with quite apparent brown villi which give a smoky tinge and are quite dark on the apical two-thirds and somewhat brownish. When viewed from almost the same plane they appear wholly brownish. Squamae pallidly yellowish, with yellow border and fine white fringe. Halteres reddish yellow.

Abdomen shining blue-black, the second to fifth segments each with a transverse grayish pruinose triangle on the posterior angles, its front margin almost straight and oblique, the sides of the first segment with similar pollen. Pile short on the disk, longer and more abundant laterally, whitish at the base, becoming orange on the second segment, from thence to the apex entirely orange and of almost equal length, the genitalia alone with some longer, stouter black hairs.

Holotype.—♂, Intervale, New Hampshire, June 26, 1909 (S. A. Shaw), in the Museum of the Boston Society of Natural History.

This species is remarkable because of its structure, color of the pile and villous wings. Most of the species in the genus have the villi more or less apparent, but they are always grayish, not as stout as, and usually decidedly longer than in this species. The insect is quite typical of *Cyrtopogon* except for its narrow abdomen, in which it approaches *Lasiopogon*, but it is more tapering and the genitalia not as large and conspicuous, and the pile is very much more abundant. It forms a good connection between the two genera, which are really only feebly separated.

SYRPHIDAE.

Only one species of *Chamaesyrrhus* has been previously recognized from North America and the new species here described is of unusual interest because it is somewhat intermediate between the genera *Pelecocera* and *Chamaesyrrhus*, but shows greater affinities to the latter. The third antennal joint is very large, less rounded than in *Chamaesyrrhus willistoni* and less angular than in *Pelecocera*, the arista dorso-terminal. The two genera have appeared abundantly distinct but it is possible that further knowledge of the species comprising them may once more lead to their unison. The two North American species of *Chamaesyrrhus* may be separated by the following table.

Arista dorso-terminal, the third antennal joint with broadly rounded apical corners, the sides and apex slightly convex; joint widest apically.....	<i>apichaetus</i> , n. sp.
Arista situated slightly before the middle of the third antennal joint; third joint orbicular.....	<i>willistoni</i> Snow.

Chamaesyrrhus apichaetus, new species.

Superficially similar to *Chamaesyrrhus willistoni*, but differing as explained in table, and otherwise.

Female. — Length, 5 mm. Face and front shining black, the former densely whitish-pollinose except a large sub-cordate spot about the small but prominent tubercle, and most of the cheeks, which are of a brownish ground color. In profile the face is moderately concave above, retreating below the tubercle, but the lower third of the face is prominent, so that the tubercle is not wholly responsible for the prominence here. Pile whitish, limited to the side margins and cheeks. Sides of the front below, and a broad band on the lower third, narrowly separated from the base of the antennae by a shining area, thinly yellowish-pollinose. Pile rather short, not very abundant, black. Occiput shining black, the orbits grayish pollinose; pile black above, pallidly yellowish below. First antennal joint very short, black; second a little longer than broad, slightly tapering, its apex broadly rounded, piceous or brownish red in color; third joint very large, broadest apically, its corners broadly rounded, its margins a little convex, reddish in color, its upper and apical margins narrowly brown. Arista black, situated on dorso-apical corner, as long as the antennae, straight, not robust, tapering.

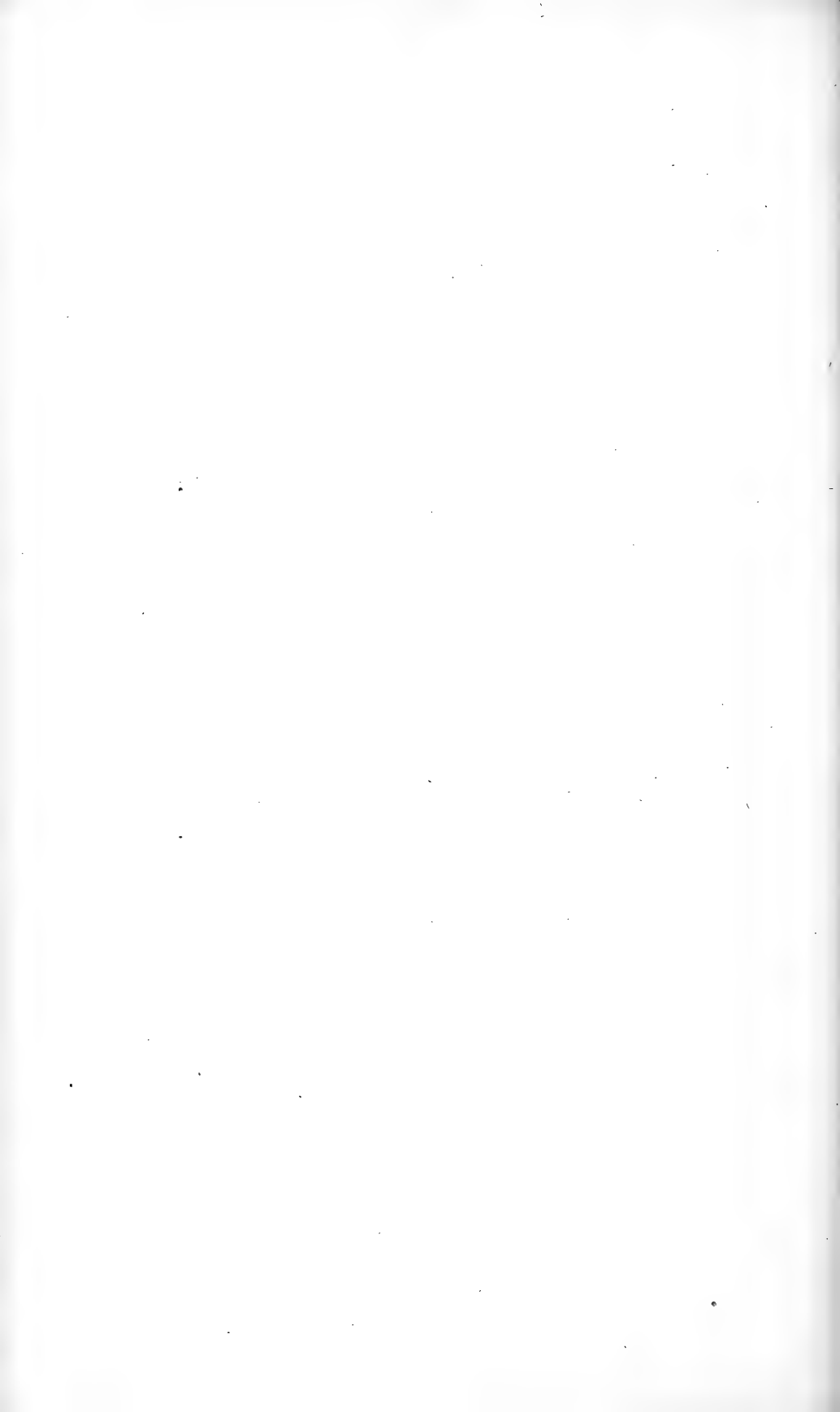
Thorax greenish black; pleura and sides of mesonotum thinly whitish-pollinose, the latter dorsally with thin yellowish pollen; on the anterior two-thirds, when viewed from behind, with a yellowish pollinose geminate median stripe. Pile of mesonotum short, black; on the lateral and posterior margins and on the pleura, short, white. Scutellum greenish black, pale pilose, with four bristles.

Front four coxae, all the trochanters, bases and apices of the femora, basal third and broad apices of the front four tibiae, basal fourth and apex of the hind ones, and the first two joints of the front four tarsi, yellowish; legs elsewhere piceous or brownish black.

Wings hyaline, stigma luteous; apical cross-vein straight, very oblique, the apex of the first posterior cell acute. Squamae white, with pale yellowish border and white fringe. Halteres yellow.

Abdomen shining greenish black, very thinly whitish pollinose; short whitish pilose, the middle line and apices of the second and third segments short black pilose.

Holotype. — ♀, Carmel, California (L. S. Slevin), in my collection.



Occasional Papers
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A NEW TANAGER FROM SURINAM.

BY THOMAS E. PENARD.

THE little town of Lelydorp, formerly known as Kofidjempo, situated in the Para district, about seventeen kilometers from the city of Paramaribo, Surinam, has already yielded several new and interesting forms of birds. To their number I now add another, a tanager, which has never before been reported from Guiana and which differs sufficiently from its nearest ally in Peru to warrant subspecific separation. I propose to name it

***Tanagra chrysopasta nitida*, subsp. nov.**

Type, adult ♂, collection of T. E. Penard, no. 2028 (now Museum of Comparative Zoölogy, no. 93,415), from Lelydorp, Surinam, 7 September, 1921; collected by T. E. Penard.

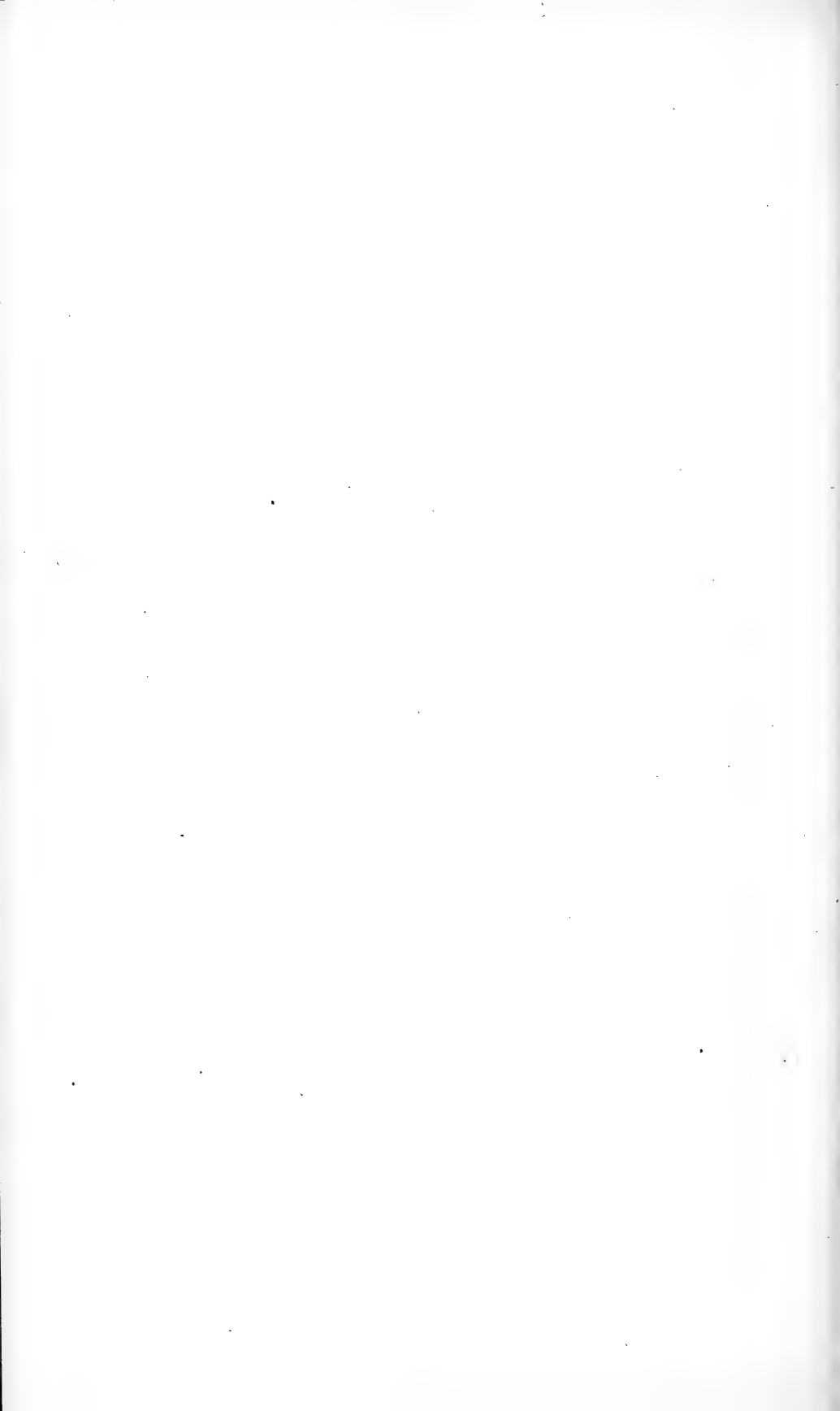
Subspecific characters.—Similar to *Tanagra chrysopasta chrysopasta* (Sclater and Salvin) of Peru, but decidedly smaller; under parts brighter and clearer orange-yellow; middle of breast and belly without any trace of olivaceous; cap more bluish, less cinereous; bill dark plumbeous; feet very small and black, not brownish.

Measurements (in millimeters).

		Sex.	Wing.	Tail.	Tarsus.	Exposed culmen.
<i>T. c. nitida</i> , Surinam, type.....		♂	54.0	30.5	14.0	8.5
<i>T. c. chrysopasta</i> , M. C. Z., 34,537; Peru: Upper Ucayali (Bartlett), topotype.....		♂	59.0	36.5	9.2
do. do. M. C. Z., 93,365; Bolivia: Rio Surutú (Steinbach)		♂	61.0	38.0	15.5	9.0
do. do. M. C. Z., 93,266; Bolivia: Rio Surutú (Steinbach)		♀	60.0	34.0	16.5	9.3

Remarks.—This new tanager is the Surinam representative of the Golden-bellied Euphonia of Peru. It is distinguishable at a glance from typical *chrysopasta* by its diminutive size. The feet especially are much weaker, being no larger than those of *Tanagra finschi* (Sclater and Salvin) or *Tanagra minuta* (Cabanis). From the upper breast to the under tail-coverts it has a wide area of bright orange-yellow without any admixture of olivaceous, giving the entire bird a much brighter appearance than its Peruvian ally.

The species has not previously been recorded from Surinam and is not known to occur in either British or French Guiana. My brothers, F. P. and A. P. Penard (Vog. Guyana, vol. 2, p. 428, 1910), list the species and state that they have no knowledge of its occurrence in the Guianas, but have reason to think it does occur there.



Occasional Papers
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TWO UNDESCRIBED SYRPHID FLIES FROM NEW ENGLAND.

BY C. HOWARD CURRAN.

Platychirus varipes, new species.

Allied to *P. podagratius* Zetterstedt of Europe, but without any long twisted hairs at the base of the front femora and with the front tibiae a little more gradually dilated.

Male.—Length, 8.5 mm. Face and front aeneous, thinly covered with whitish dust, the tubercle and oral margin black. In profile the face is long concave above, shortly concave below the nose-shaped tubercle; the base of the antennae and the tip of the oral margin are on the same plane, the tubercle occupying over one-third the length of the face and markedly prominent; pile black. Front rather broad, not swollen. Sides of the vertical triangle almost equilateral, the triangle bluish, with black pile except at the vertex. Occiput bluish black, densely grayish pollinose along the orbits except above; the pile yellow, short; the occipital ciliae long, black. Antennae black, just a trace of reddish on the third joint at the base below; third joint one and one-half times as long as wide, gently concave on upper surface, convex apically and ventrally.

Thorax aeneous, with tawny-yellowish pile, some black hairs sub-laterally on the posterior half. Scutellum concolorous with the mesonotum, with longer black pile but some pale hairs intermixed, especially basally.

Legs black, the hind knees narrowly yellow; middle knees, apex of the middle tibiae and the first two joints of their tarsi, reddish yellow. Front legs reddish yellow, their femora with a broad brownish stripe posteriorly and a narrower one anteriorly. Perhaps sometimes these stripes are more extensive and the femora chiefly shining brown except the broad base and apex. Posterior half of front tibiae black on the outer side for more than half their length, the base yellow; front basitarsi over half white. Front femora with long, moderately abundant, rather stout black hairs behind, about three of them stronger than the rest. The front tibiae are gradually dilated from the base to the apical fourth, thence to the apex strongly dilated, the anterior margin almost straight, the outer apex produced as a small triangle. The front basitarsus is almost as wide as the apex of the tibia, its posterior basal corner oblique where it receives the tibial projection, one and one-fifth times as long as wide; the following joints gradually and rather sharply decreasing in width and length but the last joint as long as the third. Middle femora with long black pile behind and on postero-ventral surface, their tibiae with conspicuous, rather abundant, fine yellow pile on both the anterior and posterior surfaces. Hind femora with long yellowish and blackish pile in front, their tibiae wholly black pilose.

Wings tinged with luteous; stigma luteous. Squamae whitish with fuscous border and pallid-yellowish fringe. Halteres fuscous.

Abdomen opaque black, the side margins and lateral spots on each segment metallic greenish, the first segment wholly of this color. The shining side margins are dilated on the basal two-thirds of the second segment to occupy one-fifth the width of the segment on either side; sub-basally on the basal third or less of the two following segments and over three-fourths of the fifth segment, the shining margin is dilated to occupy more than one-third the width on either side, its posterior margin oblique, the inner half of the fasciae thus formed on the third and fourth segments covered with hoary bloom. Pile rather sparse, yellowish on the metallic areas and base of the abdomen; elsewhere shorter, sub-appressed, black.

Holotype, ♂, Fort Kent, Maine, August 17, collected by Charles W. Johnson; in the Museum of the Boston Society of Natural History.

Stenosyrphus vittifacies, new species.

Belongs to the *sodalis* group (for definition of this group and key to species, see Canadian Entomol., vol. 55, p. 59, 1923). The black facial stripe brings it close to *S. nigrifacies* Curran; the abdominal spots, which do not reach the side margins, ally it with *S. contumax* Osten Sacken. The spots are not or are scarcely concave in front and the species does not, in this respect, agree with the other members of the group.

Male.—Length, between 9 and 10 mm. Face broadly yellow on the sides and narrowly across immediately below the antennae; the cheeks, very broad oral border and middle stripe, shining black, the median stripe elongate triangular, reaching nearly to the base of the antennae as an acute point; the yellow ground is covered by grayish pollen, which also encroaches on the black ground. Jowls more brownish. Pile moderately long, fairly abundant, black. Frontal triangle black, densely gray pollinose so that the ground color is mostly obscured; narrowly bare immediately above the antennae where it forms a broad, poorly formed W; pile black. Vertical triangle greenish black, thinly grayish-yellow pollinose, its pile black. Occiput densely grayish pollinose, clothed with pale-yellowish pile, the orbital ciliae black. Antennae black; third joint obtusely oval, one and one-fourth times as long as broad, widest sub-apically. Arista as long as the antenna, thickened on the basal third, wholly black. Eyes touching for a distance equal to the length of the vertical triangle, thinly short, yellow pilose.

Thorax aeneous, the disk somewhat dull, with several obscure, narrow, more shining vittae; pleura thinly whitish pollinose. Pile moderately long, chiefly yellowish; on the sides of the mesonotum and on the mesopleura above, black, or largely so, the pale pile also appearing tipped with black in some lights. Scutellum reddish yellowish, the base narrowly black, the whole border metallic blue; the pile long, black, pale and shorter basally.

Legs black, the apices of the femora reddish, the hind ones less broadly so; the base of the posterior tibiae, and the front four tibiae, except obscure brownish bands lying mostly beyond the middle, reddish yellow.

Wings cinereous hyaline, the stigma luteous. Squamae whitish, with yellowish border and fringe. Halteres yellow, the knobs somewhat ferruginous.

Abdomen opaque or sub-opaque black, the first segment, sides of the whole abdomen, apical third of the third segment, apical half of the fourth and the whole of the fifth, shining; first segment brownish. Second segment with a pair of rather small, sub-oval, yellow spots about the middle, well separated

from the side margins, the distance between their inner ends equal to about twice the length of one spot. The spots are placed a little obliquely, their outer end nearer the anterior margin of the segment. Second segment with a broad, sub-basal, rather narrowly interrupted reddish fascia, the width of which is equal to about one-third the length of the segment; the outer ends are separated from the side margins, rounded, the front margin of the spot almost straight, the posterior margin gently convex. Fourth segment similarly marked. Apices of the fourth and fifth segments narrowly yellow. The abdominal pile is yellowish on the first segment, basal three-fourths of the second and basal half of the two following; elsewhere black.

Holotype, ♂, Hampton, New Hampshire, April 14, 1905, collected by S. A. Shaw; in the Museum of the Boston Society of Natural History.

Occasional Papers
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NEW AND INTERESTING SPECIES OF DIPTERA.

BY CHARLES W. JOHNSON.

THIS paper adds two interesting genera to the New England fauna: *Spania* and *Hilarimorpha*, belonging to the family Rhagionidae (Leptidae). A new species of *Allognosta* of the family Stratiomyiidae is also described, with a note on *Allognosta similis* Loew.

***Spania nigra* Meigen.**

Spania nigra Meig., Syst. Besch., vol. 6, p. 335, tab. 66, f. 12-14, 1830.

Among the material collected at Witch Hole Pond, near Bar Harbor, Maine, June 21, 1921, was a single male specimen of what is evidently this interesting little species. It agrees with the description, except for a discrepancy in the venation. The venation, however, is exceedingly variable in European specimens, and this inconstancy is described by Verrall (*British Flies*, vol. 5, p. 318, 1909) as follows: "The two upper veinlets from the discal cell usually sessile, but frequently separated (sometimes widely) and not uncommonly petiolate as in *Ptiolina*, while the third veinlet is usually abbreviated, but is sometimes complete; it is also not uncommon to find a spurious cross-vein connecting the two upper veinlets from the discal cell soon after their origin and

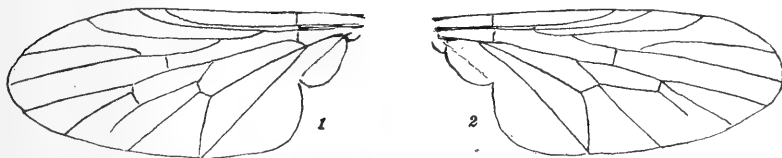


FIG. 1.—*Spania nigra* Meigen. Typical venation, after Meigen.

FIG. 2.—Venation in a specimen from near Bar Harbor, Maine.

thereby forming a small complete cell above the end portion of the discal cell, discal cross-vein hardly before the middle of the discal cell; anal cell sometimes barely closed or sometimes distinctly petiolate; it is very usual to find the venation varying differently in the two wings." In the specimen before me the anterior or

"discal cross-vein" is decidedly before the middle of the discal cell. The most striking feature of the venation in this specimen, however, and a variation not mentioned by Verrall, is the position of the fifth vein, as the posterior cross-vein is wanting and the vein extends to the edge of the discal cell; the fusing gives the appearance that it was a part of the fourth vein as shown in Figure 2. If this variation should prove constant I would propose the name *americana*. The typical venation, as figured by Meigen, is shown in Figure 1. A true representative of the genus *Spania* has not before been recorded from North America. Specimen in the collection of the Boston Society of Natural History.

Ptiolina edeta (Walker).

Spania edeta Walker, List Dipt., pt. 3, p. 489, 1849.

This species belongs to the genus *Ptiolina*. I have taken it on the "Alpine Garden" (5000 feet), Mt. Washington, New Hampshire, July 4, 1914. It has also been recorded from Alaska by Coquillett.

Hilarimorpha pusilla, sp. nov.

♂.—Head and antennae black, the third joint of the antenna about twice as long as wide, minutely pubescent, and the two-jointed style slightly more than one-half its length; ocelli yellow, prominent. Thorax and abdomen dull black with a thin brownish pollen. Halteres dark brown. Legs light brown. Wings brown, with darker-brown vein, the venation similar to the figure given in Williston's Manual (fig. 1, p. 160) except that the second basal cell is slightly longer. Length 2.5 mm.

Two specimens: *holotype*, Hanover, New Hampshire, July 7, 1908; *paratype*, Norwich, Vermont, July 8, 1908. In the collection of the Boston Society of Natural History.

ALLOGNOSTA Osten Sacken.

Table of Species.

- | | |
|--|-------------------------------|
| 1. Abdomen with the center more or less yellowish | 2. |
| Abdomen a uniform black or bronze | 3. |
| 2. Thorax and scutellum black, discal cell large and angular, halteres dark brown at the base of the knobs | <i>fuscitaris</i> Say. |
| Thorax and scutellum dark bluish green, discal cell small and less angular, halteres entirely yellow | <i>similis</i> Loew. |
| 3. Antennae with the third joint long and cylindrical, pleura black | <i>obscuriventris</i> Loew. |
| Antennae with the third joint short and conical, pleura reddish | <i>brevicornis</i> , sp. nov. |

Allognosta similis (Loew).

Metoponia similis Loew, Cent. IV, 44, 1863.

A study of the types shows that two species are involved. They consist of two males, one bearing the label *similis*, in

Loew's handwriting, the other "New York, Schaum." The description is based entirely on the first specimen, as the following lines show: "Dorsum et scutellum ex nigro viridis . . . cellula discoidali quam Metoponiae fuscitarsis Say multo minore." The other specimen is pure black with a larger discal cell,—a typical *Allognosta fuscitarsis* Say, and the locality of the type was evidently inadvertently transferred to this species. This leaves the type without a locality. It is pinned precisely like a specimen of *Allognosta obscuriventris* Loew, labeled "D. C." collected by Osten Sacken and described at the same time. I have little doubt that this specimen was also collected by Osten Sacken, who in Record of My Life Work in Entomology, p. 94, says: "Many specimens in both collections will be found without any indication of locality. Most of them are specimens of my own early collecting, principally about Washington, D. C. In sending them to Loew I always informed him of the localities, which for this reason ought to be found recorded in his description." The above conclusion as to the locality for this species is strengthened by the presence of two females in the Nathan Banks Collection taken at Falls Church, Virginia, June 28 and July 5, and a specimen from Petersburg, Virginia, June 1, in the collection of Dr. J. Bequaert. The size of the discal cell is about the same as in *Allognosta obscuriventris*, but the greenish-blue thorax and scutellum, brown abdomen, and yellow halteres readily separate it from that species.

Allognosta brevicornis, sp. nov.

♂.—Frontal triangle black, slightly pollinose, face white, with fine blackish hairs, palpi black, proboscis yellow, brown above; antennae reddish, the base of the second joint and the eight annuli of the third joint black, the latter conical and less than twice the length of the basal portion; eyes contiguous, the facets on the lower third of the eye minute. Thorax and scutellum black, shiny, covered with short black hairs; humeri and post-alar callosities brown, pleura reddish brown, black on the middle. Abdomen a uniform dark bronze, shining. Halteres black. Legs yellow, the tip of all the tibiae and the front and middle tarsi entirely black, hind metatarsi yellow, the tip and remaining joints black. Wings tinged with brown, the large stigma and veins dark brown. Length 4.5 mm.

♀.—Front black, shining, a slight central depression and a transverse line above the antennae at about the middle of the head; below this line and the face whitish, pollinose, base of the palpi reddish, and the antennae a brighter red than in the male; pleura entirely red, sternum black. Halteres reddish. In other respects resembling the male.

Thirteen specimens. *Holotype* and *allotype*: Norwich, Vermont, July 7, 1908. *Paratypes*: Mt. Greylock, Massachusetts, June 15, 1906; Jaffrey, New Hampshire, June 18, 1923; and Salisbury Cove, Mt. Desert, Maine, July 12, 1923 (C. W. J.); Bolton Mt., Vermont, July 15, 1922 (Owen Bryant), all in the collection of the Boston Society of Natural History; New Hampshire (Osten

Sacken) in the Museum of Comparative Zoölogy; and specimens from Claremont, New Hampshire, June 20, and Lake Tear, Essex County, New York, July 21, in Dr. J. Bequaert's and the author's collections. In regard to Osten Sacken's specimen, that author in Record of My Life Work in Entomology, p. 95, says: "Diptera marked 'N. H.' on white square, printed labels, were all collected by me in the White Mountains, New Hampshire, whether my name is mentioned or not."

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Occasional Papers
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NEW EPHEMERIDAE FROM NEW ENGLAND.¹

BY JAMES McDUNNOUGH.

THE study of a small but interesting collection of Ephemeridae submitted to me for identification by Mr. C. W. Johnson of the Boston Society of Natural History has resulted in the discovery of several undescribed species, descriptions of which are herewith presented.

Leptophlebia johnsoni, sp. nov.

Male.—Head and thorax rather bright black-brown, especially laterally. Abdomen with segments 2-7 translucent white, segment 2 tinged with pale brownish; spiracles marked by small black dots with faint brown shades above them; segments 8-10 (and often the posterior dorsal portion of 7) opaque, dorsally brown; segment 9 edged laterally with pale creamy, ventrally segment 8 pale creamy, segment 9 pale brown; forceps pale creamy with light-brown subgenital plate; setae white, narrowly ringed with brown; a medio-ventral row of light-brown patches on hyaline segments. Fore legs deep brown, with tip of tibia darker, four posterior legs pale golden brown. Wings hyaline with a faint but distinct pale umber shade in the apical area of fore wing; venation faint with the veins and cross-veins of apical area brownish.

Female.—Deep brown with red-brown shading on vertex of head; legs paler brown. Last ventral segment bilobed, the lobes pointed but the excavation between them rather shallow (less than half the length of segment) and gently rounded apically. Wings without apical cloud. Length of body and fore wing 7 mm.

Holotype.—♂, Jaffrey, New Hampshire, June 21 (C. W. Johnson); in the collection of the Boston Society of Natural History.

Allotype.—♀, Jaffrey, New Hampshire, June 25, in the same collection.

Paratypes.—2♂, same data as holotype; No. 772, in the Canadian National Collection, Ottawa.

Apart from the apical cloud on the primaries of the male, the species is readily distinguished from *L. mollis* and its allies by the form of the male genitalia (Pl. 6, fig. 1).

Ephemerella temporalis, sp. nov.

Male.—Eyes (living) ferruginous yellow; head deep yellowish; thorax rather bright brown, slightly olivaceous dorsally, with a paler, orange-yellow streak from the wing roots to pronotum and with pale creamy shades on the pleura at the base of the wings. Abdomen dorsally with segments 2-7 deep brown,

¹ Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa, Canada.

segments 8 and 9 ruddy brown and segment 10 paler, yellow brown; segments 2-4 with blackish posterior margins; a faint, brown, mediodorsal line, partially geminate on the anterior segments; on the anterior margin of the first eight segments are two small blackish subdorsal dots, frequently surrounded by faint pale shades; the lateral margin of segments 8 and 9 is narrowly yellowish bordered above by a faint blackish line and there are frequently slight blackish markings in the spiracular area. Ventrally pale whitish yellow, posterior segments more opaque than the anterior ones which are shaded laterally slightly with brownish; segments 4-7 with medioventral brown ganglionic blotches; two small black dots on each side of the median line about the center of each segment and a similar lateral one, slightly in advance of these in position; forceps pale ochreous; setae whitish with distinct brown rings. Legs yellow, shading into dirty white on the tibiae, the joints of which are marked with blackish; claws black; there is frequently a dark dot at apex of femora. Wings hyaline, costal veins slightly yellowish at base of primaries, otherwise all veins colorless.

Female.—Paler and more olivaceous in general coloring than the ♂; head yellow with black dots in lower corners next the eyes and slight black markings at bases of antennae and on vertical carina, vertex with central blackish shading and with two ruddy spots each side of the median line, the inner one often obscured by the dark shading; abdominal maculation much as in ♂, the mediodorsal line extending forward on to the rear portion of mesothorax. Length of body 8 mm.; of fore wing 8-10 mm.

Holotype.—♂, Ottawa, Ontario, July 4 (C. H. Curran); No. 778, in the Canadian National Collection, Ottawa.

Allotype.—♀, same data.

Paratypes.—1 ♂, 1 ♀, same data; 1 ♂, Hogs Back, Rideau River, Ontario, June 22 (R. H. Osburn); 3 ♂, Algonquin Park, Ontario, June 18 (J. McDunnough); 2 ♂, North Reading, Massachusetts, June 10 (C. W. Johnson); the two last in the collection of the Boston Society of Natural History.

Owing to the impossibility at the present time of satisfactorily identifying a number of the described species in this genus, the description of a new species is always attended with a certain amount of risk; it seems, however, advisable to tie our Canadian species definitely down to given names and work out the synonymy at leisure. The present species falls into the same group as *lutulenta* Clem., the types of which are before me. These types are in very poor condition and hard to recognize but they all show a sprinkling of black dots on legs and abdomen, lacking in *temporalis*, and the ♂ besides being apparently more olivaceous in coloration, shows slight genitalic differences, notably in the lack of a small tubercle between the bases of the forceps; this feature seems quite characteristic of the present species. The ♀ also resembles the unique ♀ type of *lineata* Clem., which, however, has a brown dorsal stripe rather than a mere line and has further no ventral maculation; the subanal plate shows a distinct angular excavation apically whilst in *temporalis* this excavation is evenly rounded. The Massachusetts specimens were labelled *excrucians* Walsh but my notes on the genitalia of the specimens in the Museum of Comparative Zoölogy at Cambridge, Massachusetts, seem to indicate a different form.

Siphonurus novangliae, sp. nov.

Male.—Head light brown with a black line below the antennae and along the edge of the vertical carina. Thorax brown, shaded with paler on the lateral anterior portion of the mesonotum and with black streaks anterior to the base of primaries; a light ruddy-brown shade before the posterior mesothoracic protuberance which is also tipped with the same color. Abdomen dorsally deep brown shaded largely with yellow brown on the three posterior segments; in segments 2-7 there are pale yellowish, semitranslucent patches laterally on the anterior portion of each segment. Ventrally segments 1 and 2 are largely brown with a yellow band on posterior margin, the remaining segments yellowish with the three posterior segments suffused with brown; there is also a series of brownish lateral patches, largest and most distinct on the anterior segments, reduced to mere streaks or obsolete on the posterior ones; forceps deep brown with basal plate yellow, especially on interior side. Fore leg brown, paler at base of femur and on coxae and with joints of tarsi marked with black; posterior legs yellow brown with the tip of femur and the tarsal joints slightly marked with brown. Setae dirty gray with black annulation. Wings hyaline with black venation and in certain lights with a very faint amber tinge over the entire surface.

Female.—Very similar to ♂ but slightly paler in coloration. Length of body 13 mm.; of fore wing 13 mm.

Holotype.—♂, Brookline, Massachusetts, June 17 (C. W. Johnson); in the collection of the Boston Society of Natural History.

Allotype.—♀, same data.

Paratypes.—2 ♂, Darien, Connecticut, June 11 (C. W. Johnson); 3 ♀, Brookline, Massachusetts, June 11, 17, in the collection of the Boston Society of Natural History and No. 773 in the Canadian National Collection, Ottawa.

The species should be readily recognized by its ♂ genitalia, the penes being barb-shaped at the base with broad truncate apices (Pl. 6, fig. 3); it is distinguished from *typicus* Eaton, a New England species, by the lack of a brown shade in the axillary fold of the fore wing.

Siphonurus rapidus, sp. nov.

Male.—Face pale grayish with broad dark transverse band below the antennae; thorax dull olive brown with a darker mid-dorsal stripe and ruddy brown shading anterior to and on the mesothoracic posterior tubercle; anterior to the wing roots is a pale whitish-yellow shade containing a deep purple-brown streak. Abdomen dorsally with the first seven segments deep purple brown, the anterior margins of segments 3-7 being semitranslucent pale whitish yellow; the three posterior segments are light brown shaded laterally and anteriorly with pale yellowish. Ventrally pale yellowish with a dark purple brown irregular medioventral stripe; anterior segments largely shaded with purple brown; forceps light smoky with pale yellow basal plate; setae dirty white ringed with blackish. Fore leg pale brownish, hind legs dirty white, with the joints marked with purple brown and in some lights with a faint purplish shade beyond the middle of the femora. Wings hyaline with black venation.

Female.—Rather paler than the ♂ and with the medioventral stripe reduced to series of patches. Length of body 10 mm.; of fore wing 12 mm.

Holotype.—♂, North Reading, Massachusetts, June 10; No. 774, in the Canadian National Collection, Ottawa.

Allotype.—♀, Jaffrey, New Hampshire, June 11; in the collection of the Boston Society of Natural History.

The ♂ type, which has been in the Canadian National Collection for some time, is in poor condition and I should scarcely have ventured to describe the species as new if it had not been for the characteristic genitalia, in which the apices of the penes are drawn out into long narrow points (Pl. 6, fig. 4).

Cinygma bipunctata, sp. nov.

Male.—Almost entirely deep black brown, the ventral surface of the abdomen somewhat paler and with the posterior margin of each segment narrowly bordered with dull whitish, this color on the rear segments extending to the lateral portions of the dorsum. Setae whitish with narrow dark rings. Fore femur deep brown, tibia pale brown, tarsi dirty whitish with joint 1 about two-thirds the length of 2; hind legs dull yellowish, the femora with prominent deep-brown median and apical spots. Wings hyaline with faint brownish tinge at extreme base, the longitudinal veins pale brownish, the cross-veins colorless and very indistinct except in apical area.

Female.—Quite similar to the ♂. Length of body 6 mm.; of fore wing 8 mm.

Holotype.—♂, Wales, Maine, June 18, 1907 (C. A. Frost); in the collection of the Boston Society of Natural History.

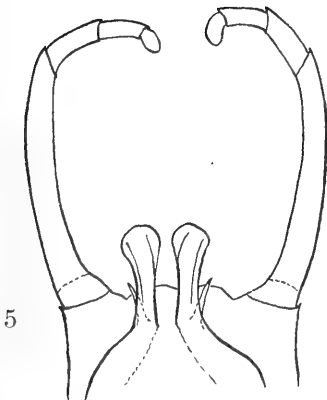
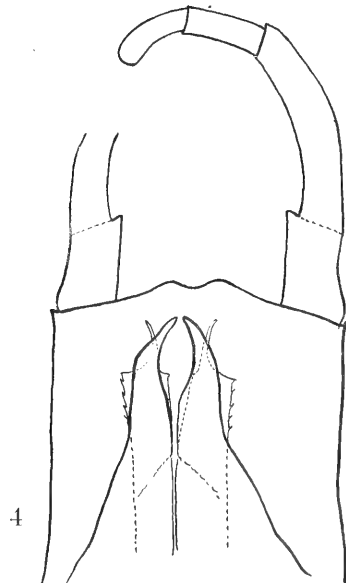
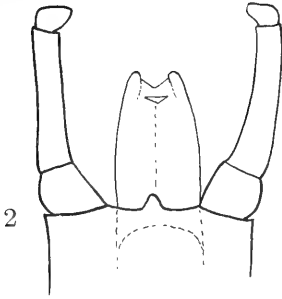
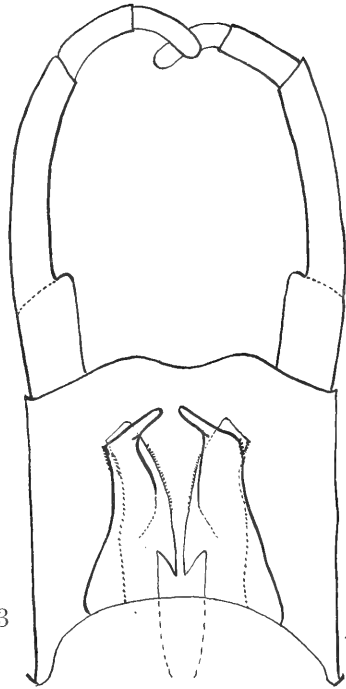
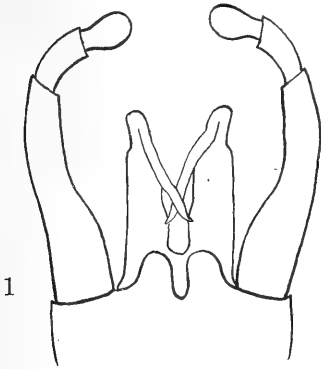
Allotype.—♀, Squam Lake, New Hampshire, July 2 (G. M. Allen); in the collection of the Boston Society of Natural History.

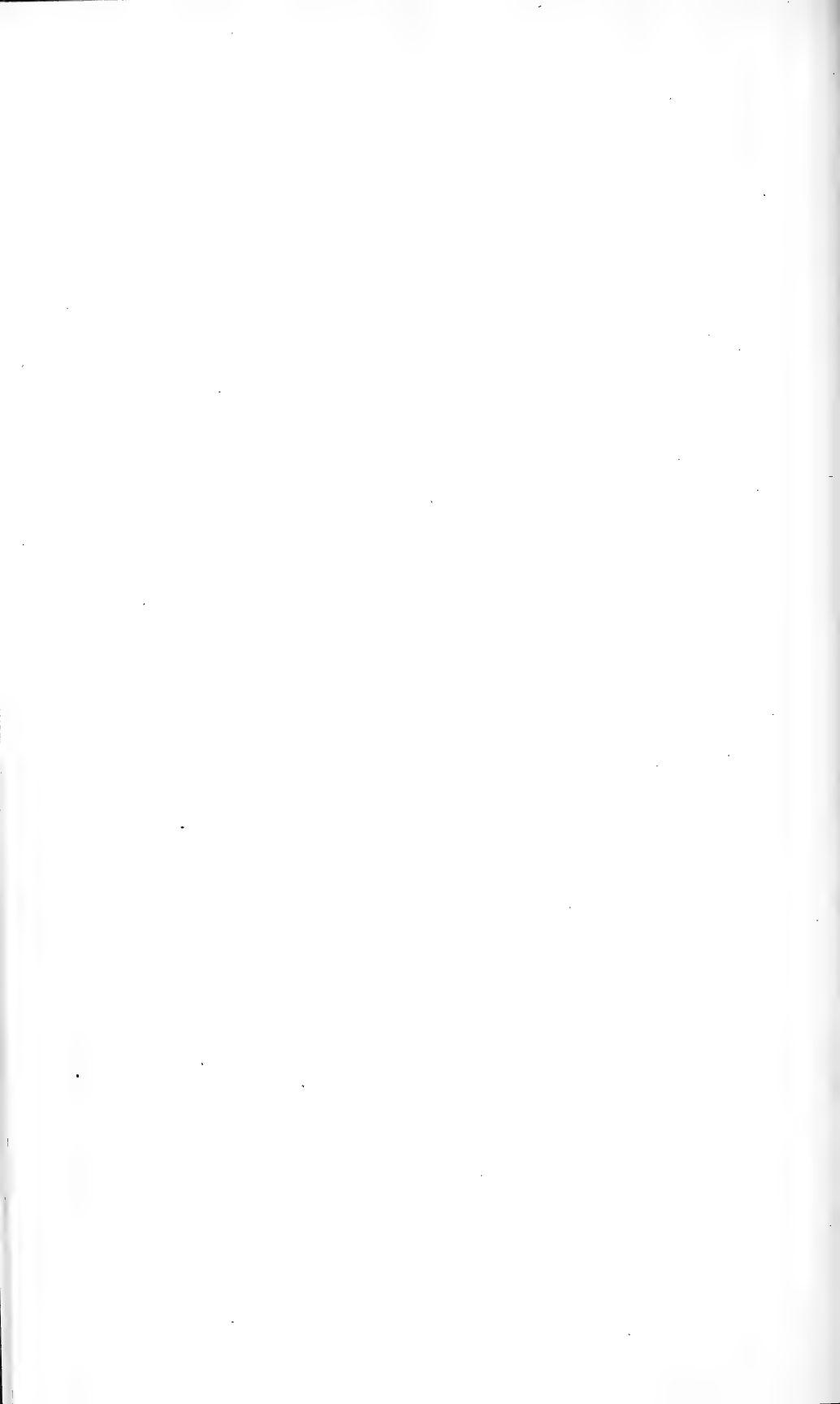
Paratype.—♂, same data as allotype; No. 775, in the Canadian National Collection, Ottawa.

The species has a superficial resemblance to *Choroterpes basalis* but the paired intercalaries between the first and second anal veins and the type of genitalia (Pl. 6, fig. 5) clearly indicate the above generic reference. The specimen serving for the slide of the genitalia would appear to have an extra joint in the forceps but I presume that this is an abnormal condition.

EXPLANATION OF PLATE 6.

Male genitalia of: 1.—*Leptophlebia johnsoni*, sp. nov.; 2.—*Ephemerella temporalis*, sp. nov.; 3.—*Siphonurus novangliae*, sp. nov.; 4.—*Siphonurus rapidus*, sp. nov.; 5.—*Cinygma bipunctata*, sp. nov





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THE IDENTITY OF *TROCHILUS RUCKERI* BOURCIER.

BY OUTRAM BANGS AND THOMAS E. PENARD.

FOR a long time the name *Threnetes ruckeri*, based on *Trochilus ruckeri* Bourcier (Proc. Zool. Soc. London, 1847, p. 46) has been used for a Costa Rican hummingbird of which a southern form, inhabiting Ecuador and western Colombia, has borne the name *Threnetes fraseri* (Gould). Bourcier's description, however, does not agree with the northern form, a fact already discussed by Hellmayr (Proc. Zool. Soc. London, 1911, p. 1177), Simon (Hist. Nat. Trochil., 1921, p. 250), and Todd (Ann. Carnegie Mus., vol. 14, 1922, p. 271). We fully appreciate the reluctance of these authors to make any change affecting nomenclature until the type in the old Loddiges collection might be examined. Such an examination, if possible, would be highly desirable. On the other hand, we believe that Bourcier's description so clearly applies to the southern form now known as *Threnetes fraseri*, that we cannot conceive in what manner an investigation of the type could possibly affect the situation. Bourcier says definitely that the under parts of the body are gray black, bronzed, that the head, neck, scapulars, back, and tail-coverts are shiny dark green, and that the middle of the tail is blue black. These characters all apply to the southern, not to the northern bird; and we, therefore, do not hesitate to attach the name *ruckeri* to the form which is currently known as *fraseri*.

The Costa Rican bird being thus without a name, we propose to call it

Threnetes ruckeri ventosus, subsp. nov.

Type, adult ♂, Museum of Comparative Zoology, no. 116,624, from Pozo Azul, western Costa Rica, 21 February, 1898; collected by C. F. Underwood.

Subspecific characters.—Similar to *Threnetes ruckeri ruckeri* (Bourcier) of western Ecuador, but upper parts bronzy green instead of shiny grass-green; middle portion of the tail-feathers (except the middle pair) dull blackish without any bluish or purplish tint; belly pale, buffy gray.

Measurements.—Type, adult ♂: wing, 60.0; tail, 35.5; exposed culmen, 29.5.

Remarks.—Hellmayr (*loc. cit.*) has already called attention to the fact that the size of the buffy throat-spot is not diagnostic because it varies with the age of the individual. This we find to be

the case. In fact a very young bird, not yet full-grown, no. 117, 670 in the Museum of Comparative Zoölogy, has no cinnamon-rufous patch whatever, and since Bourcier does not mention such a patch at all, we suspect that he had a young bird. Also in the series of fifteen specimens from Costa Rica, examined by us, there is none, young or adult, with any green or bronze on the chest such as Bourcier described by the words "*gris-noir bronzé*," whereas in the southern form the dark-gray chest is strongly mixed with green.

The Darien bird, *Threnetes ruckeri darienensis* Bangs and Barbour, has much paler gray under parts than true *ruckeri*, and the middle portions of the tail-feathers are not purplish. The upper parts, however, are dark green as in the bird from Esmeraldas, — in other words, it is an intermediate form. A bird from the Caribbean coast of Panama in the Museum of Comparative Zoölogy at Cambridge and, according to Chapman (Bull. Amer. Mus. Nat. Hist., vol. 36, 1917, p. 279), birds from the Canal Zone, are also intermediate but much nearer the Costa Rican than the Darien form.

We have used the generic term *Threnetes* instead of *Heteroglaucis*, because the characters of the latter appear to be of sub-generic rather than of generic value. The four subspecies of Rucker's Hermit are thus:

1. *Threnetes ruckeri ruckeri* (Bourcier), Proc. Zool. Soc. London, 1847, p. 46. (No type locality stated — we select Esmeraldas, northwestern Ecuador.)

Range: western Ecuador and western Colombia.

2. *Threnetes ruckeri darienensis* Bangs and Barbour, Bull. Mus. Comp. Zoöl., vol. 65, no. 6, 1922, p. 204 (Mt. Sapo, eastern Panama).

Range: eastern Panama to State of Santander and Santa Marta, Colombia.

3. *Threnetes ruckeri venezuelensis* Cory, Field Mus. Publ., no. 167, ornith ser., vol. 1, no. 7, 1913, p. 286 (Orope Zulia, Venezuela). Not seen by us.

Range: western Venezuela.

4. *Threnetes ruckeri ventosus* Bangs and Penard. (Type locality: Pozo Azul, western Costa Rica.)

Range: Costa Rica, north to Nicaragua (to Guatemala?); south to Canal Zone of Panama where not typical, approaching *T. r. darienensis*.

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NEW SPECIES OF SYRPHIDAE.¹

BY C. HOWARD CURRAN.

SYRPHINAE.

Syrphus johnsoni, sp. nov.

BELONGS to the *americanus-nitens* group; the spots on the second segment reach broadly forward to the anterior angles of the segment, the two following bands broadly separated from the lateral margins and practically straight, not bi-concave in front as in *Syrphus nitens*. Differs from *Syrphus opinator* O. S. in having the lower lobe of the squamae without pile.

Male.—Length, 9 mm. Face reddish yellow, dulled by pale yellowish pollen, the jowls, cheeks, broad oral margin and broad facial stripe, which is well separated from the base of the antennae, shining black. Facial pile black. In profile the face is gently concave above, almost perpendicular to the apex of the tubercle, sharply retreating below the tubercle to the not prominent oral tip. Frontal triangle shining black, the orbits yellow pollinose, pile moderately long, black. The frontal triangle is gently convex. Vertical triangle black, black pilose, a little prominent, slightly longer than broad. Occiput opaque black, the orbits grayish pollinose; pile whitish, slightly yellowish above, the cilia black. Antennae reddish; second joint above, the third above and on apex, broadly brown. Arista brown, gradually tapering.

Thorax brassy black, with yellow or reddish-yellow pile. Scutellum pale yellow with bluish opalescence, its base narrowly black, the pile wholly black.

Posterior legs black, the apex of the femora and base of the tibiae reddish yellow; front four legs reddish yellow, the basal third of their femora and last four joints of the middle tarsi black. All the long hairs on the legs are black.

Wings hyaline, stigma pale yellow; the third vein ends in the tip of the wing. Squamae whitish, the upper lobe slightly tinged with brown, the border and fringe pale yellow. Halteres yellow.

Abdomen opaque or sub-opaque black, with three broad reddish-yellow fasciae, the first broadly interrupted, the others entire; first segment wholly, the entire side margins, narrow apex of the second, broad apices of the two following, and whole of the fifth segment shining black. The yellow spots on the second segment lie mostly behind the middle, are triangularly oval, their small end inward, their outer end produced broadly forward almost to the base of the segment. Band on the third segment separated from the front margin by one-third its width, its anterior margin almost straight but a small triangle projects forward in the middle; behind there is a broad triangular black, median angulation, the band slightly wider laterally, its outer ends obliquely truncate. Band on fourth segment similar, but slightly narrow, its outer ends more oblique. Apex of fourth segment rather broadly reddish; a

¹Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa, Canada.

small spot on the anterior angles of the fifth segment similar in color. Pile yellow basally and on the three yellow bands, elsewhere black.

Holotype.—♀, Jaffrey, New Hampshire, June 15, 1917, collected by C. W. Johnson; in the Museum of the Boston Society of Natural History.

This species approaches *Syrphus nitens*, but in that species the forms in which the spots on the second segment reach the lateral margin are much paler and none of them has the yellow side margin of the second segment so broad. The entire fasciae are much straighter than in any specimens of *nitens* I have seen. This group is an extremely difficult one and large series are necessary in order to determine the limitation of species.

Epistrophe Walker

The genus *Epistrophe* was established by Walker for the reception of *Syrphus grossulariae* Mg. (as *E. conjugens*, n. sp.) in "Insecta Saundersiana," Dipt., pt. 3, p. 242, 1852. As I have limited this group of the old genus *Syrphus*, *Epistrophe* takes precedence over *Stenosyrphus* Mats. (1916), a name I have previously used.

Epistrophe abruptus, sp. nov.

Similar in form to *Syrphus transversalis* Curran but the cheeks in front, oral margin and median facial stripe are black and the abdomen is entirely shining black. Eyes pilose.

Female.—Length, 7 mm. Face reddish yellow, with almost whitish, rather thin pollen; median stripe occupying nearly one-fifth the width of the face and reaching almost to the base of the antennae, the oral margin broadly and the cheeks in front, shining black; jowls reddish brown. Pile on sides of face black, elsewhere whitish, not long. In profile the face is rather perpendicular, shallowly concave on the upper half, shortly concave below the rather long, roundish tubercle, the oral tip scarcely projecting. Front shining greenish black, with an arch of yellow pollen a little below the middle, the pollen continuing below along the orbits to the face. The narrow, rounded W above the antennae is reddish. Front wholly black pilose. Occiput aeneous, densely grayish pollinose along the orbits except above; the pile yellow on upper half, white on lower half and cheeks; occipital ciliae not differentiated. Eyes thinly short whitish pilose. Antennae black; third joint reddish on basal half except above, broad, oval, its upper margin almost straight; arista black, thickened on sub-basal half.

Mesonotum aeneous, slightly darker on disc; its pile short, fine, yellow. Pleura aeneous, with thin white pollen and white pile. Scutellum translucent reddish, wholly bordered by blackish blue, its pile chiefly black on apical half, short and yellowish on basal half, intermixed toward the middle.

Legs black, hind femora at apex and broad base of their tibiae, obscurely reddish; apical half or less of front four femora and the whole of their tibiae, brownish red, the knees paler. Legs with pale pile, the posterior tibiae short black pilose.

Wings cinereous hyaline, stigma luteous. The third vein ends in the tip of the wing. Squamae whitish, with yellowish border and fringe. Halteres yellow.

Abdomen shining black, the base more greenish black, the pile pale, the posterior margins of the second to fourth segments broadly black pilose except laterally. In shape the abdomen is rather rectangular, the sides strongly curved under from the apex of the second to tip of the fourth segments, the fifth and sixth segments are widest laterally, very narrow in the middle; all

the terminal segments visible from above because of the upturning of the apical segments.

Holotype.—♀, Mount Washington, New Hampshire, 2,500 ft., June 13, 1916, collected by C. W. Johnson; in the Museum of the Boston Society of Natural History.

This species cannot be confused with any described species on account of the truncate abdomen and absence of pale fasciae. Its only ally is *Syrphus transversalis* Curran, which has bare eyes, yellow abdominal fasciae and never more than a slight brown dash on the upper portion of the facial tubercle. The ♂ will be difficult to associate, although the terminal segments should be more or less deformed in appearance, if it is similar to ♂ *transversalis*.

CHILOSINAE.

Pipiza nigrotibiata, sp. nov.

Figs. 1 and 2.

Allied to *Pipiza femoralis* Lw., especially var. *albipilosa* Williston, but the posterior tibiae are almost all long black pilose, the whole insect is darker and the pile longer. The ♀ has no pale abdominal fasciae.

Male.—Length, 8.5 to 9.5 mm. Face moderately retreating, scarcely produced below, gray pollinose, black pilose with the sides and upper half of the front pale-haired or all pale-haired, the hair rather long and abundant. Front similarly pollinose to face except immediately above the antennae. Vertical triangle pale-haired, several black hairs in front and a few scattered elsewhere; occiput grayish pollinose and pale-haired, the occipital ciliae black. Eyes with black or brown hair which becomes yellowish and white on the lower edge. Antennae black, the apex of the second and broad base of third segments often brownish red; third joint elongate-subcordate, more cut off above; arista longer than the third joint, thick on basal half, distinctly micropubescent to tip, brownish red in color, the apical third brown (Fig. 1).

Thorax and abdomen blue black, densely punctured, white pilose, the former with scattered black hairs before the suture, which may sometimes be very numerous, especially along the sides and often on the posterior and upper margin of the mesopleura. The scutellum lacks an apical groove and bears only a few black hairs or none.

Legs black; apices of femora, basal sixth and apex of tibiae, first three joints of front four tarsi, although the third joint may be darker, reddish yellow, the broad apex of the first joint of the hind tarsi and the whole of the second joint brownish red. Pile of legs moderately long, whitish, the posterior tibiae with long black hair except on the antero-ventral surface and anterior surface at apex. Posterior femora rather robust, strongly angulate at apex. They are larger than in *Pipiza femoralis* Lw. but decidedly smaller than in *grandifemoralis* Curran (Fig. 2).

Wings cinereous hyaline, usually strongly tinged with brown on apical half, especially toward the front. Venation as in *femoralis*.

Abdomen with the usual sub-opaque areas, the pile longish and the black pile much more conspicuous than in allied species. Genitalia normally all black-haired.

Female.—Front moderately narrowed above; in the middle with broadly separated, large, roundedly triangular gray pollinose orbital spots, connected along the eyes with the facial pollen. Frontal pile almost white, with conspicuous black hairs just above the antennae and a very narrow fascia across the ocelli.

Pile shorter and denser throughout, the posterior tibiae with white pile, their tarsi almost pure reddish on the first two joints, but the first is darker above. The abdomen lacks the sub-opaque areas and the insect is more slender.

Holotype.—♂, Bathurst, New Brunswick, June 15, 1923 (J. N. Knull); No. 776, in the Canadian National Collection, Ottawa.

Allotype.—♀, Jaffrey, New Hampshire, June 17 (C. W. Johnson).

Paratypes.—4♂, Chester, Massachusetts, August 6 (C. W. Johnson); ♂, Alstead, New Hampshire, August 8, 1914 (A. P. Morse).

The allotype and four paratypes are in the Museum of the Boston Society of Natural History.

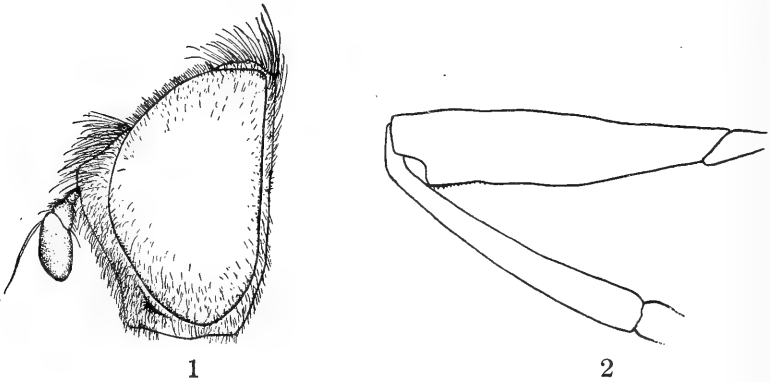


Fig. 1.—*Pipiza nigrotibiata*, *sp. nov.* Head in profile.

Fig. 2.—Posterior femur and tibia.

Pipiza nigrotibiata is a very distinct species and is readily distinguished from its allies. The only confusion which may arise concerning the identity of the ♀ may be expected in the case of *P. severnensis* Curran and *tricolor* Curran. This latter may be eliminated on account of its much smaller size and absence of femoral angles, while *severnensis*, (as I remember the ♂) has the femora no larger than in *femorialis* Lw. and both these females may have a reddish abdominal fascia, as neither is known. None of the other eastern species has the hind tibiae black pilose and there should not, therefore, be any confusion.

Occasional Papers
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NEW SPECIES OF PLATYPALPUS OCCURRING IN
NEW ENGLAND.

BY A. L. MELANDER.

In order to facilitate the preparation of the list of New England Diptera, the following descriptions of new species of flies of the family Empididae have been prepared, based in part on material collected in recent years in New England.

Platypalpus coquilletti, sp. nov.

Syn.: *trivialis* Melander, not Loew, Tr. Am. Ent. Soc. vol. 28, p. 216, f. 26, 34, 43 (1902).

Body black, thorax pollinose, with yellow bristles, coxae and femora largely black. Antennae black, third joint oval; front femora thickened, hind femora and all tibiae yellow, front tibiae thickened, wider than the hind tibiae, spur of middle tibiae strong, tarsi strongly annulate; posterior cross-vein short, located beyond the anterior a greater distance than its length, the under side of the second basal cell greatly bowed upward distally, the first posterior cell wide near the middle.

Type.—Male, New Bedford, Massachusetts, June 12 (Hough), in Melander Collection.

Paratype.—Bayville, Long Island, New York (Banks).

Platypalpus cuneipennis, sp. nov.

♂.—Length 1.75 mm. Black, with yellow legs, mesonotum shining; antennae black, the outer joint short-ovate, one-half the length of the black arista; cross-veins contiguous, anal angle much reduced, anal cell completely lacking. Occiput lightly dusted, its hairs fine and sparse; vertical bristles small; front polished, less than twice as long as wide; face one-half the front in width, white pollinose; proboscis black; palpi large, decumbent, pale yellow, with a single pre-apical hair. Humeri and extreme sides of the mesonotum lightly dusted, dorsal hairs sparse, bristles small and yellow, lateral scutellars short, median pair well separated; sternopleurae wholly polished; abdomen polished, its hairs sparse, genitalia small, terminal. Hairs of the legs rather long, front femora little thickened, middle femora with about fifteen setulae in each flexor row bounded on each side by two or three yellow bristles; middle tibiae three-fourths their femora, with a small black spur, tarsi becoming somewhat dusky apically. Calypteres, fringe and halteres yellow. Wings distinctive in lacking the anal cell; veins piceous except at base, costa somewhat thickened beyond the first vein, its last sections proportioned 4:3:1; third and fourth veins nearly parallel, cross-veins at two-fifths the wing-length, basal

sections of the fifth vein three-fourths the distal section, wings widest at end of fifth vein and there two-fifths the length; cilia as long as the anterior cross-vein, anal angle less projecting than in the other species.

Holotype.—Lynden, Vermont, June 13, 1914 (Melander).

***Platypalpus flammifer*, sp. nov.**

Length 2.2 mm. Black, disk of the thorax shining, antennae elongate, with a white arista, front and face broad and shining; legs more or less testaceous, the posterior coxae, the apical third of the hind femora, the tibiae and the tarsi brownish to black, no tibial spur; cross-veins meeting and nearly transverse. Occiput finely cinereous, its hairs sparse, the single vertical and ocellar bristles black, sides of the front diverging above; antennae black, three-jointed, the basal joint minute, the last joint subulate, four times as long as broad and nearly twice as long as the arista; palpi short ovate, brownish, not hairy but with a single apical seta. The narrow sides of the thorax and the upper half of the pleurae cinereous, one pair each of the usual bristles black; abdomen shining, ovipositor pollinose; pygidium obliquely erect, glistening, bare, the lower valve shallowly convex and produced upward. Front femora not ciliate, middle femora with about eight yellow setae behind, their tibiae three-fourths as long as the femora. Veins thin but firm and brown, costa somewhat thickened at the end of the first vein, its second, third and fourth sections proportioned 4: 2.5:1; third vein straight, ending before the tip of the wing, parallel with the fourth vein, cross-veins at three-sevenths the length of the wing; sections of the fifth vein proportioned 0.4: 0.5:1; anal cross-vein at an angle of sixty degrees, anal vein faint, vanishing at the base, marginal cilia short.

Distribution.—Ithaca, New York (Cornell University Collection); Buffalo, New York (M. C. VanDuzee); Hartland, Vermont, May, and Hanover, New Hampshire (P. W. Whiting); Greenfield, Massachusetts; Lynden, Vermont; and Perma, Montana (Melander).

Holotype.—Ithaca, New York (Melander Collection).

***Platypalpus harpiger*, sp. nov.**

♀.—Length 5 mm. Body black, head and thorax closely gray pollinose, legs including coxae entirely yellow, the tip of the long tibial spur alone black; base of abdominal segments with narrow interrupted pollinose fasciae; antennae yellow, the third joint short; cross-veins separated, the posterior oblique. Front and face with parallel sides, the ground-color of the face yellow; epistome pollinose; one pair each of ocellar and vertical bristles yellow; proboscis black; palpi large, securiform, pale yellow, with a few pre-apical white hairs; antennae entirely yellow, the outer joint triangular, twice as long as deep and two-thirds as long as the black, moderately thick arista. Pollinosity of mesonotum dense, the setulae of the acrostichal and dorso-central rows and the bristles yellow, four scutellar bristles, center of sternopleurae polished; last two segments of the abdomen opaque, the stiles linear. Front femora with about a dozen outstanding flexor yellow hairs; middle femora with twenty-eight black setulae in each of the flexor series and with about six yellow bristles in front toward the knee and about a dozen longer yellow bristles in the posterior row; middle tibiae more than two-thirds the length of the femora. Calypteres, fringe and entire halteres pale yellow. Veins yellowish becoming slightly darker toward the tip, the second, third and fourth sections of the costa proportioned 7: 6:1; third vein gently swinging back and ending a little beyond the tip of the wing,

fourth vein quite strongly bowed, the first posterior cell widest at the middle where it occupies two-sevenths of the wing-width; cross-veins at two-fifths the wing-length, distance between the cross-veins two-thirds the length of the anterior cross-vein; base of anal vein very weak.

Holotype.—Boston, Massachusetts, June, 1914 (Melander).

Platypalpus hians, var. *fuscohalteratus*, var. nov.

Quite similar to the Western typical form except that the thoracic bristles (*i.e.*, one notopleural, one supra-alar, one prescutellar, one postalar, and four scutellar) are black and that the halteres are decidedly dusky; face very short, the epistome polished. Dark halteres are very unusual among the species of *Platypalpus*. The Maine specimen has the third antennal joint largely yellow.

Distribution.—Ithaca, New York; Capens, Maine (C. W. Johnson); Sudbury, Ontario (H. S. Parish).

Holotype.—Ithaca, New York (Melander Collection).

Platypalpus holosericus, sp. nov.

♀.—Length 3–4 mm. Robust, black, thorax entirely densely cinereous pollinose, the ground color nowhere visible; bristles yellow, legs including the coxae yellow, tibial spur large, epistome and face white pruinose; base of the antennae yellow, the third joint ovate, two-thirds as long as the arista; posterior cross-vein oblique, located beyond the anterior, first posterior cell narrowed at the apex. Head densely cinereous pollinose, one pair of yellow vertical bristles present; front narrow, its sides parallel; antennae two-jointed, the outer joint nearly twice as long as wide; palpi yellow, broadly oval, large, not hairy. Mesonotal hairs rather sparse but evident, two dorso-central, one pair of each of the other usual bristles; no glabrous pleural spot; abdomen shining black, the lateral anterior angles of the segments with more or less evident triangular cinereous marks, the lateral pits evident; ovipositor brown-pollinose. Front femora with yellow flexor cilia, middle femora not setose behind; middle tibiae two-thirds as long as their femora, tarsi weakly annulate. Veins pale, costa not thickened, its second, third and fourth sections proportioned about 5:5:1; third vein nearly straight, ending at or beyond the wing-tip, the fourth vein with a perceptible backward curvature, the first posterior cell widest near the middle; posterior cross-vein separated from the anterior by a little less than the length of the anterior; sections of the fifth vein proportioned 0.6:0.9:1; anal cross-vein forming an angle of fifty-five degrees, anal vein distinct but weak, marginal cilia very short.

Sixteen specimens: Forest Hills, Massachusetts, July (C. T. Brues); St. John, New Brunswick, June (W. McIntosh, in the U. S. National Museum); Megantic, Quebec, June (C. H. Curran, in Canadian National Museum).

Holotype.—Forest Hills, Massachusetts (Melander Collection).

Platypalpus pectinator, sp. nov.

Length 3 mm. Black, mesonotum densely pubescent, shining, pleurae pruinose except usual spot, bristles yellow, legs yellow, tibial spur minute, tarsi not annulate, third antennal joint conical (♂) or ovate (♀), cross-veins meeting. Occiput cinereous, front and face nearly devoid of dust, shining, sides of the front diverging above; palpi very large, orbicular, yellow, white-pollinose on the outside, one short white pre-apical seta; antennae plainly three-

jointed, not shining, the third joint of male nearly three times as long as wide, pubescent, two-thirds as long as the arista; of the female short ovate and one-fourth or one-third as long as the arista; cephalic bristles small, blackish, two pairs of verticals. Pubescence of the mesonotum fine but relatively dense, humeri, notopleural suture, scutellum and pleurae densely whitish-gray pruinose, sternopleurae glabrous in front and in the middle behind; abdomen brownish black, shining; pygidium large, spherical, minutely but densely pubescent so as to appear pollinose under low magnification. Front legs not thickened, front femora with fourteen fine short cilia below in the anterior row, under side of the middle femora with about twenty-six black setulae in the anterior row and about sixteen black setae in the posterior row, in back of which are eight long stiff yellow setae; middle tibiae three-fourths as long as their femora. Veins thin but firm and blackish; costa not thickened, its second, third and fourth sections proportioned 4.4: 3:1; third vein recurved, ending beyond the tip of the wing; cross-veins nearly transverse, located at three-sevenths the length of the wing, meeting, the posterior nearly three times as long as the anterior; sections of the fifth vein proportioned 0.5: 1:1; anal cross-vein at an angle of forty degrees, anal vein fine but distinct, marginal cilia short.

Thirty specimens; type from Moscow Mountain, Idaho, August 23; paratypes from Pullman, Palouse, Mica, Washougal, Everett, Tulalip, Lake Cushman, Lake Crescent and Vashon, Washington; Moscow and Lake Waha, Idaho; Perma, Thompson and Gardiner, Montana (Melander); Banff, Alberta (Garrett); Price County, Wisconsin (W. M. Wheeler); Niagara Falls, New York (M. C. VanDuzee); and Chester, Massachusetts (C. W. Johnson). One specimen from Alaska differs in having the posterior cross-vein located a little beyond the anterior. The Atlantic Coast specimens have the notal pubescence very slightly longer than the others, thus approaching *P. pubescens*.

Platypalpus porrectus, sp. nov.

♀.—Length 2.5 mm. Head globose, front and face short and relatively broad, cinereous, the sides of the front diverging above, epistome black, mouth-opening rather large; proboscis black, inner side of the oval palpi blackish, the outer side white-pollinose; one apical seta, antennae black, two-jointed, the outer joint elongate, nearly four times as long as wide, rather shining and pubescent, the slender arista about two-thirds as long as this joint; occiput olivaceous cinereous, two pairs of vertical and one of ocellar bristles black. Mesonotum moderately coated with olive-gray pollen, the bristles black, one small humeral and one pair each of notopleural, supra-alar, postalar, dorso-central and scutellar bristles; pollen of the pleurae whitish, sternopleural spot large; abdomen shining black, the pits hardly noticeable. Legs testaceous, coxae blackish at the base, tarsi progressively dusky; front femora not ciliate but puberulent beneath, middle femora with a few irregular blackish setulae on the anterior face, not yellow-setose, but the black setulae of the posterior flexor row longer than usual; spur of the middle tibiae minute. Veins blackish, costa swollen at the insertion of the first vein, its second to fourth sections proportioned 2: 2.2:1; third vein straight, fourth vein slightly diverging, the first posterior cell widest at the end, cross-veins meeting, the anterior two-thirds as long as the transverse posterior, sections of the fifth vein proportioned 0.5: 0.6:1; anal cross-vein at an angle of sixty degrees, anal vein weak over all; marginal cilia short.

Distribution.—San Juan and Orcas Islands, Washington (Melander); Eureka, California (H. S. Barber); Capens, Maine (C. W. Johnson).

Type.—Mt. Constitution, Washington, May 17, 1910.

Platypalpus sutor, sp. nov.

Length 2.5 mm. Mesonotum moderately cinereous pollinose on a black ground, bristles yellow, legs including the coxae yellow, tibial spur large. Front cinereous, slightly broadening above, face half as wide as the front, white, epistome shining black; palpi short, oval, blackish inside, white pruinose outside, with two apical setae; antennae black, the basal joint minute, the third joint ovate, one-half longer than broad and one-third as long as the arista. Setulae of the occiput and of the mesonotum rather long but sparse, two pairs of dorso-centrals; pleurae whitish pruinose, sternopleural glabrous space large, center of the mesopleurae thinly coated; abdomen shining black, pygidium large. Front femora ciliate beneath, middle femora sparsely ciliate in front and setose in back, tarsi weakly annulate. Veins brownish, costa not thickened, its second, third and fourth sections proportioned 4:2.6:1; third vein ending before the tip of the wing, nearly straight, the fourth vein subparallel with it, cross-veins nearly transverse and nearly meeting, located before the middle of the wing; sections of the fifth vein proportioned 0.6:0.7:1; marginal cilia as long as the anterior cross-vein.

Type.—Woodland, Washington, May 23, 1910.

Paratypes, sixteen, from Everett, Lynden, Potlatch, Quilcene, Sultan and Tacoma, Washington, July and August (Melander).

Variation.—Upper side of the front and hind femora except the base and apex, brown. British Columbia (U. S. National Museum).

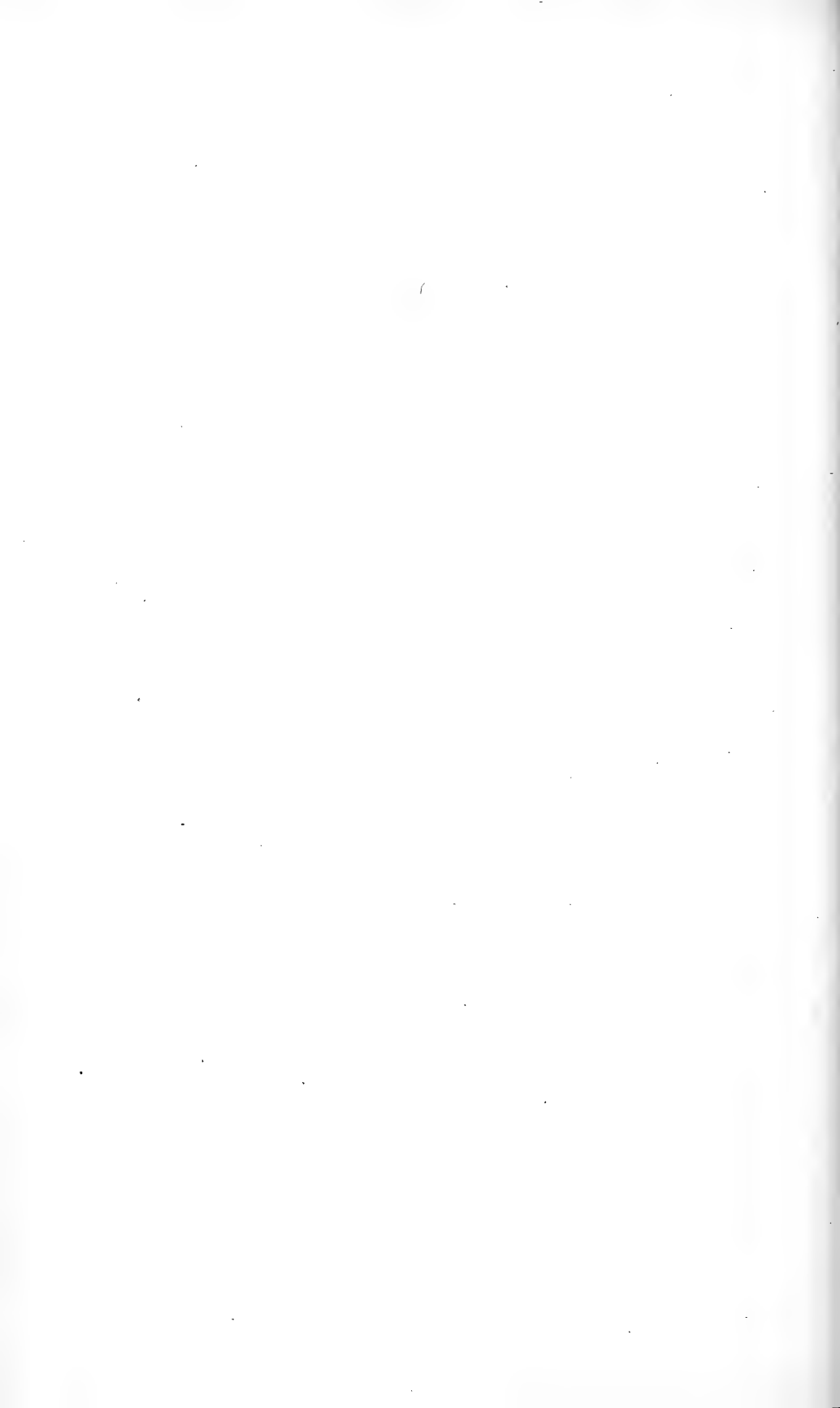
Variation.—Last two sections of the fifth vein subequal. New York; Chester, Massachusetts.

Platypalpus versutus, sp. nov.

♀.—Length 2 mm. Body yellow, the thorax overlain with white pollen; the abdomen with a slender blackish median line extending over the first five segments. Head black in ground color, white-pollinose, the face yellow and overlain with dense silvery pubescence; palpi yellow with white pubescence, measuring one-third as long as the testaceous proboscis, hairs and bristles of the head entirely white; antennae light yellow, the third joint ovate, the arista yellowish, a little longer than the third joint. Thoracic bristles yellow, rather long, one humeral, one notopleural, one supra-alar, two dorso-central, two scutellar bristles; sternopleurae with a rather small glabrous space. Legs entirely yellow, only the claws and the tip of the small tibial spur black; middle femora ciliate with nine yellow bristles. Veins nearly colorless, the second, third and fourth sections of the costa proportioned 3.5:2.5:1; third and fourth veins parallel, cross-veins separated by the length of the anterior, the posterior rather oblique; anal cross-vein nearly perpendicular, base of anal vein wanting, the outer part weak.

Type.—Falls Church, Virginia, June, collected by Nathan Banks.

Paratype.—Male, Mount Equinox, Vermont (C. W. Johnson); has blackish open genitalia and lacks the abdominal vitta. Paratype, female, Ithaca, New York (Melander) also lacks the abdominal stripe.



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NOTES ON MILTOGRAMMINAE WITH DESCRIPTIONS
OF TWO NEW SPECIES.

BY H. W. ALLEN.

Senotainia vigilans, new species.

Male.—Front at narrowest 0.38 of the head-width (average of two 0.37, 0.39); frontal vitta brown, at base of antennae at least twice as wide as lowest ocellus, broader posteriorly; vertex and upper part of the front including the vitta, golden pollinose, remainder of front and the face silvery; about twelve weak bristles in each frontal row; only two orbitals present, approximated at their insertion which is near the vertex, the lower one proclinate, the upper reclinate; parafrontals nearly bare of hairs; vibrissae length of second antennal joint above front edge of oral margin, and separated by one and one-half times length of second antennal joint; facial ridges bare save for one or two small bristles just above vibrissae; no scattered bristly hairs lateral to vibrissae; antennae extend three-fourths distance to vibrissae, second joint yellow at least apically, third joint yellow usually overlain with blackish tomentum, twice the length of the second joint; arista thickened on the basal three-fifths, penultimate joint slightly longer than broad; parafacials bare; in profile, buccal width one-tenth eye-height and subequal to width of parafacial, front projects nearly half the eye-width; axis at vibrissae slightly less than at base of antennae. Thorax cinereous, with four indistinct black vittae; postsutural dorsocentral bristles becoming rapidly weaker from back to front, usually but two differentiated; two sternopleurals; three pairs of marginal scutellars of about equal size. Abdomen red save the base of the first and the apex of the fourth segments which are black, thinly gray pollinose except the numerous polished spots on dorsum; first segment without median marginal macrochaetae, second with a weak pair, third and fourth with marginal rows of about eight bristles. Inner forceps of the genitalia moderately stout, tapering to sharp, stout points, united save for minute cleft at the apex; outer forceps almost as long as the inner pair, bulbous at base, suddenly constricted to angular stem which is expanded again at tip into process with sharp angles at front and back, the larger rear angle apposed to tips of inner forceps; sides of fifth sternite large, lobiform, nearly bare of hairs. Wings without costal spine; one bristle at base of third vein. Legs black; middle tibia with a single bristle on outer front side near middle; hind tibia with a row of irregular bristles on outside, not extending far beyond the middle; hind femur bearing villous hairs equaling its thickness on proximal third of under surface.

Female.—Front at narrowest 0.35 of head-width (measurements of six as follows: 0.33, 0.33, 0.34, 0.34, 0.38, 0.38); frontal vitta at base of antennae three times width of lowest ocellus; buccal width equal to one-eighth eye-height. Pulvilli much shorter than last tarsal joint. Otherwise like the male save for usual difference in genitalia.

Length 5 to 6 mm.

Type.—Male, in the U. S. National Museum. Adaton, Mississippi, August, 1922.

Allotype.—Female, in the U. S. National Museum. Adaton, Mississippi, July 15, 1922.

Range.—Massachusetts, Ohio, District of Columbia, Maryland, Mississippi.

Described from the following material: one male and one female reared from the nest of *Bicyrtes quadrifasciata* Say, taken at Adaton, Mississippi, August, 1922, and three females collected about a Bembicid colony at the same locality (H. W. Allen); one male, Agricultural and Mechanical College, Mississippi, August 7, 1922 (H. W. Allen). In the U. S. National Museum, aside from the type and allotype: one female taken as it emerged from the nest of *Bembex spinolae*, June 6, 1914, Washington, D. C. (J. B. Parker); one female labeled "Parker Note No. 44," concerning which Professor Parker has furnished the information that, "this fly was captured as it emerged from the nest of *Bicyrtes ventralis* Say, into which it had dashed in pursuit of the wasp as she entered with a Hemipterous insect." A male from Glen Echo, Maryland, August 30, 1923, in the collection of J. R. Malloch. A male and a female taken *in coitu*, at West Springfield, Massachusetts, July 25, 1915 (H. E. Smith), loaned by the Museum of Comparative Zoölogy, agree with the type in the number and position of the orbital bristles and in the degree of thickening on the arista, but the front is narrower as in *rubriventris*, and there are no median marginal bristles on the second abdominal segment in either; also two specimens from the same locality in the collection of the Boston Society of Natural History. A single female specimen reared from puparium taken from sand beneath the burrows of *Bembex spinolae* and other fossorial Hymenoptera, at Columbus, Ohio, August 10, 1921 (H. W. Allen), in my collection, agrees with the type in the width of the front, in having the arista thickened no more than the basal half and in the presence of conspicuous blackish tomentum on the third antennal joint. It differs slightly, however, in having two proclinate orbitals.

This species is very closely related, morphologically, to *litoralis*. However, in the specimens that I have examined, the presence of a large amount of red on the abdomen is constant in *vigilans*, while in *litoralis* there is never any reddish coloration. Some specimens of *vigilans* vary toward *rubriventris*. Males of these two species may always be readily separated by comparison of the outer forceps which are hooked toward the tips of the inner forceps in the former, away from them in the latter. In both sexes of *vigilans*, the bucca and front are wider, the arista is more extensively thickened than in *rubriventris*, and there is one less proclinate orbital bristle.

Senotainia litoralis, new species.

Male.—Front at narrowest 0.32 of head-width, (measurements of five as follows: 0.29, 0.31, 0.33, 0.33, 0.34); frontal vitta behind base of antennae scarcely wider than lowest ocellus, broadening gradually to width greater than parafrontal at the ocellar triangle; posterior two-thirds of vitta distinctly pollinose, obscure; face and front silvery; a frontal row on either side of vitta of about nine weak bristles, separated at their middle by distance less than

width of either parafrontal; one reclinate and usually two proclinate orbital bristles; only a few black bristly hairs on parafrontals outside frontal rows; vibrissae inserted length of second antennal joint above front edge of oral margin, separated by distance about equal to length of second antennal joint; no scattered bristly hairs in region lateral to vibrissae; facial ridges bare except for one or two small bristles above the vibrissae; antennae extending to length of second antennal joint above the vibrissae, the second joint rufous, third joint one and one-half to two times as long as second, yellow, usually overlain more or less completely with blackish tomentum; arista thickened on basal half, penultimate joint slightly longer than broad; sides of face bare; in profile, bucca equals one-tenth eye-height, and is subequal to parafacial; proboscis almost as long as height of head, labella fleshy, palpi yellow, slightly clavate. Thorax cinereous, with five rather indistinct black vittae, the outer pair broad and obscure; usually two postsutural dorsocentrals, sometimes a weak third anteriorly, two strong sternopleurals, three marginal scutellar bristles of about equal size. Abdomen densely gray pollinose over black, without reddish spots on the sides, with row of three obscure black spots on apices of intermediate segments; the second segment with a pair of weak median marginal bristles, third and fourth with marginal rows of about eight. Genitalia as in *vigilans*; sides of fifth sternite roundly angular at apex, not lobiform. Wings hyaline; without costal spine; one bristle at base of third vein. Legs black; middle tibia with one small bristle on outer front side near middle; pulvilli of fore foot about as long as last tarsal joint; hind femur without villosity on inner proximal surface.

Female.—Front at narrowest 0.27 (average of five) of the head-width. Pulvilli much shorter than last tarsal joint. Genitalia non-piercing, telescoped within abdomen, in repose. Otherwise like the male.

Length 4.5 to 6 mm.

Type.—Male, in the U. S. National Museum, from Moss Point, Mississippi.

Allotype.—Female, in the U. S. National Museum, from Moss Point, Mississippi.

Described from the following material: one specimen from Manomet, Massachusetts, July 17, 1904 (J. A. Cushman); seven females, Chesapeake Beach, Maryland; two males, Sandusky, Cedar Point, Ohio (J. S. Hine); two males and one female, Lafayette, Indiana (J. M. Aldrich); seven males and eleven females, Moss Point, Mississippi, September 8, 1922 (H. W. Allen); two males and three females, Mobile, Alabama, September 4, 1922 (H. W. Allen); seven males and six females, Gulfport, Mississippi, September 10, 1922 (H. W. Allen); one male and one female, cowpeas, Agricultural and Mechanical College, Mississippi, August 31 to September 1, 1922 (H. W. Allen); one male, College Station, Texas, September 9, 1920 (H. J. Reinhard); one female, Owen's Lake, California, labeled "on flowers of *Asclepias*" (J. M. Aldrich); one specimen in the U. S. National Museum labeled "Parker, Note No. 25", concerning which Professor Parker states, "This fly followed *Oxybelus quadrinotatus* Say into its burrow as the latter entered carrying a house-fly. As the fly came out of the burrow, it was captured, as was *Oxybelus* as she emerged soon afterward."

One male and three females from Moscow, Idaho (J. M. Aldrich, in the U. S. National Museum, differ slightly from the typical in

having the eyes broader and inclined to be angular along the lower orbit. Two of the males from Lafayette, Indiana, one from Moscow, Idaho, in the U. S. National Museum, and one in my collection from Moss Point, Mississippi, in which the genitalia have been relaxed, have the pendant process of the penis extremely long and slender. These variations have not been considered of specific significance.

***Phrosinella fulvicornis* Coquillett.**

Hilarella fulvicornis Coquillett, Journ. N. Y. Ent. Soc., vol. 3, p. 106, 1895.
Euhilarella fulvicornis Townsend, Proc. Biol. Soc. Washington, vol. 28, p. 22, 1915.

The writer compared Coquillett's type with genotype specimens of *Hilarella hilarella* Zetterstedt and *Phrosinella nasuta* Meigen from Europe, determined by Professor Bezzi. The latter species apparently has not been previously examined by workers in this country. Coquillett's *fulvicornis* differs from *Hilarella* in having the bucca and back of head about the oral cavity with sparse, pale hairs, the apical cell open, the inner eye-orbits sinuous and the parafacials distinctly pinched in at the lower corners of the eyes. It agrees with *Phrosinella* in all these characters, and others of generic significance with the possible exception of the sexual dimorphism in the specialization of the fore tarsus not occurring in *nasuta*. A careful study of the Miltogramminae of North America reveals several instances of striking specialization of the fore tarsus occurring in species closely related to others without such specialization, and placed by common consent in the same genus with them. Hence, I recognize *fulvicornis* as of a genus distinct from *Hilarella* but congeneric with *Phrosinella nasuta*.

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NEW AMPHIBIANS FROM PANAMÁ.¹

BY EMMETT R. DUNN.

AMONG the material taken last summer (1923) in Panamá by C. B. Duryea and myself was a small caecilian which seems to be new. It was found under the following circumstances. We were eating breakfast on the 6th of August, in a palm-thatch hut some distance off the trail between Chiriquicito and Boquete, when one of our guides called attention to a "snake" which was coming out of the ground under the raised platform on which we slept. It proved to be a caecilian. All efforts to pull it out being fruitless, it was dug from its burrow. With the animal in hand the peculiar small head and thick body explained the difficulty of extrication. The shape of the creature seemed very strange to me, and examination of the available literature and collections has not afforded a parallel. It fits, however, into the recent definition of the genus *Siphonops*, and serves to add that genus to the fauna of North America. It may be called

***Siphonops parviceps*, new species.**

Type.—No. 9407, Museum of Comparative Zoölogy, from La Loma, on trail from Chiriquí Grande to Boquete, altitude about 2000 feet, Province of Bocas del Toro, Panamá. E. R. Dunn and Chester B. Duryea, collectors.

Diagnosis.—A *Siphonops* with head much smaller than body in diameter; circular folds extending to anus; primary series all complete, secondary series present. Primaries 96, secondaries 13.

Description.—Diameter of head 5 mm., diameter of neck 5 mm., posterior angle of mouth to tip of snout 6 mm., diameter of body 8 mm. Primary folds all complete, 96 in number, extending to anus. Secondary folds 13 in number, first three incomplete, interpolated between last 13 primary folds. Maxillary teeth 13, palatine teeth 10, mandibular teeth 10. Tentacle between eye and nostril, nearer to lip than to either, slightly nearer to eye than to nostril. Eye nearer to lip than to tentacle; nearer to lip than nostril. Eyes farther apart than length of snout. Black; head lighter, tinged with brown. Length 180 mm., greatest diameter 8 mm., greatest circumference 22 mm. Ratio of length to diameter 22.5; ratio of length to circumference 8.

Remarks.—This species is a *Siphonops* as defined by Nieden. It has visible eyes, horseshoe-shaped tentacular groove, no scales, one row of mandibular teeth, and the parietal and squamosal are in contact. It differs from described species of *Siphonops*

¹ Contributions from the Department of Zoölogy, Smith College, No. 118.

nops in having a series of secondary folds. It differs from *Siphonops annulatus*, which also has an extremely low count of folds, in lacking the bare region anterior to the anus. In habitus it differs from any described species of the order.

Among the specimens collected in the Canal Zone by Dr. Thomas Barbour's party during the last winter (1924) is a small salamander which seems to be new. It may be called

Oedipus complex, new species.

Type.—No. 9408, Museum of Comparative Zoölogy, a young male, from Las Cascadas, near Gamboa, Canal Zone.

Range.—Known only from type locality.

Diagnosis.—A worm-like Oedipus with reduced limbs, toes fully webbed, 17 costal grooves, maxillary teeth present, snout short and blunt, eye as long as its distance from tip of snout.

Description.—The type is a young male, 17 costal grooves; 9 costal folds between appressed toes; head width $7\frac{1}{2}$ in length from snout to vent; head length $5\frac{3}{4}$ in length of body; head a blunt oval as seen from above; eye longer than its distance from tip of snout; angle of jaw back of upper angle of eye; outline of upper jaw convex as seen from side; both eyelids fitting under a fold of skin behind; a groove from eye to gular fold; a groove from this down behind angle of jaw; tail longer than head and body, constricted off at base, terete; lips of vent papillate. Limbs weak; fingers 3, 2, 4, 1, in order of length, completely webbed, tip of 3 projecting slightly; toes 3, 4, 2, 5, 1, in order of length, completely webbed, tip of 3 projecting slightly; vomerine teeth 8-9 in series, beginning beyond outer border of nares, curving in and back, each group separated from its fellow by width of nares and from parasphenoids by twice that distance; latter in a single patch, beginning opposite anterior fourth of eye-socket; maxillary completely toothed. Brownish black, with brown flecks above; these are most concentrated on the dorsum of the tail and in a dorsolateral line on each side of the body; leaden below with light flecks.

Total length 67 mm., head 5, body 27, tail 35.

Habits.—The type was taken while a termite's nest was being cut from a log.

Remarks.—Probably most nearly allied to *Oedipus uniformis* from which it differs mainly in having 17 rather than 19 costal grooves. From the other form with 17 costal grooves, *Oedipus parvipes*, it differs widely in shape of head, size of eye, maxillary dentition, and, to a less extent, in the amount of webbing of the toes.

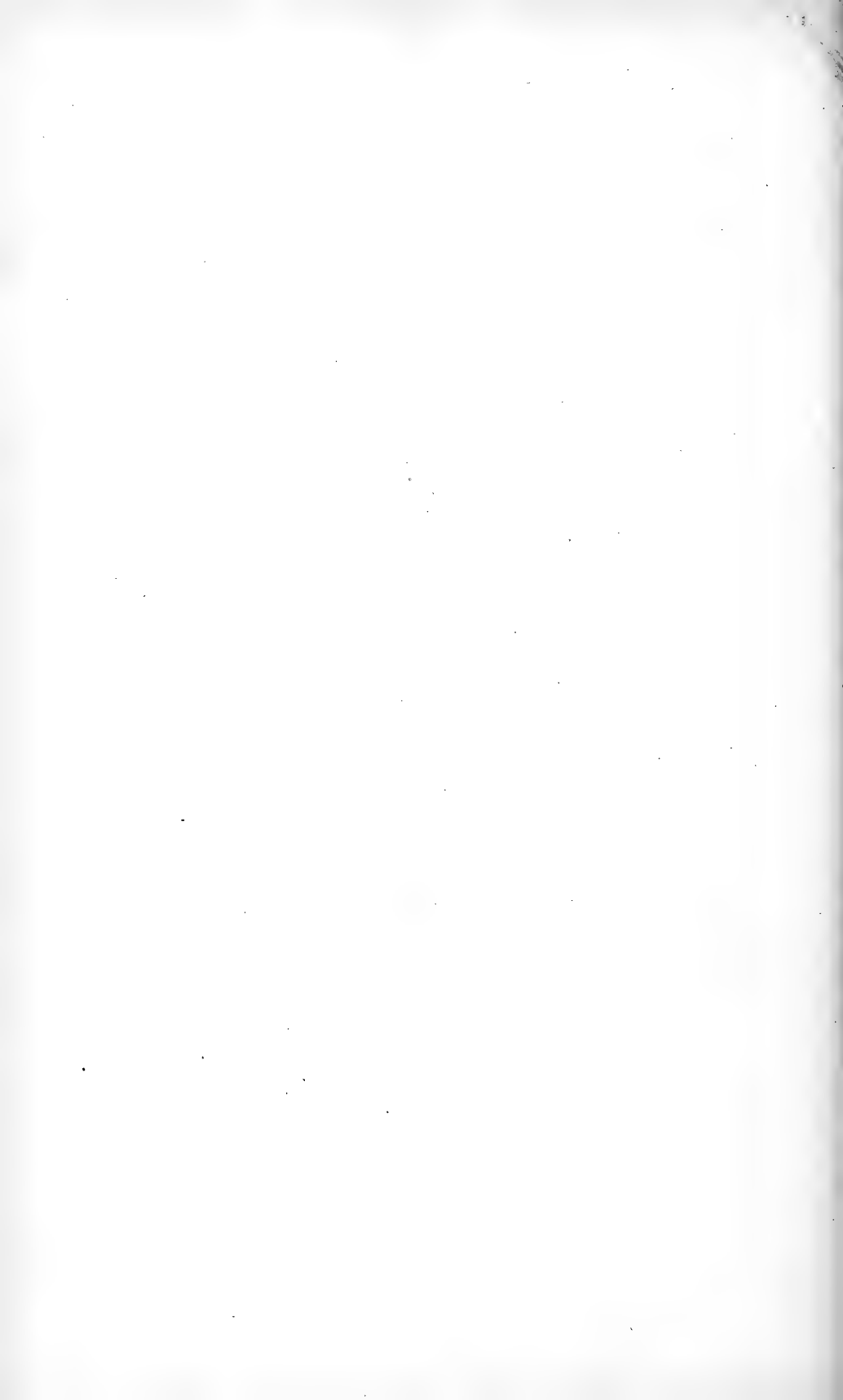
The worm-like forms of Oedipus, frequently known as Oedipina, fall into two rather natural groups, which are distinguished by the shape of the head or rather of the snout. Some forms have a short, rounded snout and large eyes, while others have a long, narrow snout and small eyes.

Short blunt snout.	Long sharp snout.	Number of costal grooves.
<i>lineolus</i>		14
<i>infuscatus</i>		?
<i>complex</i>	<i>parvipes</i>	17
<i>uniformis</i>	<i>collaris</i>	19
	<i>alfaroi</i>	20

Several tendencies are noticeable in this series of forms: *parvipes* has few and *alfaroi* no teeth on the maxilla; *lineolus*, *uniformis* and *alfaroi* have lost the basal constriction of the tail, and it is weakly developed in *parvipes*.

It is probable that *infuscatus* is wrongly recorded from Haiti and is indeed a synonym of *lineolus*. It was described on the same page as *parvipes* and was said to have smaller legs (in *parvipes* hind leg reaches over 4 costal folds, in *infuscatus* the hind leg reaches the antepenultimate groove, hence over two folds). Furthermore, it has a long narrow form, the head width being 7 times included in the length from snout to vent; and the tip of the tail was reproduced, which could not be true of any *Oedipus* unless the basal constriction of the tail was weak or lacking as in these worm-like forms. The proportions given are quite those of *lineolus*.

Disregarding the Haitian form as mythical, the general relationships of the Panamanian and Costa Rican forms may be stated thus: in Panamá occur two forms with 17 costal grooves, each related to a Costa Rican form which is more elongate and has 19-20 costal grooves. These two sets are *complex-uniformis*, and *parvipes-alfaroi*. *Oedipus collaris*, a large sharp-snouted form, ranges from Panamá to Nicaragua; *lineolus*, with fewest costal grooves, is known only from Mexico.



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A REVIEW OF THE NEW ENGLAND SPECIES OF
CHRYSOTOXUM.

BY CHARLES W. JOHNSON.

IN 1907 at the Museum of Comparative Zoölogy I saw Loew's types of *Chrysotoxum* which were in one of the small glass-covered boxes in which the collection was shipped. This box has since been misplaced. I made notes on the species at the time. These were published in *Psyche* (vol. 14, p. 77-79, 1907) and specimens compared with the types are in my collection. In the *Canadian Entomologist* (vol. 56, p. 34-40, 1924), Mr. C. Howard Curran has published a "Synopsis of the genus *Chrysotoxum* with notes and descriptions of new species." The determinations in that paper are so much at variance with my notes and homotypes, that I cannot refrain from reviewing the subject. My remarks, with one exception, are confined to our eastern species, as material from the West is limited.

Chrysotoxum ventricosum Loew.

In my note on this species I state, "The two types are marked 'W. T.' [Washington Territory], and the original description gives 'Washington.' Osten Sacken's Catalogue gives 'Distr. Columbia,' as does Williston in his Synopsis of the Syrphidae." It is this error in habitat that has misled authors. Loew's note, that this species is similar to *Chrysotoxum arcuatum* Linné except that the base of the abdomen has black pile, seems to confirm my statement, for my homotype from Colorado agrees with *Chrysotoxum arcuatum* in my collection except for the black pile mentioned. The scutellum of the types shows faintly the dark translucent disk so characteristic of the genus and cannot be said to be "totum flavum." The short antennal joints and globose abdomen readily separate it from the eastern forms that have been inadvertently referred to it. I have seen no specimens of *Chrysotoxum ventricosum* east of Colorado.

Chrysotoxum derivatum Walker.

This and the preceding species have served as a dumping-place for doubtful species. There are only three items in Walker's description of any real value for identification: "Scutcheon

brown, with a yellow band on the fore border.—Length of the body $3\frac{1}{2}$ lines.—Albany River, Hudson Bay.” The small size (7 mm.) is unusual for species of this genus. A male specimen, from Penobscot County (Section 2, Range 7), Maine, August 2, 1910 (Dr. J. A. Cushman), measuring 8 mm. in length agrees with Walker’s description. The scutellum has a dark band across the middle, leaving a narrow basal and apical margin of yellow, the basal half of all of the femora is black, the length of the first and second joints of the antennae is about equal, while the length of the third equals the first and second together. Coming from the Canadian life-zone I have little doubt but that this is the true *Chrysotoxum derivatum*. A female (8 mm.) from Sherborn, Massachusetts, August 24, 1912 (C. A. Frost) I am also referring to this species. The only other specimen before me referable to this species is a female (9 mm.) from Grand Lake, Newfoundland, June 28, 1906 (O. Bryant). It might be of interest to note in connection with Mr. Curran’s remarks under this species that Walker also records *Chrysotoxum fasciolatum* from Albany River, Hudson Bay (List of Diptera, vol. 4, p. 541, 1849).

***Chrysotoxum pubescens* Loew.**

Chrysotoxum luteopilosum Curran, Can. Ent., vol. 56, p. 36, 1924.

The specimen which I compared with the type agrees in every respect with the paratypes of *Chrysotoxum luteopilosum* Curran in the Society’s and my own collection. The yellow spot above the front coxae was evidently overlooked by Loew in describing it. “Alae cinereo-hyalinae, adversus costam lutescentes,” can only apply to this species, as none of the other species has a distinctly yellow costal margin. That this is *Chrysotoxum pubescens* is further corroborated by specimens in the Osten Sacken collection from “Illinois,” bearing the number “94” and labeled “*Chrysotoxum pubescens*” in Osten Sacken’s handwriting. In regard to numbered specimens Osten Sacken in his “Record of my Life Work in Entomology,” 1903, p. 94, says: “Labels with numbers corresponding to the same numbers in the Osten Sacken collection (in the same museum) represent specimens which were sent to Loew, while keeping duplicate specimens in my own collection.” There seems to be no doubt that these are some of the original lot.

***Chrysotoxum laterale* Loew.**

This species is allied to *Chrysotoxum pubescens*, but the broad yellow lateral margin and almost complete fasciae on the third to fifth abdominal segments readily distinguish the species. The costal margin is brown, and there is a dull yellowish spot above the front coxae. In New England it is rare; I took one specimen at New Haven, Connecticut, June 11, 1914, and it is recorded from “Maine” by Curran.

Chrysotoxum plumeum, new species.

Chrysotoxum ventricosum Curran (*nec* Loew), Can. Ent., vol. 56, p. 39, 1924.

♂.—Face in profile straight, below the antennae, not noticeably concave and not protruding at the lower end of the facial stripe; face yellow with yellowish pile, front and vertex black with black pile, upper part of the front whitish pollinose; antennae brownish black, first and second joints about equal in length, the third as long as the first and second combined, arista yellow; scutellum yellow with a dark discal spot and long yellow pile; a pearl-gray spot above the front coxae; abdomen with prominent yellow pile, longest on the second segment, first segment yellow on the sides, second, third, and fourth segments with slightly arcuate bands, narrowly interrupted, those on the second and third reaching the lateral margin, the fourth narrowly separated; posterior marginal band on the second segment very narrow, on the third wider and expanded at the center, on the fourth more expanded and projecting forward as a point; fifth segment with two oblong yellow spots and a central triangle, narrowly connected with the spots near the posterior angles; legs yellow, basal third of the first and middle femora dark brown; wings grayish hyaline with the brownish costal margin extending to the end of the costal vein. Length 10 mm.

♀.—Front with a wide whitish-pollinose band midway between the base of the antennae and the ocelli, narrowly interrupted; band on the posterior margin of the fourth abdominal segment connected at the lateral margin; the spots and triangle on the fifth segment are narrower, more elongated and very narrowly separated at the posterior angle. Legs entirely yellow. Length 11 mm.

Eight specimens. *Holotype*, Woodbury, New Jersey, April 29; *allotype*, Riverton, New Jersey, September 14. *Paratypes*, Folsom, Pennsylvania, May 8, 1892, and Riverton, New Jersey, September 8, in the author's collection; Montgomery, Massachusetts, May 27, 1899 (Dr. Geo. Dimmock), and South Norwalk, Connecticut, August 4, 1908, in the collection of the Boston Society of Natural History; Falls Church, Virginia, May 9 and September 23 (Nathan Banks), in the Museum of Comparative Zoölogy.

Readily separated from the following species by its straight, not concave, face and usually shorter antennae.

Chrysotoxum perplexum, new species.

♂.—Face convex with a prominent tubercle at the lower end of the facial stripe, vertex and front black, the latter with the upper part whitish pollinose; the first joint of the antennae longer than the second and the third slightly longer than the first and second combined, arista reddish; scutellum with a broad transverse black band, leaving a narrow basal and apical margin of yellow; sides of the first abdominal segment yellow, the arcuate bands on the other segments narrowly interrupted; those on the second and third segments extend to the lateral margin, that on the fourth narrowly separated; posterior margin of the second segment entirely black; on the third and fourth the yellow posterior marginal band is narrow on the sides and expanding in the middle, widest on the fourth; the two elongated spots on the fifth segment are curved and the central triangle is small, leaving a very broad V-shaped mark; base of the front and middle femora dark brown, costal margin of the wing brown. Length 12 mm. Female similar to the male.

Holotype, Base Station, Mt. Washington, New Hampshire, August 16, 1916 (C. W. J.); *allotype*, Bolton Mt., Vermont,

September 12, 1922, 2600 ft. (Owen Bryant); and the following *paratypes*: MAINE, Southwest Harbor, August 20, and Bar Harbor, September 10; NEW HAMPSHIRE, Franconia (Mrs. A. T. Slosson); MASSACHUSETTS, Chester, August 6, 1914, Auburndale, August 9, and Brookline, September 6; CONNECTICUT, Colebrook, September 8, 1922 (W. M. Wheeler) in the collection of the Boston Society of Natural History; also Lexington, Massachusetts, August; Falls Church, Virginia, May 10 and 30, and Great Falls, Virginia, September 24 (Nathan Banks) in the Museum of Comparative Zoölogy.

Chrysotoxum fasciolatum De Geer.

The largest and most common species in northern New England, usually about 14 mm. in length. Readily separated from *Chrysotoxum perplexum* by its shorter first antennal joint and broader, less arcuate abdominal fasciae, the front edge of the interrupted fasciae being almost parallel with the anterior margins of the segments.

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NEW SPECIES OF THE DIPTEROUS FAMILY
DOLICHOPODIDAE.

BY MILLARD C. VAN DUZEE.

IN identifying specimens of the family Dolichopodidae sent from New England and elsewhere, several new species have been recognized, the descriptions of which are here given.

***Thinophilus ochrifacies*, new species.**

♂.—Length 2-2.7 mm. Face wide, ochre yellow. Palpi yellowish with thick yellow pollen, still they are more whitish on apical edge. Front blue or green on the vertex, sometimes wholly opaque with yellowish pollen. Occiput covered with yellowish pollen, its lower half with long white hairs; upper orbital cilia black. Antennae yellow; third joint brown, small; arista brown.

Dorsum of thorax and the abdomen greenish, the former with thick brown pollen; pleurae and coxae more black with white pollen. Abdomen with conspicuous black hairs. Hypopygium small, with yellow appendages extending forward under the abdomen (I think there are also brown appendages folded up close to the venter above the yellow ones).

Fore coxae more or less yellow, but greenish or brown at base, sometimes mostly infuscated; they are nearly bare. All femora and tibiae yellow. Middle tibiae with one small bristle above near the base and another near the middle; posterior pair with several small bristles. Tarsi yellow at base, usually brown toward their tips; joints of fore tarsi as 15-7-7-5-5; middle ones as 22-10-9-6-7; joints of hind pair as 14-16-10-7-8. Pulvilli very small, whitish. Calypters, their cilia and the halteres yellow.

Wings grayish, sometimes tinged with brown in front, without any trace of clouds on the cross-vein or last section of fourth vein; last section of fifth vein and cross-vein about as 26 to 8.

♀.—The face is about the same as in the male, still it appears more brown, it is wholly opaque with pollen; the palpi are longer than in the male and have the pollen more white. The general color is about the same, as is also the proportionate length of the tarsal joints; wings as in the male.

Described from four males and seven females. Two males and a female were taken at Cold Spring Harbor, Long Island, New York, September 5, by Mr. Burns; all the rest were taken by C. W. Johnson in Massachusetts: one male (holotype) at Cohasset, September 8; one male at Edgartown, June 29; two females at Chatham, July 1; and four females at Eastham, June 27.

Holotype and allotype in the collection of the Boston Society of Natural History.

Thinophilus viridifacies, new species.

♂.—Length 2.3 mm.; of female 2.7 mm. Face metallic green with thin white pollen, more yellowish white on the lower half. Palpi yellow with white pollen. Front dull green with a little white pollen. Occiput, dorsum of thorax, pleurae and abdomen white pollinose. Lower half of occiput with long white hairs. Antennae yellow; third joint small, brown, rounded but rather flattened in outline at tip.

Thorax coppery or green; abdomen green with bronze reflections and conspicuous black hairs. Hypopygium small; outer appendages long, yellow; there are also long blackish appendages above these next to the venter.

Fore coxae largely yellow, at least on apical half. Femora and tibiae yellow. Tarsi yellow only a little darkened at tip. Middle and hind tibiae each with several small bristles above, the former with one small bristle on lower posterior edge. All femora with several very small black bristles near the tip. Joints of fore tarsi as 13-7-5-6; of middle ones as 18-8-7-5-5; of hind pair as 14-13-8-7-8. Calypters, their cilia and the halteres pale yellow.

Wings a little grayish, veins brown; cross-vein and last section of fifth vein as 9 to 30.

♀.—Face metallic green, as in the male, its pollen very thin, white above, yellowish on lower part. Palpi appearing white from the thick white pollen; front as in the male, except that the pollen on the front and also on the dorsum of the thorax is more brown. The anterior femora are somewhat infuscated on the middle for half their length or more. Otherwise about as in the male.

Described from two pairs taken at Edgartown, Massachusetts, June 29, by C. W. Johnson. Holotype and allotype in the collection of the Boston Society of Natural History.

This differs from *Thinophilus prasinus* Johnson in having the face metallic, the whitish pollen scarcely dulling the ground-color, in being much smaller and in having the front more metallic; in a female paratype of *Thinophilus prasinus* that I have, the front is opaque with white pollen, but in this form the female has only a little brownish pollen on the front, and it has the fore femora somewhat infuscated, while in the female of *Thinophilus prasinus* the fore femora are not at all darkened. The new species, *Thinophilus ochrifacies*, differs from both of these species in having the face wholly opaque with thick yellowish or brownish-yellow pollen.

Gymnopternus singularis, new species.

♂.—Length 2.6 mm. Face not very wide for the genus, brownish; palpi and proboscis black. Front black with brown pollen. Antennae black; third joint about as long as wide, pointed at tip, nearly straight on upper edge beyond the nearly basal arista, rounded below on apical portion so as to form a point at upper corner. Orbital cilia wholly black.

Thorax green, dulled with brown pollen; prothorax with a large bristle above fore coxae; pleurae more black. Abdomen dark green with black hairs, quite shining. Hypopygium black, rather large; its lamellae yellow, narrow, rounded when applied to the end of the hypopygium, fringed with a few black hairs.

All coxae and femora black, their tips narrowly yellow. All tibiae yellow, still the tips of the posterior ones are black; middle and hind tibiae each with a bristle below near apical third. Fore and middle tarsi black from the tip of the first joint; hind tarsi wholly black. Joints of fore tarsi as 20-8-7-5-7;

those of middle ones as 30-17-12-8-8; hind tarsi with their joints as 24-25-18-12-8. Calypters and halteres yellow, the former with black cilia.

Wings grayish, darker in front; third and fourth veins about parallel beyond the cross-vein; last section of fifth vein about 33, of cross-vein about 11 fiftieths of a millimeter.

Described from two males taken at Kingston, Rhode Island, July, by John Barlow. Holotype in the collection of the Boston Society of Natural History.

Gymnopternus nigricoxa, new species.

♂.—Length 4 mm.; of wing 4.5 mm. Face wide for a male, white. Front thickly covered with white pollen, still the bluish-black ground-color can be seen through it when viewed in certain directions. Antennae wholly black; third joint about as long as wide, somewhat rounded at tip; arista nearly basal. Orbital cilia wholly black. Palpi and proboscis black.

Dorsum of thorax blue-black, sometimes almost violet, with brown pollen which does not dull it, except when viewed obliquely; pleurae more black with gray pollen. Abdomen dark green with whitish pollen on its sides. Hypopygium and its lamellae wholly black, the latter rather narrow, crescent-shaped, fringed with little black hairs; central filament yellowish.

All coxae and femora black, extreme tips of coxae, trochanters, and extreme base and broader tips of femora yellow. Anterior surface of fore and middle coxae covered with black hairs. All tibiae yellow, posterior pair black at tip for nearly one-fourth their length. Fore tibiae with the usual row of little bristles rather large and reaching nearly their whole length; there are several much longer bristles in the row. Middle tibiae with one large bristle near the middle of lower surface on anterior edge, and five large bristles above. Hind tibiae with five or six bristles above and one large one near apical fourth below. Fore and middle tarsi a little longer than their tibiae, black from the tip of the first joint; hind tarsi wholly deep black. Joints of fore tarsi as 35-16-12-9-7; of middle tarsi as 49-28-23-15-11; those of hind tarsi as 35-42-29-17-12. Calypters and halteres pale yellow, the former with black cilia.

Wings tinged with brown, which is slightly darker in front of third vein, the cross-vein narrowly clouded; third and fourth veins nearly parallel beyond the cross-vein, still the third is a little bent backward at tip; last section of fifth vein about one and a half times as long as the cross-vein.

♀.—The female agrees with the male in all color characters, in size and in the wing characters.

Described from one male (holotype) taken at Watchogue, Long Island, New York; one female (allotype) taken at Protection, Erie Co., New York, June 16; one male taken at Wells, New York, July 16, by D. B. Young; two males and two females taken in Massachusetts, one at Winchendon, July 5, one at Wellesley, July 18, one at Medford, June 23, and one at Saxonville, by A. P. Morse; one male taken at Joliette, Quebec, July 15.

Type in the author's collection.

Gymnopternus obtusicauda, new species.

♂.—Length 3.5 mm.; of wing the same. Face rather wide, grayish white. Front blackish, covered with white pollen which scarcely conceals the ground-color. Palpi and proboscis black. Antennae black; third joint as long as wide, rounded below, the tip being a little pointed at upper angle; arista inserted near the base. Orbital cilia wholly black.

Thorax and abdomen dark greenish; pleurae with gray pollen; hairs of the abdomen black, still sometimes they have a reddish appearance when viewed

in certain lights. Hypopygium rather large; its lamellae and inner appendages black, the lamellae large; when closely applied to the hypopygium they are cut off rather straight on apical margin so as to give the hypopygium a truncate appearance, the hairs on their margin small, black; central filament and its sheath testaceous black.

Fore coxae yellow, sometimes with a blackish spot at base on outer surface, anterior surface with small black hairs, middle coxae black with yellow tips, posterior pair largely yellow, their base blackish. All femora, tibiae and fore tarsi yellow, the latter slightly darker toward their tips; middle tarsi black from the tip of the first joint; hind tarsi infuscated almost to their base. The row of little bristles on fore tibiae quite conspicuous, but not reaching the base; middle tibiae with one large bristle on lower anterior edge, and about five on upper surface. Hind tibiae with six large bristles in two rows on upper surface and two or three small ones below, their tips very slightly darkened on inner side. Fore tarsi slightly longer than their tibiae, their joints as 28-12-10-7-8; joints of middle ones as 37-22-18-11-10; those of hind pair as 28-35-23-15-11. Calypters and halteres pale yellow, the former with black cilia.

Wings dark grayish, sometimes tinged a little with brown; tip of third vein bent backward so as to approach fourth a little; fourth vein ending in the apex of the wing; last section of fifth vein about one and three-fourths times as long as the cross-vein.

Described from one male (holotype) taken at Machias, Maine, July 20, by C. W. Johnson; one male taken at Hampton, New Hampshire, September 30, by S. A. Shaw; two males taken in New York, one at Old Forge, Long Lake, August 23, by Shannon and Sibley, and one at McLean Bogs, Tompkins Co., May 30, by M. D. Leonard.

Holotype in collection of the Boston Society of Natural History.

This differs from *Gymnopternus frequens* Loew in the form of the lamellae, those of the latter being much smaller and widest in the middle, making the hypopygium appear more pointed at tip; *Gymnopternus obtusicauda* is also a little larger and the posterior tarsi and wings are of a darker color.

Gymnopternus vernaculus, new species.

♂.—Length 3.7-4 mm.; of wing 4-4.5 mm. Face moderately wide, whitish. Front blackish, thickly covered with white pollen, which usually conceals the ground-color. Palpi and proboscis black. Antennae wholly black; third joint about as long as wide, pointed at tip. Orbital cilia wholly black.

Thorax and abdomen dark green, almost greenish black, shining; pleurae dulled with a little gray pollen. Hypopygium black; its lamellae black or testaceous, sometimes yellowish at base, narrow, fringed with short black hairs; when closely applied to the hypopygium they give its apex a somewhat obtuse appearance; the central filament and its sheath yellowish testaceous.

All coxae black almost to their tips, immature specimens with the anterior pair more yellowish brown; fore coxae with minute black hairs on the anterior surface and black bristles at tip. Trochanters, femora and tibiae wholly yellow; fore tibiae with the usual row of little bristles small, they do not reach the base, but where they end there are two larger bristles; middle and hind tibiae each with two conspicuous bristles on lower anterior edge, the former with about five, the latter with about seven large bristles on upper surface. Fore and middle tarsi yellow, becoming infuscated toward their tips; last joint black; they are a little longer than their tibiae. Hind tarsi more or less infuscated from the tip of the first joint, sometimes only the tips of the first two, and the whole of last three joints darkened. Joints of fore tarsi as

32-16-12-8-9; of middle ones as 44-25-19-14-12; those of hind tarsi as 31-38-26-17-13. Calypters and halteres pale yellow, the former with black cilia.

Wings dark grayish, scarcely darker in front; costa rather thick, especially from the tip of the first vein, which is about half as far from the root of the wing as the cross-vein; third vein distinctly bent backward at tip so as to approach fourth a little; fourth ending slightly before the apex of the wing; last section of fourth vein 45, of cross-vein 24 fiftieths of a millimeter.

Described from eight males from Erie Co., New York: five were taken at Lancaster, June 4; two at Colden, May 31; and one at Springville, June 7; also one male taken at Machias, Maine, July 22, by C. W. Johnson.

Holotype taken at Lancaster, New York, and in the author's collection.

This differs from *Gymnopternus chalcochrus* Loew in having the face white and the third vein bent a little backward at tip, while in that species the face is distinctly yellow and the third vein is almost exactly parallel with fourth from the cross-vein to its tip.

***Pelastoneurus cristatus*, new species.**

♂.—Length 3 mm.; of wing 2.4 mm. Face moderately wide, silvery white, still the green ground-color showing through on upper part. Palpi covered with white pollen. Front blue or violet, rather dull. Antennae yellow; third joint about as long as wide, rounded at tip, brownish; arista brown, feathered with rather long hairs on apical half. Orbital cilia wholly black.

Thorax with anterior half of dorsum dark green, dulled with brown pollen; posterior half of dorsum and the scutellum deep violet, shining; pleurae green with white pollen; there is scarcely a trace of the usual black stripe above the root of the wing. Abdomen green with conspicuous spots of white pollen on the sides of the segments; its hairs black. Hypopygium black; its basal portion small, about the size of the small lamellae, which are blackish, somewhat obcordate with the upper lobe the largest; they are covered with long hairs; there are two pair of inner appendages, one short, horn-like, pointed at tip, and bare; the other pair are long and slender with several branched bristles near the tip.

Fore coxae yellow, blackened a little at base, this infuscation extending nearly to the middle on outer surface, their anterior surface with a few minute black hairs, and a row of black bristles on apical half; prothorax with a large black bristle above the fore coxae. All femora and tibiae yellow, hind femora narrowly black at tip; hind tibiae sometimes slightly brownish at extreme base and tip. Fore tarsi yellow with last two joints brown, they have long tomentum on the lower surface; this is snow white and nearly as long as the thickness of the joints, giving the tarsi something of a compressed appearance. Middle and hind tarsi black from the tip of the first joint, still the posterior pair are blackish almost to their base. Joints of fore tarsi as 19-10-7-5-7; of middle ones as 30-45-13-9-9; and of hind ones as 21-32-24-16-12. Calypters and halteres yellow, cilia of the former black.

Wings tinged with brown; third vein bent backward at tip; last section of fourth vein bent near its middle, ending close to the tip of third vein; last section of fifth vein about one and a half times as long as the cross-vein.

Described from two males. The holotype was taken at Eastham, Massachusetts, June 27, by C. W. Johnson; the paratype was taken at Hampton, New Hampshire, August 8, 1923, by S. Albert Shaw.

Holotype in the collection of the Boston Society of Natural History.

This is the fourth species of the genus to be described with the remarkable branched bristles on the inner appendages of the hypopygium. *Pelastoneurus furcatus* Loew has the lamellae forked; *Pelastoneurus ramosus* Van Duzee has long sickle-shaped lamellae; in *Pelastoneurus arboreus* Van Duzee the lamellae are very large, irregularly elongate-oval, while in this form the lamellae are about as long as wide and somewhat obcordate in outline.

Occasional Papers
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NEW LIZARDS FROM NORTHWESTERN PERU.

BY G. KINGSLEY NOBLE.

THE present paper is the tenth to appear dealing with the zoological results of the Harvard Peruvian Expedition of 1916.¹ This paper concludes the descriptions of new reptiles secured by the expedition, or at least, those reptiles recognized without doubt as new. No attempt has been made to give a complete list of the species found in the regions visited. Descriptions of the new reptiles have appeared as various groups were studied and compared with related forms from Ecuador and southern Peru. Although this has resulted in a very tardy appearance of some of the descriptions, the plan has proved satisfactory in most other respects. The region visited was almost unknown herpetologically. This has resulted in the discovery of a large number of new forms. The reptile fauna as a whole exhibits a mixture of affinities, but these cannot be adequately determined until the fauna of southern Ecuador is better known.

I am indebted to Dr. Thomas Barbour of the Museum of Comparative Zoölogy for the opportunity of making the collections reported upon in this paper, and for his kindness in permit-

¹As these papers are rather scattered, they may be listed here as follows:

1. Bangs, Outram, and Noble, G. K. 1918. Description of a new woodpecker from Peru. *Proc. New England Zoöl. Club*, vol. 6, p. 85-86.
2. Bangs, Outram, and Noble, G. K. 1918. List of birds collected on the Harvard Peruvian Expedition of 1916. *Auk*, vol. 35, p. 442-463.
3. Barbour, T., and Noble, G. K. 1920. Some amphibians from northwestern Peru, with a revision of the genera *Phyllobates* and *Telmatobius*. *Bull. Mus. Comp. Zoöl.*; vol. 63, p. 395-427, pl. 1-3.
4. Dunn, E. R. 1923. Some snakes from northwestern Peru. *Proc. Biol. Soc. Washington*, vol. 36, p. 185-188.
5. Noble, G. K. 1921. Some new lizards from northwestern Peru. *Ann. N. Y. Acad. Sci.*, vol. 29, p. 133-139.
6. Noble, G. K. 1921. The bony structure and phyletic relations of *Sphaerodactylus* and allied lacertilian genera, with the description of a new genus. *Amer. Mus. Novitates*, no. 4.
7. Noble, G. K. 1921. Two new lizards from northwestern Peru. *Ann. N. Y. Acad. Sci.*, vol. 29, p. 141-143.
8. Noble, G. K. 1921. A search for the Marsupial Frog. *Natural History*, vol. 21, p. 475-485.
9. Noble, G. K. 1921. Pages from the photographic journal of the Harvard Peruvian Expedition. *Natural History*, vol. 21, p. 486-493.

ting me the loan of this material while studying other South American collections in the American Museum of Natural History.

Dicrodon barbouri, new species.¹

Diagnosis.—A medium-sized *Dicrodon* more Ameiva-like in scutation than the other species of the genus; five enlarged occipitals followed by a row of post-occipitals, median occipital nearly as large as the single fronto-parietal; scales of the back granular, of uniform size from occiput to base of tail; over twenty femoral pores.

Distribution.—Valley of Chira River, and possibly adjacent river valleys in the province of Piura, Peru.

Type.—Adult male No. 17,972, Museum of Comparative Zoölogy; edges of thickets near Chira River, Sullana, northwestern Peru. July 30, 1916. G. K. Noble.

Description of type.—Nostril on the posterior part of anterior nasals; anterior nasals narrowly in contact behind rostral; fronto-nasals exactly as wide as long, separated from the loreal by the postnasals and prefrontals which make a contact on each side as broad as the contact of the anterior nasals with each other; prefrontals broadly in contact, their suture less than half the length of either prefrontal; frontal in contact with the first and second supra-oculars, separated from the third and the posterior half of the second supra-ocular by a single row of small scales; four supra-oculars, the most posterior of the right side split obliquely to form an additional scale; first supra-ocular in contact with the loreal and also with the supraciliaries; the other three supra-oculars separated from the supraciliaries by two or three rows of small scales; six supraciliaries on a side; a single fronto-parietal; five occipitals, the median largest and in contact on either side with a pair of somewhat smaller occipitals; posterior to the occipitals a single row of postoccipitals about a third the diameter of the median occipital, this row followed by three or four other rows which grade into the granules of the neck; five enlarged upper labials to the middle of the eye; five lower labials to the same point; between lower labials and chin-shields a wedge of scales, the anterior very much smaller than the posterior and extending forward only part of the length of the first chin-shield. Chin and throat covered with small scales, a broad band of about six rows of larger scales extending transversely across the throat at the angle of the jaw; a collar of larger scales on the neck region, these scales largest in the mid-line and grading off both on the sides and anteriorly.

Dorsal scales granular, minute, sharply marked off from the large scales of the tail and the enlarged scales on the sides of the appendages; ventral scales in eight longitudinal rows and thirty-five transverse rows; a double row of small scales lateral to the enlarged ventral plates; pre-anal plates enlarged, forming an irregular triangle four scales high and four scales wide at the base, the scales of this triangle alternating with one another; femoral pores in twenty-one and twenty-two rows. Antebrachials in two rows of enlarged scales, continuous with the brachials which are in six rows, the pre-axial scales much the larger and grading into the postaxial ones; under sides of thighs covered with large scales, three rows at the distal end of the thigh and eight at the proximal end; the pre-axial scales much the larger; under side of lower leg covered with three rows of very large scales; first pre-axial toe slightly longer than the fifth; tail covered with a series of keeled quadrangular scales, the keels oblique, but forming for the most part continuous ridges the length of the tail; thirty-one scales around the tail at the fifteenth ring.

¹ Named for Doctor Thomas Barbour, Museum of Comparative Zoölogy, Cambridge, Massachusetts, well known for his contributions to Neotropical herpetology.

Ground color above and on the sides a pale yellowish brown, slightly bluer on the head and appendages; whole upper surface covered by a series of whitish spots, these forming sixteen longitudinal rows on the back and sides, a few of the spots on the sides of the neck fusing to form the beginnings of a stripe; ventral surface whitish, yellowish pink on the chin and appendages, the color tending to rosy on the tail and lower legs; indistinct spotting of a bluish tone at the bases of the abdominal scutes; granules of the throat slightly bluish.

Measurements.—Total length, 422 mm.; head and body, 106; arm, 41; leg, 84; head length, 26; head breadth, 16.

This was a common species and a considerable series of specimens was preserved.

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Polychroides, new genus.

Diagnosis.—Body strongly compressed, covered with keeled, imbricating scales of moderate size; head with large swollen scales tending to be bluntly keeled; tympanum distinct; a gular fold present in both sexes but larger in the male, this fold fringed anteriorly with elongate scales; digits compressed, four enlarged scales at the base of the claw; ventral lamellae of digits with a series of small keels to each scale; third and fourth toes subequal; femoral pores present in both sexes; tail very long, slightly compressed at the base; teeth tricuspid, the premaxillary teeth only faintly so; no pterygoid teeth; no sternal fontanelle; abdominal ribs.

Type.—*Polychroides peruvianus*, new species.

Remarks.—The generic status of many of the slow-moving arboreal iguanids is very uncertain. The species described below cannot be referred to either *Enyalius*, *Enyalioides* or *Polychrus* as at present defined. It seems most closely related to *Polychrus* with which it agrees in its femoral pores, large head scales, subequal third and fourth toe and its sacculated lung. I have seen both *Polychrus* and *Polychroides* alive and have been struck by their great similarity in behavior. The pronounced nuchal crest of the latter readily distinguishes it from the former.

Polychroides peruvianus, new species.

Diagnosis.—A compressed, long-tailed *Polychrus*-like iguanid, having a pronounced nuchal crest and a dorsal crest in the male; a pronounced gular fold present, denticulated anteriorly with enlarged scales; a pronounced sexual dimorphism,—the males with the higher dorsal crest, enlarged femoral pores and with a whitish or yellowish head; the females without a dorsal crest, with ill-defined femoral pores and with a dark-brown or greenish head striped on the sides with white.

Distribution.—Wooded valleys of the Andes of northern Peru, extending through the province of Cajamarca and part of Piura; specimens taken near Bellavista and Querocotilla.

Type.—Adult male, No. 17,973, Museum of Comparative Zoölogy; valleys near Querocotilla, province of Cajamarca, Peru. September, 1916. G. K. Noble.

Description of type.—Head large, greatest width of head contained one and two-thirds times in the greatest length; canthus rostralis very pronounced, continued posteriorly into a supraorbital and temporal ridge, the scales of this ridge swollen but not forming a denticulation; nostril piercing a single scale, immediately ventral to the anterior end of the canthus rostralis; distance be-

tween anterior end of nostril and tip of snout equals the distance between posterior edge of nostril and anterior border of the orbit (not the eye, which is very much restricted by a dermal capsule as in chamaeleons); tympanum vertically oval, about the same diameter as the eye opening; head scales large, swollen and irregular, not distinctly keeled; a cluster of scales on the top of the snout, behind the nostrils and before the eyes largest; a series of six enlarged scales forming a supra-orbital semicircle; a series of three small scales in a mid-line on the occiput, in contact on either side with two very large scales which in turn are in contact laterally with three or four somewhat smaller scales; four upper and four lower labials to the mid-point of the eye; a pronounced gular pouch; gular scales much larger than the ventrals, ovate, keeled, not mucronate as the ventrals; scales on the posterior part of the gular pouch smaller than the adjacent gulars; a series of elongate, pointed scales fringing the anterior ventral edge of the pouch; a nuchal crest formed of five or six enlarged pointed scales, grading without a break into a series of dorsal-crest scales which are about one-half as long as the nuchals; the highest nuchal scale slightly longer than the greatest diameter of the tympanum; scales of the back and ventral surface of nearly uniform size; those of the abdomen, smallest, those near the mid-line of the back, largest; dorsal and ventral scales keeled, pointed, imbricating, continuous with smaller scales on the legs; tail covered with somewhat smaller scales, but the keels forming a continuous ridge along the length of the tail; fifteen of these ridges at a point about one-fourth the length of the tail. Limbs slender, rather long; adpressed hind leg reaches shoulder; femoral pores pronounced, eleven to a side.

Head straw-color, blotched with a slightly darker tone; in life, cream-color and yellow; body blue-gray blotched with brown and a light-green tone; in life, a bright green blotched with brown; no distinct pattern, but the darkest blotches tending to form four transverse bars; gular sac and throat cream-color; ventral surface of abdomen and appendages suffused with a brownish tone.

Measurements.—Total length, 511 mm.; head and body length, 128; fore leg from axilla, 62.5; hind leg from vent, 81; greatest width of head, 22.

Remarks.—This species is closely allied to *Enyalioides festae* Peracca from which it differs in its larger head-scales and gular sac, also in certain differences in the scutation of the digits and head. I would not hesitate to refer it to the genus *Enyalioides* were it not that this procedure would require a considerable modification of our present conceptions of that genus.

Phyllodactylus magister, new species.

Diagnosis.—A large *Phyllodactylus* very closely allied to *Phyllodactylus tuberculosus*, without tubercles on the reproduced tail; a series of sixteen longitudinal rows of enlarged keeled tubercles on the back; occiput covered with granules intermixed with tubercles; abdominal scales in thirty-one and sixty-two rows; differing from *Phyllodactylus tuberculosus* in its proportionately smaller tubercles of the back, its smaller post-mentals, and its wider scutes on the median ventral surface of the tail, also in the different arrangement of the distal lamellae on the ventral surfaces of the toes, and in the somewhat different coloration.

Distribution.—Arid valleys of the Chinchipe and Marañon from Perico on the north to Bellavista on the south, extending westward to Tamboa in the province of Cajamarca, Peru.

Type.—Adult male, No. 17,974, Museum of Comparative Zoölogy; deserted huts near Perico, valley of the Chinchipe. September, 1916. G. K. Noble.

Description of type.—Head much larger than broad; distance from the anterior angle of the eye to tip of snout a trifle longer than distance from posterior border of eye to posterior angle of ear; greatest diameter of eye contained in the distance between eye and tip of snout one and four-fifths times; ear opening narrow, oblique, approximately one-half the greatest diameter of the eye; digits slender, the distal dilation truncate, its greatest width contained about twice in the greatest diameter of the eye; slender part of the digit with a series of enlarged plates below, nine of these plates under the fourth toe, separated from the distal dilations by four rows of small scales, each row consisting of either two or three scales; snout covered with uniform granules or small tubercles; occiput with minute granules intermixed with tubercles which are smaller than the large tubercles of the back; no denticulation on the anterior edge of the ear opening; rostral twice as broad as high, rectangular but notched at two corners by the nostrils, partly cleft in the mid-line as in most members of the genus; two enlarged internasals in broad contact; nostril in contact with the first supralabial, the rostral, the internasal and two small scales; six supralabials and six infralabials to the middle of the eye; mental large, pentangular, in contact with two enlarged chin-shields which are surrounded with scales approximately one-third the size, these chin-shields grading rapidly into the small scales of the throat; back covered with small granules and sixteen longitudinal rows of trihedral keeled tubercles; a few tubercles lateral to the outer rows, tending to form an incomplete row on either side, just dorsal to the enlarged ventral scales; lower surfaces with smooth, imbricate scales in thirty-one longitudinal rows (counting the enlarged scales which encroach upon the sides of the body); sixty-two of these abdominal scales in a straight line between constriction of the neck and vent; tail (reproduced) cylindrical, tapering, covered with imbricate smooth scales, those of the ventral surface much larger than those above; a median series of transversely expanded scales below, these three to four times as broad as long.

Pale grayish brown above and below; a series of irregular dark blotches on the dorsal surface; no facial stripe; no bandings of a dark tone on the back; tail marked as the back with a series of poorly defined spots.

Measurements.—Total length, 122 mm.; head and body length, 58; fore leg from axilla, 18; hind leg from vent, 24; greatest width of the head, 12.

Remarks.—Three species of *Phyllodactylus* are found in the region traversed by the Harvard Peruvian Expedition of 1916. *Phyllodactylus inaequilus* Cope is confined to the sandy deserts of the coast. The expedition met with it at Paita and Eten where it was found only under boards, brush and other litter strewn about on the sand. The two other species differ radically from *Phyllodactylus inaequilus* in habits, for they were never found on the ground, but always in houses or in deserted shacks. *Phyllodactylus phacophorus* Tschudi seems to have a much wider range than *Phyllodactylus magister*. The former species was found in many scattered localities in the provinces of Piura and Cajamarca, namely: Huancabamba and Chongollapi as well as Bellavista and Perico. The latter species appears to be chiefly confined to the Chinchipe and Marañon valleys, although one specimen was taken at Tamboa. Although *Phyllodactylus phacophorus* and *Phyllodactylus magister* were taken in the same huts, it is probable that they do not compete with each other in securing food, for the latter species is usually very much larger

than the former. Our largest specimen of *Phyllodactylus magister* measures 68 mm. in head and body length, while none of our specimens of *Phyllodactylus phacophorus* reach over 45 mm. from snout to vent. Young specimens of both species are radically different in color; the latter with its conspicuous striping cannot be confused with the former.

***Stenocercus nigromaculatus*, new species.**

Diagnosis.—Dorsal scales strongly spinose, slightly larger than ventrals, slightly smaller than caudals; fifth toe shorter than second; a dorsal denticulation. Brownish above with two pale dorso-lateral stripes and a series of dark cross-bars; males with a black Y-shaped mark on the lower chest and abdomen, also a black stripe on the ventral surface of the thighs and across the cloacal region.

Distribution.—Found only in the valley of the Huancabamba River and vicinity; taken at several points near the town of Huancabamba and at Chumaya.

Type.—Adult male, no. 17,975, Museum of Comparative Zoölogy; Huancabamba, province of Piura, Peru. August, 1916. G. K. Noble.

Description of type.—Anterior head shields swollen but not keeled; supra-oculars and occipital shields keeled; epidermal sense organs irregularly scattered over the head shields; nostrils superior; nasals separated from the rostral by a pair of scales; only one scale of the supra-orbital semicircles in broad contact with its mate of the opposite side, but another pair barely meeting; twelve scales in each supra-orbital semicircle; scales between supra-orbital semicircles and the small postnasals of more or less the same size; supra-oculars smaller than the shields on the snout, imbricating and forming about five longitudinal and nine transverse rows; no series of swollen scales separating the supra-oculars from the supraciliaries; six very much elongated and obliquely set supraciliaries; occiput covered with uniform scales of the same size or slightly smaller than those in the supra-orbital semicircles; no distinction between parietal and occipital scales; no pterygoid teeth; ear opening with one large and three small denticulate scales projecting posteriorly from its anterior margin; supra- and infralabials very narrow, the supralabials bordered above by another row of scales broader than themselves; infralabials bordered below by a series of scales about the same width as themselves; four and one-half upper and five lower labials to the middle of the eye; sides of the neck covered with scales of the same size as those on the dorsum; a pronounced fold immediately before the shoulder; a series of five or six enlarged chin-shields; scales of the throat of uniform size and slightly smaller than those on the abdomen; body slightly depressed; a vertebral denticulation formed by scales only slightly larger than those of the back; dorsal scales large, strongly imbricate, sharply keeled and ending in a short spine, the keels forming continuous lines which are somewhat oblique and directed toward the mid-line of the body; ventral scales smooth, pointed but not mucronate, slightly smaller than the dorsal scales; the adpressed hind limb reaches halfway between shoulder and ear; tail more than twice as long as head and body, slightly compressed; caudal scales a little larger than dorsals, keeled, mucronate and forming oblique ridges as in the case of the dorsals.

Ground-tone brownish to dull green; on each side of the back a pale stripe which becomes fawn-colored just behind the shoulders and fades out in the lumbar region; a series of ten transverse bars of dark brown across the back between these lateral stripes; the color between these dark blotches varies from fawn-color on the shoulders to greenish toward the tail; a conspicuous vertical

bar of black just before the shoulder and behind the neck-fold; lower surface yellowish or greenish, slightly iridescent; a black Y-shaped mark beginning just behind the shoulders and extending to the vent; black continued on to the ventral surfaces of the hind legs; an indistinct mottling of pale brown on the throat; a suffusion of pink on the under surfaces of the tail.

Measurements.—Total length, 231 mm.; head and body length, 74; fore leg from axilla, 28; hind leg from vent, 46; greatest width of head, 12.5.

Remarks.—Females differ from the males in having much more conspicuous dorso-lateral stripes. These are continued forward along the sides of the head. The black cross-bars on the back are only irregularly formed in the female; they usually consist of a series of spots. There is no conspicuous black pattern on the ventral surface of the female.

This species of *Stenocercus* which has very much the same form as *Leiocephalus*, differs from that genus not only structurally (absence of abdominal ribs), but also in habits. All the specimens secured frequented stone-walls or stone piles and were never seen among the ground litter or in open places as in the case of *Leiocephalus*.

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NEW OR LITTLE KNOWN CRANE-FLIES FROM
NEW ENGLAND.

BY CHARLES P. ALEXANDER.

THE two species described as new in this paper are characterized at this time in order to be available for the forthcoming list of the Diptera of New England. Records of the capture of two other flies that had been unrecorded from these States are added. The unique type of *Tipula insignifica* was included in material kindly submitted to me for examination by Mr. C. W. Johnson, to whom my sincere thanks are extended for many kindnesses in the past.

Family ANISOPODIDAE.

Subfamily *Axymyiinae*.

***Axymyia furcata* McAtee.**

Eupetenus atra Coquillett (*nec* Macquart), Ent. News, vol. 20, p. 106, text-fig., 1909.

Axymyia furcata McAtee, Proc. Ent. Soc. Washington, vol. 23, p. 49, 1921.

Axymyia furcata Shannon, Proc. Ent. Soc. Washington, vol. 23, p. 50-51, 1921.

This rare anisopodid fly had been taken hitherto only in New York, Pennsylvania and northern Virginia. The writer captured a single female specimen on the eastern slopes of Mt. Toby, Franklin Co., Massachusetts, May 17, 1924. Down this slope of Toby a large mountain stream pours over densely moss-covered boulders, reaching the lower levels near the Central Vermont Railroad siding near Montague. The specimen of *Axymyia* was swept from vegetation along this stream, at an altitude of approximately 600 feet, where it was associated with various Tipulidae, notably small swarms of *Ormosia nubila* (O. S.) and *Ormosia meigenii* (O. S.) and numerous scattered individuals of *Tricyphona vernalis* (O. S.) and *Tipula iroquois* Alexander. When at rest in the net, the fly resembles a small lepidid or a species of *Anisopus*. Like the species of Tipulidae with which it was associated, this fly is presumably a member of the vernal Dipterous fauna of the Canadian-Transition life-zone.

Family TIPULIDAE.

Subfamily *Limoniinae*.*Ormosia notmani* Alexander.

Ormosia notmani Alexander, Canadian Ent., vol. 52, p. 225, 1920.

This crane-fly was described from a single specimen taken at Keene Valley, Essex Co., New York, in late May. It has since been found commonly at Amherst, Massachusetts, where it flies during the month of May. In 1923, the fly was on the wing from May 8 to May 20; in 1924, from May 3 to May 29. During the early part of its flight-period, it is associated with such crane-flies as *Ormosia innocens* (O. S.), *Ormosia nubila* (O. S.), *Neolimnophila ultima* (O. S.), *Dicranota eucera* O. S. and *Rhaphidolabis cayuga* Alexander. At the end of this flight-period, all of the above have disappeared and have been replaced by *Dicranomyia liberta* O. S., *Erioptera (Hoplolabis) armata* O. S. and *Tricyphona inconstans* (O. S.). This interesting little crane-fly is characteristic of small sunken streams flowing between high dirt banks. In the hollows of such banks the flies lurk and swarm in small dancing groups over the water. Besides the above records for Hampshire Co., the fly has been taken at the following stations in Franklin Co.: Mt. Toby, altitude about 700–800 feet, May 20, 1923; Fish-hatchery, near Sunderland, May 5, 1924.

Ormosia fernaldi, new species.

General coloration brownish gray; antennae of male relatively elongate; wings tinged with gray, the stigma more infuscated; cell *1st M*₂ open by the atrophy of the outer deflection of *M*₃; cell *1st A* widest at the wing-margin; outer dististyle of male hypopygium oval in outline, smooth; inner dististyle produced into a long, straight, simple rod.

Male.—Length about 3.2 mm.; wing about 4 mm.

Female.—Length about 3.5 mm.; wing 4–4.2 mm.

Rostrum and palpi dark brown. Antennae relatively elongate, in the male, if bent backward, extending to some distance beyond the base of the abdomen; flagellar segments elongate-cylindrical to fusiform; antennae black throughout. Head dark gray.

Thorax dark brownish gray without distinct stripes, the pleura somewhat clearer gray. Halteres pale brown, the knobs yellowish. Legs with the coxae brownish gray; remainder of the legs dark brown. Wings tinged with gray, the costal and stigmal regions vaguely more infuscated; veins darker brown. Venation: *Sc*₁ ending opposite *r*, *Sc*₂ near midlength of *Rs*; *r* at fork of *R*₂₊₃; cell *1st M*₂ open by the atrophy of the outer deflection of *M*₃; basal deflection of *Cu*₁ just before the fork of *M*; anal veins gently divergent, cell *1st A* being widest at the margin; distal third of vein *2d A* running generally parallel to vein *1st A*.

Abdomen dark brownish gray. Male hypopygium with the apparent ninth sternite (morphologically the ninth tergite) conspicuously projecting as a depressed lobe, widened outwardly, the caudal margin gently concave. Outer dististyle a small, flattened-oval appendage arising from a wider base, the apex obtusely rounded; inner dististyle broad and flattened at base, near midlength suddenly narrowed into a long, straight, blackened tip, the apex simple and obtusely rounded; angle of curvature of this style filled with a pale membrane that is set with microscopic tubercles. Gonapophyses appearing as slender rods that are gently sinuous, the tips subacute, extensively blackened.

Habitat.—Massachusetts.

Holotype, ♂, Fish-hatchery, near Sunderland, Franklin County, altitude 200 feet, May 5, 1924 (C. P. Alexander). *Allotopotype*, ♀; *paratopotypes*, 1 ♂, May 2, 1924; 4 ♀ ♀, with the type. The type is in the collection of the writer; a paratype in the collection of the Boston Society of Natural History.

This interesting vernal crane-fly is named in honor of Professor Henry T. Fernald, to whom the writer is greatly indebted for invaluable advice and suggestions during the course of his studies on this group of flies. *Ormosia fernaldi* somewhat resembles *Ormosia notmani* Alexander, from which it is readily distinguished by the longer antennae and the structure of the male hypopygium. The fly is characteristic of the *Alnus-Caltha-Chrysosplenium* association, although sometimes occurring in the open where the alder has been cut away. It flies in early May in company with *Ormosia arcuata* (Doane), *Ormosia innocens* (O. S.), *Ormosia nubila* (O. S.), *Rhaphidolabis cayuga* Alexander, *Tricyphona mcateei* Alexander and *Tipula dejecta* Walker.

Subfamily *Tipulinae*.

Tipula insignifica, new species.

Belongs to the *marmorata* group; wings with the usual pattern almost obliterated; male hypopygium of simple structure, the eighth sternite unarmed.

Male.—Length about 9 mm.; wing 11.8 mm.

Frontal prolongation of the head moderately elongate, brown, the nasus very long and slender, concolorous; palpi dark brown. Antennae with the scapal segments light yellow, the first segment a little infuscated and pruinose dorsally at base; flagellar segments black, the segments only slightly incised. Head gray, the vertex with a brown median line that is slightly widened behind.

Mesonotal praescutum gray with three dark-gray stripes that are little evident on this background; scutum gray, each lobe with two dark-gray areas, the more mesal one much the larger; scutellum and postnotum gray, with a continuous though ill-defined darker-brown median line. Pleura gray, the dorso-pleural membrane buffy. Halteres pale, the knobs infuscated. Legs with the coxae pale brown, slightly pruinose; trochanters brownish yellow; femora brown, the bases yellowish, the tips grading insensibly into brownish black; tibiae brown, the tips dark brown; tarsi brownish black. Wings with a very faint brownish tinge, cell *Sc* and the stigma darker brown; a vague darker seam in cell *M* along vein *Cu*, interrupted near midlength by an ill-defined subhyaline area; oblitative areas before the stigma and across the end of cell *1st M*₂; veins dark brown, most of the longitudinal veins indistinctly seamed with darker. Venation: distal section of vein *R*₂ preserved but with no macrotrichiae beyond the base; basal section of *R*₂ virtually lacking; *R*₂₊₃ about one-third longer than the distal section of *R*₂; *R*_s straight, a little longer than *R*₂₊₃; *m-cu* about its own length from the proximal end of cell *1st M*₂.

Abdomen obscure brownish yellow, the caudal margins of the subterminal segments very narrowly ringed with paler; hypopygium a little darker. Male hypopygium with the ninth tergite relatively large, the caudal margin with a broad V-shaped notch, the broad lateral lobes thus formed obliquely truncated. Basistyle fused with the ninth sternite, indicated by a suture beneath; outer dististyle a flattened-cylindrical fleshy lobe of nearly equal width throughout its length, the apex obtuse, the surface provided with very short, stout setae; inner dististyle a highly compressed blade jutting into the notch of the tergite.

Viewed from beneath, the mesal face of the basistyle is seen to bear an elongate pale cushion on either side of the genital chamber, the narrowed apex directed dorsad, the surface only sparsely setiferous. Region of ninth sternite beneath subcarinate medially. Eighth sternite unarmed.

Habitat.—New Hampshire.

Holotype, ♂, Alpine Garden, Mount Washington, New Hampshire, altitude 5000–5500 feet, September 21, 1919; in the collection of the Boston Society of Natural History.

Occasional Papers
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HERPETOLOGICAL NOVELTIES FROM CHINA.

BY LEONHARD STEJNEGER.

AMONG the collections received by the United States National Museum from its correspondents in China, a recent revision has brought to light a certain number of undescribed forms which it has been thought best to publish in advance of a more elaborate report now in the printer's hands.

AMPHIBIA.

Microhyla grahami, new species.

Diagnosis.—Interorbital space almost twice as wide as upper eyelid; skin above, including head and legs, strongly tubercular; toes with mere rudiment of web at base and scant indication of lateral dermal margins; tips of digits very slightly widened; heel of extended hind leg reaches middle of eye; two small metatarsal tubercles.

Type-locality.—Sui-fu, Province of Szechwan, China.

Type.—U. S. National Museum, No. 65,936; Rev. D. C. Graham, collector.

Microhyla sowerbyi, new species.

Diagnosis.—Interorbital space slightly wider than upper eyelid; skin above, including head and legs, densely tubercular; toes scant one-third webbed, with rather wide dermal margins and well-developed disks; heel of extended hind leg reaches between eye and tip of snout; two prominent, though small, subequal metatarsal tubercles.

Type-locality.—Near Yen-ping-fu, Province of Fukien, China.

Type.—U. S. National Museum, No. 65,309; A. de C. Sowerby, collector (No. 231).

Kaloula rugifera, new species.

Diagnosis.—Toes nearly one-third webbed at the base; fingers dilated into well-developed truncated disks; upper surface and sides with numerous elongated warts; interorbital space much wider than upper eyelid; both metatarsal tubercles large, with cutting edge, outer transverse.

Type-locality.—Kiating, Province of Szechwan, China.

Type.—U. S. National Museum, No. 65,520; Rev. D. C. Graham, collector.

***Polypedates omeimontis*, new species.**

Diagnosis.—Fingers half-webbed; head without spines; no cutaneous folds along legs; no dermal flap at heel; vomerine teeth in two slightly oblique series between the choanae; tympanum distinct, more than half the width of eye; upper and lower surfaces, except of hands and feet, granular; interorbital space slightly broader than upper eyelid; largest digital disk nearly as large as tympanum; tibio-tarsal joint reaching posterior angle of eye.

Type-locality.—Shin-kai-si, Mt. Omei, Szechwan Province, China.

Type.—U. S. National Museum, No. 66,548; Rev. D. C. Graham, collector.

REPTILIA.

***Phoxophrys grahami*, new species.**

Diagnosis.—All scales keeled; anterior superciliaries not enlarged into horn-like appendages; supralabials eight; flanks with numerous large scales equal to the largest on the back.

Type-locality.—Sui-fu, Province of Szechwan, China.

Type.—U. S. National Museum, No. 65,500; Rev. D. C. Graham, collector.

***Eumeces pekinensis*, new species.**

Diagnosis.—Median dorsal scale-rows not enlarged; two unpaired postmentals; lower temporal of the second row wedge-shaped; soles of hind feet nearly uniformly granular with only a few larger tubercles near the heel; a postnasal; 24 scales around the middle of the body.

Type-locality.—Hsin-lung-shan District, Imperial Hunting Grounds, Chili Province, 65 miles northeast of Peking, China.

Type.—U. S. National Museum, No. 60,863; A. de C. Sowerby, collector; August, 1917.

***Lygosaurus sowerbyi*, new species.**

Diagnosis.—Three large supra-oculars; third supra-ocular in contact with parietals; parietals larger than fronto-nasal.

Type-locality.—Futsing District, Fukien Province, China.

Type.—U. S. National Museum, No. 65,375; A. de C. Sowerby, collector (No. 153).

***Takydromus intermedius*, new species.**

Diagnosis.—Head one and three-fourths times to twice as long as broad; anterior supra-ocular very small, mostly indicated by a minute granule; enlarged dorsals in eight longitudinal series, the

two median ones smaller; ventrals in six series, smooth or very feebly keeled; four pairs of chin-shields; two inguinal pores on each side; nasals in contact behind rostral; tail two and one-half times to three times the length of head and body.

Type-locality.—Shin-kai-si, Mt. Omei, near Kiating, 4400 feet altitude, Szechwan Province, China.

Type.—U. S. National Museum, No. 64,437; Rev. D. C. Graham, collector; 1921.

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A NEW CYNORHINELLA (SYRPHIDAE, DIPTERA).

BY RAYMOND C. SHANNON.

THIS peculiar little fly was kindly loaned for study by Mr. C. W. Johnson. It proves to be our first eastern United States species of *Cynorhinella*. Unfortunately only the female is at hand and it lacks one of the conspicuous characteristics of this genus, namely, a saw-toothed projection on the outer apical end of the hind femora. However, it possesses the other characteristics of the genus and very probably when the male is found it will make up this deficiency.

The following notes relate to the status of the genus. Curran erected *Cynorhinella* (*Canadian Entomologist*, vol. 54, p. 14, 1922) for a new species which he named *canadensis* (male). He states in the description: "I am unable to place the following specimen in any genus known to me, and it traces out to *Cynorhina* in Williston's manual, and apparently comes closest to this genus but the thickened, arcuate hind femora with the projection apically, and the more distinct facial side margins separate it. It is related to *Chilosia* and *Chrysochlamys* by the last mentioned character, but there is no semblance of bristles and the shape of the abdomen is distinctive." The name *Cynorhina*, referred to by Curran, does not, however, appear in Williston's Manual. It is considered as a subgenus of *Criorhina* in the "Synopsis of North American Syrphidae," and was raised to generic rank in *Bulletin Brooklyn Entomological Society*, vol. 16, p. 33, 1921. From the foregoing it would appear that this genus should be located in the subfamily *Xylotinae*.

In the same year, I proposed the genus *Apicomomyia* for *Myiolepta bella* Williston (*Insector Inscitiae Menstruus*, vol. 10, p. 122, 1922), and retained it in the subfamily *Chilosinae*. In 1923, Curran made this genus a synonym of *Cynorhinella* (*Canadian Entomologist*, vol. 55, p. 155). It is here proposed to hold the genus in the *Chilosinae* on the basis of the following characters (Curran does not state the position of the discal cross-vein in his description but it is assumed that it is in the same position as shown by its congeners):

Cynorhinella (subfamily Chilosiniinae): head, frontal aspect, distinctly triangular in shape; face without yellow (all species of *Cynorhinella* have the face in part yellow except *umbratilis* which may more properly be placed in *Criorhina* because of the dichoptic eyes of the male); face tuberculate in both sexes; lower post-margin of scutellum with fringe of downward-projecting fine hairs; second vein but slightly turned up at its tip and joining costa well beyond middle of the section between the first and third veins; discal cross-vein before middle of discal cell; hind femora greatly enlarged, with a prominent saw-toothed projection on the outer apical end, except in female and possibly the male of the species described below.

Cynorhinella canadensis Curran differs from *bella* Williston, as far as the description indicates, in having a small anterior tooth on the hind femora (absent in *bella*) and by having the front, face and legs chestnut brown (these are for the most part black in *bella*).

Cynorhinella longinasus, new species.

♀.—Face considerably produced downward, giving the head, frontal aspect, a triangular shape; front shining black, longer than broad, gradually widening downward; antennae moderate, first joint dark brown, second yellow, third narrowly yellow at base, remainder slightly brownish; arista brownish on basal third, whitish beyond, somewhat thickened basally, a little longer than antenna, and somewhat shorter than front measured across base of antennae; face shining black, a very faint light pollinose band extending across below antennae, a few fine hairs along eye margins and lower oral margins; face unusually produced downward, pointed, much longer than broad, nearly straight from antennae to front oral margin with small tubercle located at middle. Mesonotum shining black with two faint longitudinal vittae and scattered short pale pile; scutellum broader than long, faintly marginate, with downward-projecting hairs on lower post-margin. Legs black, knees pale; hind femora but little thickened with a very slight indication of a prominence on lower apical end which is marked by small black spines; metasternum pubescent. Abdomen shining, with scattered pale pile. Wings smoky; apical cross-vein forming an acute angle with third vein, the petiole beyond much shorter than length of discal cross-vein; tip of second vein very slightly turned upward and joins costa noticeably beyond middle of the section between tips of first and third veins. Squamae white, halteres faintly yellow. Length 5.5 mm.; wing 5.25 mm.

Holotype, female, Jaffrey, New Hampshire, June 6, 1920 (C. W. Johnson); in collection of Boston Society of Natural History.

Remarks.—This differs from *bella* notably in size, being about one-half as large; in color of arista; more elongated face and shorter and broader fifth posterior cell; and absence of femoral tooth.

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NEW ROBBER-FLIES (ASILIDAE, DIPTERA).¹

BY STANLEY W. BROMLEY.

THE numerous papers that have appeared recently on this family of flies might lead one to believe that the field was nearly exhausted in this country, so far as new species are concerned. It is a significant fact, however, to which attention was called by Melander in the December (1923) number of *Psyche*, in reference to the coincidence of his study of the genus *Cyrtopogon* with that of Curran's review of the genus, that nineteen new species in such a well-known genus should be described by two independent workers without synonymy. I believe that in both *Cyrtopogon* and *Dioctria* there will be found undescribed species in unworked collections, and more intensive collecting will bring to light many more.

***Dioctria propinqua*, new species.**

♀.—Length 11 mm. Black. Face and anterior vertex, golden pruinose. Antennae, black with golden hairs; third segment slightly longer than 1 and 2 combined; style small. Proboscis black; palpi black with yellow hair. Beard white. Occiput very pale yellow pollinose. Thorax, abdomen, coxae, femora, tarsi and distal half of tibiae black. Proximal half of tibiae pale brown. Coxae with white pile; legs with scattered golden hairs. Thoracic dorsum golden pollinose with vestiture yellow. Hypopleurae and a patch anterior to the mesopleural suture silver pollinose becoming golden toward base of wings. Wings smoky; veins yellow basally, becoming brown distally. Abdomen with very short, scattered, appressed golden pile, becoming more numerous posteriorly, longer and lighter in color on venter and first three tergites.

Holotype from Dorchester, Massachusetts (June). In Melander's key to this genus (*Psyche*, vol. 30, p. 213, December, 1923), it would run to No. 9, *sackeni*, form *rivalis* Melander. It differs, however, in having the wings lighter-colored, in having the proximal half of the tibiae very pale brown rather than black, and in being appreciably greater in length. At any rate, the specimen is sufficiently distinct from *sackeni* to merit description. The holotype is in the collection of the Boston Society of Natural History.

***Dioctria seminole*, new species.**

♀.—Length 8 mm. Black and yellow; a slender species. Vertex, palpi, antennae, black. Style very small, slightly less than one-sixth the length

¹Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Massachusetts.

of the third segment. Face and occiput silvery pruinose. Mystax silvery white. Hairs of palpi pale golden. Thorax shining black except humeral calli and lateral apices (parascutella) of mesothorax which are reddish yellow. Short silver pile on coxae and a pruinose strip of same color extending from base of wing to pro-coxa. Another branch of this strip just anterior to the mesopleural suture. Pruinose area of same color on post-scutellum and hypopleurae. Coxae, legs, pale yellow. Hind femur brownish above and at apex. Middle portion of hind tibiae brown. Hind basitarsus as long as next three joints together. Wings hyaline with iridescent reflections. Veins yellow basally, brown distally. Halteres yellow. Abdomen slender, fifth segment laterally dilated. First tergite, black; second, black with a median yellow area widening at lateral margins; third, yellow anteriorly, black posteriorly; fourth, black with lateral and posterior margins yellow; fifth, black with anterior, posterior and lateral (very narrowly) margins yellow; sixth and seventh, black with very slight amount of yellow on margins; eighth, yellow. Venter black.

A unique *Dioctria* in material loaned (through the kindness of Dr. J. Chester Bradley). The holotype was taken at Tallahassee, Florida, May 2, 1915 (C. S. Spooner) and is in the collection at Cornell University.

Cyrtopogon tenuis, new species.

♂, ♀.—Length 8 and 9 mm. respectively. Black. Antennae black with black hairs; style one-fifth length of antenna, with short spine at tip. Hairs of vertex and occiput black, of post-genae, white. Mystax thin; black below, yellowish-brown pollinose. Thoracic dorsum black with black hairs, brownish and white pruinose, pattern more obscure than in *Cyrtopogon lyratus*. Scutellum convex, black with black hairs. Coxae and legs black except tarsi and proximal one-third to three-fourths of tibiae which are dark chestnut. Wings hyaline, slightly smoky toward apex. Cross-veins faintly clouded with gray. Halteres yellow. Abdomen shining black with light hairs anteriorly, black hairs posteriorly. Lateral posterior angles of tergites 2-5, white pruinose. In male, a faint brown-pruinose patch on each posterior median of tergites 2-5, giving appearance of indistinct bands.

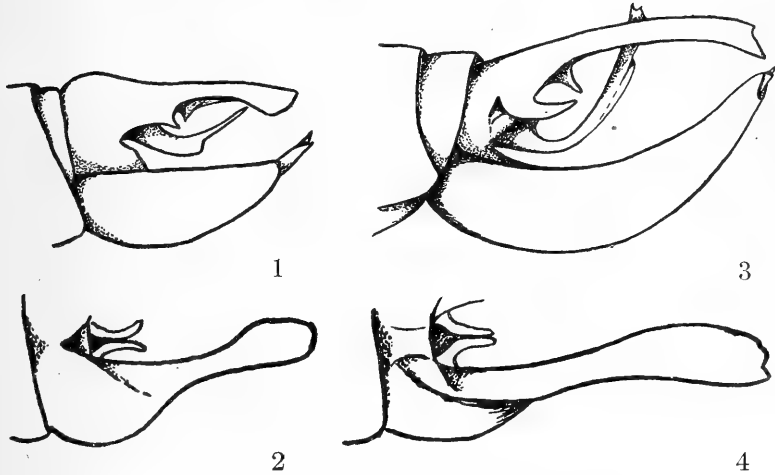
Two specimens, Southwest Harbor, Maine, July 20, 1923 (C. W. Johnson). The holotype (♂) and allotype (♀) are in the collection of the Boston Society of Natural History. In the keys it runs to *Cyrtopogon lyratus* O. S., but differs from that species in having the thoracic markings duller and more obscure, the anterior three-fourths of the tibiae chestnut, the sides of the first abdominal tergite with weak, scattered pile and no silver pruinosity, such as occurs in *lyratus*, the mystax with white hairs intermingled with the black, and the cloudings of the wings gray rather than brown. It is also appreciably smaller, more slender and with shorter pile.

Laphria altitudinum, new species.

♂, ♀.—Length 16-24 mm. Black with pile on thoracic dorsum pale yellow, and on abdomen, reddish yellow. Antennae black with black hairs. Proboscis and palpi black. Mystax, beard, and occipital hairs black. A few golden hairs on face and base of palpi. In some the beard is yellow, and in one specimen the yellow hairs extend into the mystax. A pair of golden bristles on ocellar tubercle (in twenty specimens of *Laphria sericea* examined, these bristles were black). Patch of long, pale-yellow pile on pleurotergite. Legs black with black hairs; a few light-colored hairs on pro-coxae. One individual has pale hairs on front femur and tibia, with a few hairs of same

color on the middle femur and tibia. Wings smoky, with brownish cloudings along veins. Venter of abdomen black. Hairs on first tergite, and on sides of second and sometimes third, mostly black. Hairs on eighth tergite black; rest reddish yellow.

Through the kindness of Mr. C. W. Johnson, seven specimens of this species were loaned for study. They fall close to *Laphria sericea* Say and are undoubtedly the same as the individual mentioned by McAtee (Ohio Journal of Science, vol. 19, p. 151, 1918), under *Laphria sericea*. Here he states, "A female specimen from White Mts., Vt.? [N. H.], Geo. Dimmock (M. C. Z.) which is referred to here differs in having the thoracic dorsum clothed with pale yellowish pile." The male, furthermore, differs quite markedly in the conformation of the genitalia. Both sexes differ from *sericea* in having the wings darker, with dark-brown cloudings along veins, and the hair on the first tergite of the abdomen and on the sides of the second and, in some specimens, the third, mostly black.



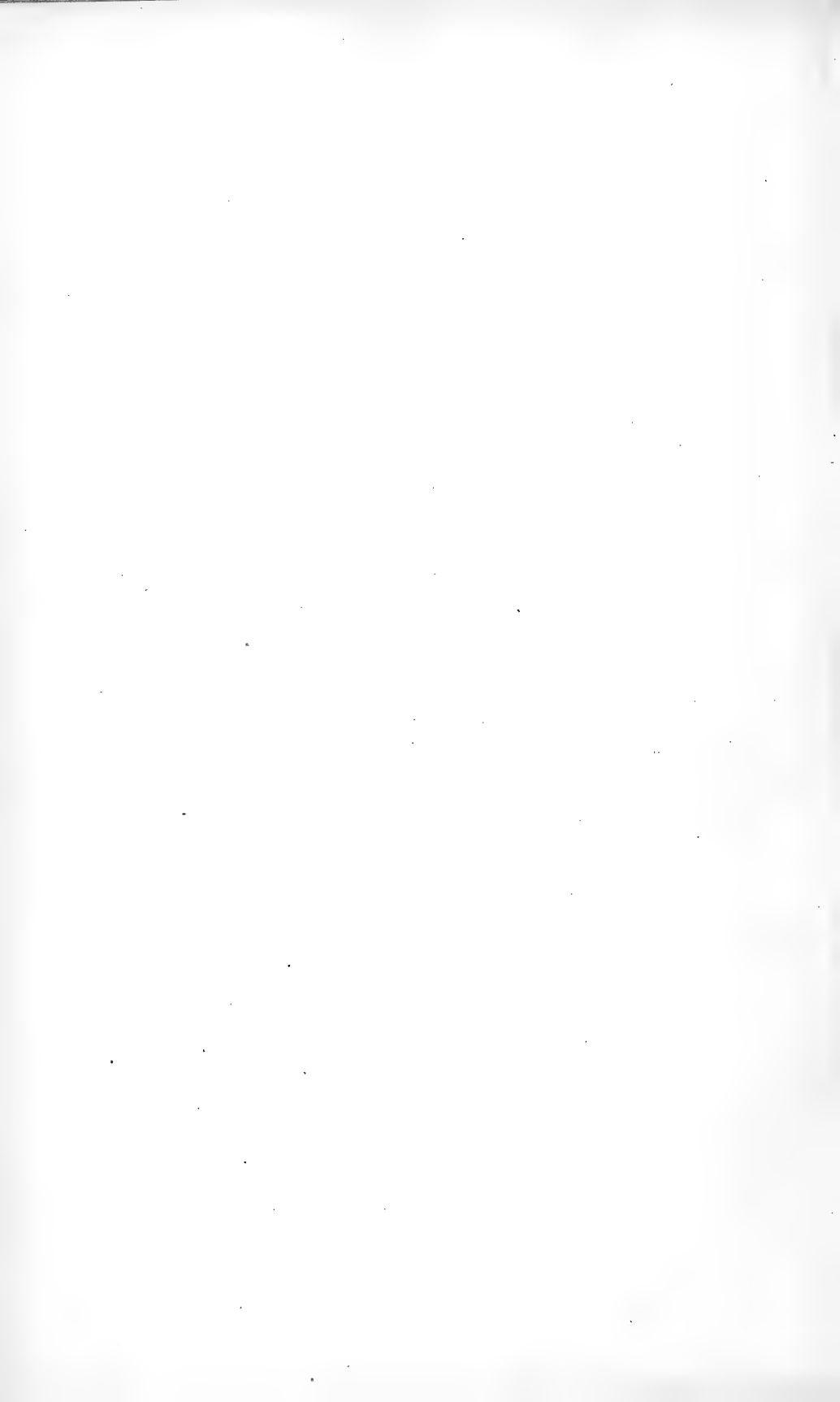
TEXT-FIG. 1. *Laphria sericea*, lateral aspect of male terminalia.

TEXT-FIG. 2. *Laphria sericea*, dorsal aspect of left forceps.

TEXT-FIG. 3. *Laphria altitudinum*, lateral aspect of male terminalia.

TEXT-FIG. 4. *Laphria altitudinum*, dorsal aspect of left forceps.

The holotype, Bar Harbor, Maine, June 16, 1922 (C. W. Johnson), allotype, Mt. Washington, New Hampshire, July 30 (F. W. Dodge); and two paratypes, Mt. Washington, New Hampshire, June 15 and July 4, are in the collection of the Boston Society of Natural History; one paratype, Tear Lake, Essex Co., New York, July 20, is in the collection of Dr. J. Bequaert, one in the U. S. National Museum, and one in the collection of C. W. Johnson.



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NOTES ON SOME CENTRAL AMERICAN SNAKES.

BY THOMAS BARBOUR AND AFRANIO DO AMARAL.

LAST winter the senior author spent several months in Central America, largely in the Panama Canal Zone, being occupied there with the building of the Barro Colorado Island Laboratory of the Institute for Research in Tropical America. This left him but little time for field work in herpetology. His two companions, however, W. Sprague Brooks, Esq., and Dr. Edward Wigglesworth collected extensively and many amphibians especially were gathered. The collection of snakes would not have been large but for the assistance and zeal of Mr. J. B. Shropshire, Chief Sanitary Inspector for the U. S. Army, who not only made all of his own subordinates watch constantly for reptiles but secured many specimens through the kind interest of his friends in the Army Medical Corps. All of these various naturalists often worked in more or less the same areas so that many individual specimens do not bear the collector's name, having been put in containers holding reptiles from a given locality. For this reason it is particularly important to acknowledge with cordial thanks Mr. Shropshire's aid, since the Museum record will not emphasize this as it deserves to be.

We have chosen only a few snakes to discuss in these short notes since naturally a great number of specimens represent well-defined species already recorded from the Panamanian area. A single specimen from Venezuela is included which was found among unidentified material in the Museum of Comparative Zoölogy.

Constrictor constrictor imperator (Daudin).

It is probable that the Central American "boa constrictor" should stand as a subspecies of the South American *C. constrictor* and it is probably simply an intermediate between that species and *mexicana*, the most northerly race. *C. divinitoquus* Laurenti from the Lesser Antilles and *C. occidentalis* (Philippi) are apparently full species well differentiated isolation.

The Central American race is not uncommon in the forested areas and adults as well as young are in the collection from the Canal Zone.

Leptotyphlops affinis (Boulenger).

A second record for this rare species is afforded by No. 18862, Museum of Comparative Zoölogy, from Merida, Venezuela, collected by Colonel Wirt Robinson on June 11, 1908. This locality is in the same mountainous region as the type locality, which is Táchira, somewhat to the westward of Merida.

Liophis decorata (Günther).

Three stages in the evolution of color pattern are shown by specimens in the collection. No. 4539, Museum of Comparative Zoölogy, is a young example from the mountains of Alvarez, near San Luis Potosí, Mexico; No. 18931, Museum of Comparative Zoölogy, a half-grown specimen from Fort Sherman, near Colon, and an adult, No. 15310, Museum of Comparative Zoölogy, is from Santa Cecilia, Costa Rica.

In the smallest specimen the canthal and nuchal stripe is continuous and distinct, in the Panamanian example it is interrupted on the left side behind the temporal region for a distance of about two millimeters, while in the adult from Costa Rica the streak is broken on each side so that two yellow black-edged spots are all that is left, one between the parietal and anterior temporal and the other on the nape. The canthal stripe tends also to disappear with age.

The dorsum of the youngest specimen is brown with three longitudinal black lines; the lateral stripe, which runs on each side between the fourth and fifth scale-rows, is bordered mesially by a light-colored zone. With age the vertebral line disappears and a wide dark-brown streak appears in its place and this extends laterally to the black side-lines from which it is separated by the light-yellow mesial border. On the apex of each gastrostege in the young there is a very tiny black dot, which is large and distinct in the half-grown but in the adult is almost completely obliterated by the invasion of very dark brown pigment which extends progressively downward from the black lateral streak. Thus, comparing young with adult, in the former one observes a snake with three black longitudinal dorsal lines; in the latter a dark-brown snake with two light yellow lateral lines each bordered inferiorly with very dark brown, almost black. Garman (Bull. Essex Inst., vol. 19, 1887, p. 9 of separate) hinted at these color changes but had only No. 4539, Museum of Comparative Zoölogy, before him to compare with the descriptions.

The species has not been previously reported from Panama.

Coniophanes punctigularis Cope.

A specimen taken by Messrs. Brooks and Wigglesworth at Barro Colorado Island seems to represent the most southerly record for this rather unusual species.

Phrynonax poecilonotus (Günther).

A typical example from near Gatun, Canal Zone, collected by a soldier of Fort Davis.

Phrynonax shropshirei, sp. nov.

Type.—No. 18819, Museum of Comparative Zoölogy, an adult male from the vicinity of Gatun, Canal Zone of Panama.

Paratype.—No. 18820, Museum of Comparative Zoölogy, from Fort Sherman, Canal Zone, collected by Mr. J. B. Shropshire, Chief Sanitary Inspector, U. S. Army, Canal Zone.

Description.—Sixteen maxillary teeth, posterior slightly enlarged; anterior mandibular teeth longest; diameter of the eye one-half as long as its distance from the end of the snout, 7:14.

Rostral slightly wider than deep (8:7), just visible from above; internasals two-thirds as long as the prefrontals (4:6); frontal as long as wide (10:10), as long as its distance from the end of the snout, a little shorter than the parietals (10:12); loreal a little longer than deep (3:2); one preocular forming a suture with the frontal; two postoculars; temporals 2+; seven (right) and eight (left) upper labials, fourth and fifth or fourth, fifth and sixth entering the orbit, eighth very much the longest; seven to eight lower labials in contact with the anterior chin-shields which are much shorter than the posterior (10:17). Scales in 25 rows (21-24-25-24-21-19-17-15), the three median rows feebly keeled. Ventrals 211, obtusely angulate laterally; anal entire; subcaudals 116+n (113p.+3+n), divided. Blackish brown above, irregularly barred with yellow, dorsal scales either entirely black or black-edged; head dark brown above, wide border on upper lip yellow, above blackish. Lower surface yellowish, gradually changing to almost clear black posteriorly, including all of the tail; ventrals on anterior portion of body dark-edged. Total length 1630 mm.; tail 430 mm.

The paratype, also an adult male, has eight upper labials of which the fourth, fifth and sixth enter the orbit; six or seven lower labials in contact with the anterior chin-shield; ventrals 215; anal 1; caudals 93 pairs+n.

The general coloration of the paratype is somewhat lighter than that of the type but the pattern is exactly the same. Total length 1460 mm.; tail 330.

Tretanorhinus nigroluteus Cope.

Two specimens, No. 2717, Museum of Comparative Zoölogy, collected by Dr. G. A. Maack at Bas Obispo (now under Gatun Lake) show the prefrontals completely divided in both cases. So also, in No. 826, Museum of Comparative Zoölogy, from San Juan del Norte, Nicaragua, which is the type of *Helicops agassizii* Jan. Two recently acquired examples likewise show this condition to a lesser degree in that the prefrontals are only partially divided. These two are No. 18,812 from near Fort Sherman near Colon and No. 18,818 from Fort Randolph also near Colon.

According to Boulenger, *T. mocquardi* Bocourt, has but a single prefrontal while in *nigroluteus* it is supposed to be double. Moreover, in *T. mocquardi* the scale-rows are said to be 19 while in *nigroluteus* they are 21; so also, the preoculars are said to be

two and three respectively. In No. 18,818, however, the preoculars are three on the right side and two on the left and the scale rows are 21; while in No. 18,812 the scale-rows are 19 in number, and but two preoculars are present. There seems no reason therefore to continue to recognize *T. mocquardi* as valid.

This is one of the very few neotropical species that frequent salt water. It is found about mangrove swamps, if not exclusively, at least frequently, having much the habits of *Natrix compressicauda*.

***Pseudoboa petola* (Linné).**

Coluber petola Linné, Syst. Nat., ed. 10, vol. 1, p. 225, 1758.

This wide-ranging species is apparently rare in Panama although common throughout most of its enormous range. It is represented in our collection by several specimens from Ancon, Canal Zone, taken by Mr. James Zetek, of the U. S. Department of Agriculture, and others. The Harvard party in Panama during 1924, as during other trips, is much indebted to Mr. Zetek for very many favors.

***Micrurus dunni* Barbour.**

No. 18,813, Museum of Comparative Zoölogy, from near Corozal, Canal Zone. This is the second recorded example of this species. It is much larger than the type, being 350 millimeters long, the tail 26 mm. in length, thus nearly double the length of the original specimen (Occ. Papers, Mus. Zool. Univ. Michigan, no. 129, p. 15, January 25, 1923). That snake was described as having the third and fourth upper labials nearly equal in size but the second example shows that the third labial in the adult is much larger than the fourth. This agrees with the condition in the closely allied forms such as *M. lemniscatus*, *M. filiformis* and *M. hollandi*. This specimen has nine triads of rings as against eleven in the type.

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A YUNNAN GECKO.

BY THOMAS BARBOUR.

BOULENGER in 1903 (Ann. Mag. Nat. Hist., ser. 7, vol. 12, p. 429) described a lizard from Yunnanfu which he called *Gehyra yunnanensis*, making small comment as to its affinities except to say that it was most nearly related to *Gehyra larutensis* Boulenger, recently described (Ann. Mag. Nat. Hist., ser. 7, vol. 6, 1900, p. 188, type locality Larut hills, 3500 ft., Selangor, Malay Peninsula). This species I have not seen and it may not be a *Gehyra* either.

Recently the Rev. Dr. John Graham, who discovered Boulenger's type, sent me a collection of reptiles from Yunnanfu and in it is a gecko which agrees in all details with Boulenger's description of *G. yunnanensis* except that the lamellae under all the digits are sometimes divided although there is some variation to be observed. What seems obvious, and in this Dr. Stejneger agrees, is that this lizard is so different in appearance from the other species of *Gehyra* that it cannot be considered congeneric. In habit and in some digital details it more resembles *Hemidactylus*. I shall call it

***Cainodactylus*, gen. nov.**

Type: *Gehyra yunnanensis* Boulenger.

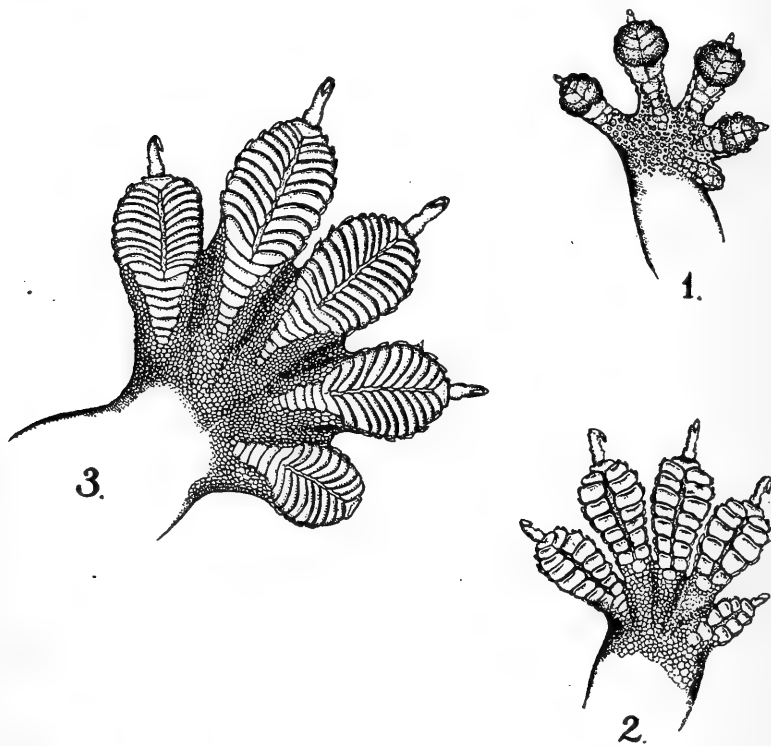
A slender gecko, in habit like *Hemidactylus mabouia*, the digits free, somewhat dilated basally and strongly expanded distally. A few, usually three, divided chevron-like lamellae under the distal expansions; beneath the small clawless first digit the lamellae may be entire or divided. While this arrangement is very *Hemidactylus*-like, still the clawless first digit and the extension of the enlarged subdigital scales on to the palm do recall the condition in *Gehyra*. The three sketches (Text-fig. 1-3) make this condition more clear than a verbose description.

Our specimen furnishes the following redescription of the species.

Cainodactylus yunnanensis (Boulenger).

Description based on No. 18967, Museum of Comparative Zoölogy, from Yunnanfu, China. Rev. John Graham, collector.

Rostral rectangular, two and a half times as broad as high, with just a trace of a median cleft in the posterior margin; nostril bordered by rostral, first upper labial, two or three ill-developed nasals and a few small granules; ten or eleven upper labials, nine



TEXT-FIG. 1. Palmar view, *Cainodactylus yunnanensis* (Boulenger), Museum of Comparative Zoölogy No. 18967, Yunnanfu, China. Rev. J. Graham, collector.

TEXT-FIG. 2. Palmar view of manus, *Hemidactylus mabouia* (Mareau de J.). Mt. Hundugula, 1200 feet, Tanganyika Territory. A. Loveridge, collector.

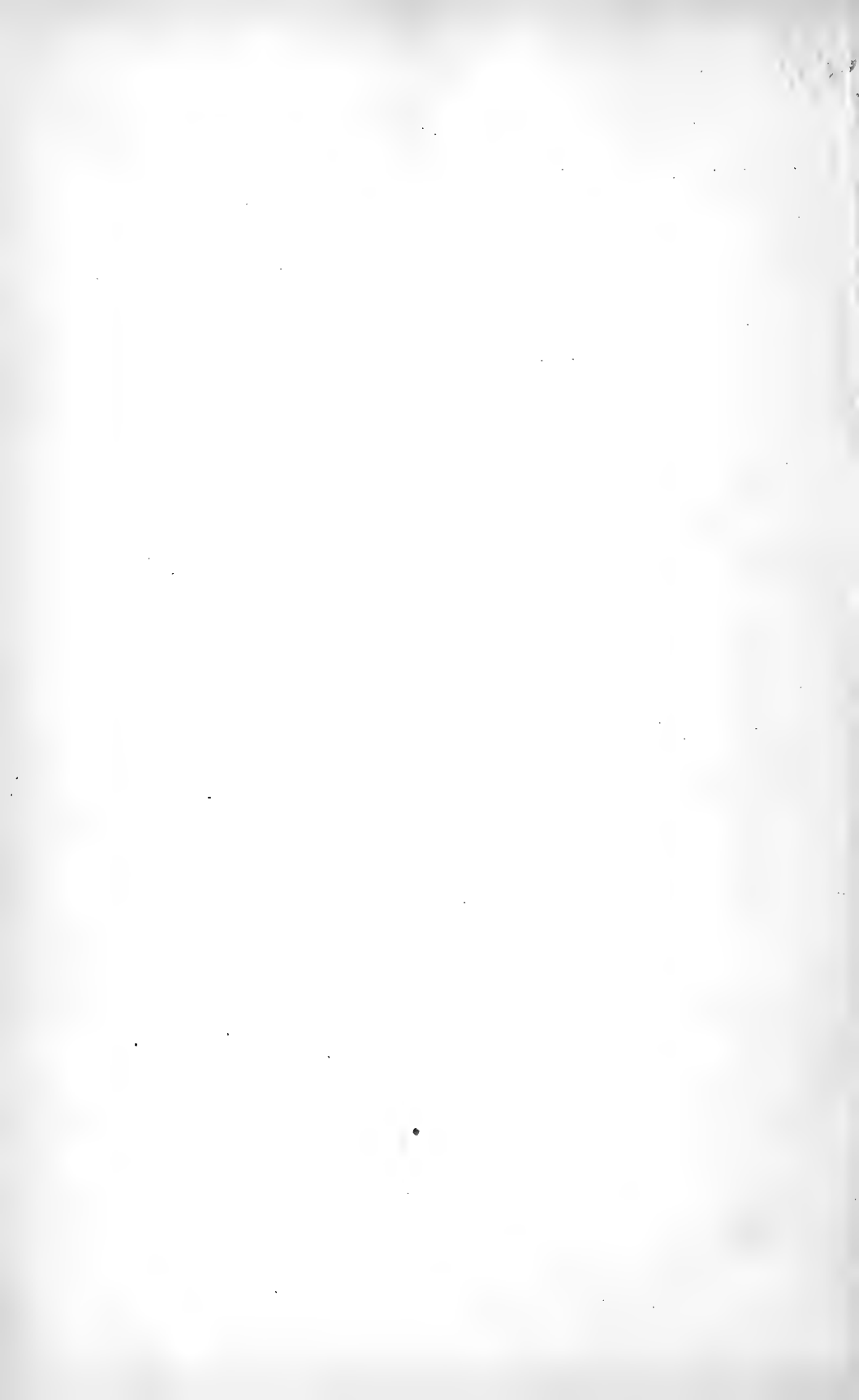
TEXT-FIG. 3. Palmar view of manus, *Gehyra interstitialis* Oudemans. Fak Fak, Dutch New Guinea, T. Barbour Collection.

or ten lower labials; mental large, triangular, followed by a median pair of large chin-shields, a second pair bordering these slightly diminished in size; other shields, somewhat enlarged but diminishing progressively, border all the lower labials; scales on head, back and limbs granular and equal in size; those on the snout somewhat enlarged; scales of the throat all flattened granules but those of chest and belly enlarged cycloid, imbricate and smooth; digits as described above; tail cylindrical, covered

with round or ovate, imbricate and somewhat projecting scales, both above and below. (Since this specimen is a female, the femoral and preanal pores are not developed.)

Coloration: freshly preserved specimen, brownish above, mottled with ashy gray and dark, rich brown, the brown marblings tending roughly to form a ladder-like pattern on the back; tail with dark cross-bands, each dark bar being margined posteriorly by a light line; lower surfaces white, somewhat clouded with dusky.

Total length, 72 mm.; ear opening to tip of snout, 9.5 mm.; tip of snout to vent, 38.5 mm.



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A NEW SNAKE OF THE GENUS *LAMPROPELTIS*.

BY ARTHUR LOVERIDGE.

AMONG a small collection of reptiles made at Miquihuana, Tamaulipas, Mexico, by Mr. Wilmot W. Brown, and presented to the Museum of Comparative Zoölogy by Col. John E. Thayer, was a very handsome King Snake which Dr. Barbour has kindly allowed me to describe. Owing to Dr. F. N. Blanchard's recent excellent revision of the genus¹ this has been an easy matter.

***Lampropeltis thayeri*, sp. nov.**

Type, No. 19551, Museum of Comparative Zoölogy (collector's No. 1944), an adult male from Miquihuana, Tamaulipas, Mexico, collected by W. W. Brown. June 16, 1924.

Diagnosis.—Differs from *L. mexicana* in being completely ringed with broad bands of bright Venetian red, margined with narrow rings of black, 30 of such red rings as against 39 red blotches on *L. mexicana*. Dorsal scale-rows 25-23-19 as against 23-21-19; nine infralabials against ten, there being four instead of five under the last three supralabials. The higher number of caudals, 62 instead of 55, is a sexual difference to be expected as the types of *L. mexicana* are both females.

Description.—Ventrals, 194; caudals, 62; supralabials, 7; infralabials, 9, fifth largest, 4 under the last 3 supralabials; preocular single; postoculars, 2; temporals, 2 in the first row, 3 in the second, and 4 or 5 in the third; posterior chin-shields shorter than the anterior, and separated from each other by a small scale; loreal about twice as long as high; anal plate entire; scales smooth, with 2 apical pits in some cases only; dorsal scale-rows 25-23-19. Length of body, 690 mm. Length of tail, 50 mm. Tail is contained $14\frac{1}{2}$ times in total length. Eye as large as in *L. mexicana* but its diameter is not twice the height of the third supralabial, being but very slightly greater than the height of the third supralabial.

Coloration.—Head dirty white above, so heavily stippled with black as to produce a gray effect by nearly obscuring the ground color; a black blotch behind the eye; the frontal, supraoculars, and anterior third of the parietals bright Venetian red bordered by

¹ Blanchard, F. N. "A Revision of the King Snakes: Genus *Lampropeltis*." Bull. U. S. Nat. Mus., no. 114, 1921.

black, lightly in front, and heavily behind on the parietals. The first of 24 bright Venetian-red body-rings commences three scale-rows behind the parietals. Each of these rings is narrowly bordered before and behind by black, these black rings occupying from one to two scale-rows in width. The first of these black rings is produced forward on the parietals in a point. The red rings are six scale-rows in width (*circa* 15 mm.) anteriorly decreasing in size to three scale-rows (*circa* 10 mm.) at midbody, but increasing again toward the tail. Six red rings on the tail make 30 in all. Counting the ground-color gray band on the head there are 31 gray bands in total length. Counting the traces of black rings on the head there are 62 such rings in all, the last enveloping the tail-tip which is wholly black. Below, the throat is yellowish followed by irregular black blotches on the ventrals which replace in an irregular fashion the gray bands of the dorsal surface. The black and red rings are more or less distinct and clearly defined on the ventral surface and tail.

Remarks.—Miquihuana lies some 125 miles, as the crow flies, northwest of San Luis Potosí, the type locality of *Lampropeltis mexicana* (Garman). I am informed that the avifauna of these two localities also differs considerably. The new species has been carefully compared with the types of *L. mexicana* which are preserved in the Museum of Comparative Zoölogy.

Lampropeltis leonis (Günther).

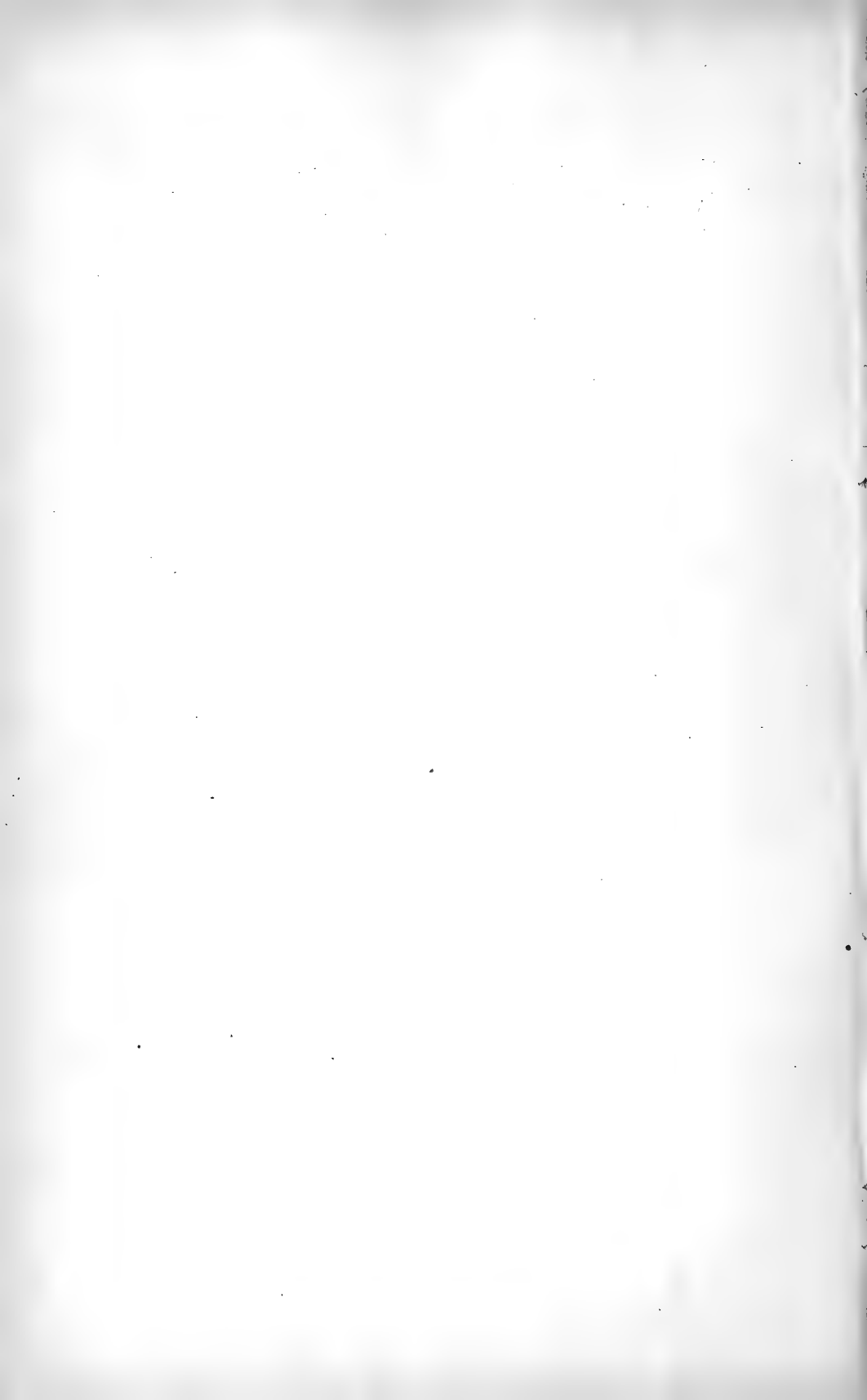
I should like to take this opportunity of remarking that the Museum of Comparative Zoölogy has recently received four examples of this very rare snake (hitherto only known from the type, described in 1893) from Alvarez, San Luis Potosí, Mexico. They were collected by Mr. W. W. Brown and presented to the Museum by Dr. Barbour.

They agree in most respects with Günther's description but differ in having two apical pits on their smooth scales as anticipated by Blanchard (page 138). While the type had 200 ventrals and 50 caudals, the present series have a range of 189–196 ventrals and 54–58 caudals, no less than three of the four snakes having 58 caudals. There is an aberration in No. 19024 which has 3+4 temporals on the left side, *two* of the three anterior ones being in contact with the postoculars. In No. 19025 the temporals are 2+3 with *both* anterior in contact with the postoculars.

It is, however, in coloring that the chief differences occur. The type is said to have "body pale olive-color on the back, with 27 salmon-colored incompletely black-edged spots." In our specimens the spots are as follows:

19022.	36 spots on the body and 9 on the tail
19023.	39 " " 10 "
19024.	47 " " 11 "
19025.	35 " " 10 "

None of these specimens has a black band along the middle of the lower part of the tail though it is indicated by a coalescing of black spots in No. 19024 which is the only adult specimen of the series. No. 19025 agrees with the type in having a few black blotches on its ventral surface, the others, particularly No. 19024, are very heavily blotched and marbled with black along the whole under surface.



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A REVIEW OF THE LIMPKINS (*ARAMUS* VIEILLOT).

BY JAMES L. PETERS.

THIS paper is the outgrowth of a systematic identification of the Limpkins in the collection of the Museum of Comparative Zoölogy. Early in the work it became apparent that the generally accepted ideas as to the nomenclature and subspecific determination of the races, particularly of the northern species, would have to be revised, and the loan of specimens from Porto Rico, Mexico and Central America, by the United States Biological Survey and the United States National Museum but confirmed these conclusions.

I take this opportunity to express my thanks to Dr. E. W. Nelson and Dr. C. W. Richmond for the loan of important specimens from the collections under their respective care, and to Mr. T. E. Penard of Arlington, Massachusetts, for permission to make use of his Surinam material. All measurements given are in millimeters; colors are according to Ridgway's 1912 standards.

The genus *Aramus* comprises two species: one is found in extreme southeastern United States, the Greater Antilles, and from central Mexico southward to Panama; the other is confined to South America from the Cienega Grande, Colombia, to eastern Argentina. Both species appear to be local in their distribution, rather shy and difficult to secure, and for this reason it is hard to assemble a representative series of either species from all parts of their range.

The synonymy of the genus is unusually clear, but two names having been proposed for it directly, though established names belonging to totally different genera have been utilized by some of the older authors.

ARAMUS Vieillot, *Analyse*, 1816, p. 58. Type, by monotypy, Courlili Buffon = *Ardea scolopacea* Gmelin.

NOTHERODIUS Wagler, *Syst. Avium*, 1827. Type, by monotypy, *Notherodius guarauana* Wagler = *Ardea scolopacea* Gmelin.

***Aramus scolopaceus scolopaceus* (Gmelin).**

[*Ardea*] *scolopacea* Gmelin, *Syst. Nat.*, vol. 1, pt. 2, 1789, p. 647. "Habitat in Cayenna" (ex Courlan ou Courlili Buffon, *Hist. Nat. des Ois.*, vol. 7, p. 442, and *Pl. Enlum.*, pl. 848).

Notherodius guarauana Wagler, *Syst. Avium*, 1827. "Cajenna, Brasilia, Paraguaya." The measurements given indicate that the description refers to the small race from northern South America, to which I hereby restrict the name.

Description.—Adult male: forehead and sides of head avellaneous or buffy brown, shading into blackish brown No. 3 on the occiput, all the feathers with paler mesial streaks; back of the neck and anterior portion of interscapular region black, the central part of each feather being occupied by large white markings, linear to guttate and lanceolate in form; remainder of the interscapulum, wing-coverts and long inner secondaries olive brown glossed with greenish, margins paler; back, rump and upper tail-coverts clove brown; tail clove brown with bronze gloss. Primaries and outer secondaries olive brown with purplish-bronze gloss. Throat whitish, shading into hair brown on the front and sides of neck; breast and abdomen olive brown, the median portion with lanceolate mesial streaks of white; flanks and under tail-coverts clove brown; feathered portion of tibiae olive brown with white mesial streaks on the inner aspect; under wing-coverts fuscous with broad white spots basally.

Adult female: similar to the adult male but smaller.

Measurements.—Two males: wing 298–309 mm.; tarsus 115–118; culmen 102–108. Two females: wing 285–286; tarsus 101–110; culmen 91–97.

Range.—From northern Colombia (Cienega Grande), Venezuela, Guianas to central (?) Brazil, exact limits unknown.

Specimens examined.—SURINAM: Paramaribo, 2♂, 2♀ (in collection T. E. Penard).

Aramus scolopaceus carau Vieillot.

Aramus carau Vieillot, *Nouv. Dict. d'Hist. Nat.*, vol. 8, 1817, p. 300. Paraguay, ex Azara.

Rallus gigas Lichtenstein, *Verz. Doubl.*, 1823, p. 78. São Paulo, Brazil, and Montevideo, Uruguay.

Rallus ardeoides Spix,¹ *Avium Brasil.*, vol. 2, 1825, p. 72, pl. 91. "Prope pagum Contendas vel Riachão in provincia Minas Geraes."

Subspecific characters.—Similar to *A. s. scolopaceus* but much larger throughout and with a heavier bill.

Measurements.—Four males: wing 335–343 mm. (340.5); tarsus 128–139 (133.75); culmen 112–131 (121.5). One, sex not determined: wing 321; tarsus 124; culmen 118.

Range.—Central (?) and southeastern Brazil, Paraguay, Uruguay, eastern Argentina.

Specimens examined.—BRAZIL: Rio Grande do Sul, Cacequy, 1♂. ARGENTINA: Entre Rios, Concepcion del Uruguay, 2♂; Santa Fe, La Noria, 1♂. PARAGUAY: no locality, 1.

Aramus pictus pictus (F. A. A. Meyer).

Tantalus pictus "Bartram", F. A. A. Meyer, *Zool. Annalen*, vol. 1, 1794, p. 287. St. John's River, Florida.

N[umenius] vociferus Latham, *Index Orn.*, *Suppl.*, 1801, p. lxxv. Florida, ex Bartram.

Rallus giganteus Bonaparte, *Journ. Acad. Nat. Sci. Phila.*, ser. 1, vol. 5, 1825, p. 31. Florida.

Notherodius holostictus Cabanis, *Journ. f. Orn.*, vol. 4, 1856, p. 426. Cuba.

Aramus scolopaceus auct. nec Gmelin.

Aramus guarana auct. nec Wagler.

Description.—Superficially similar to *A. s. scolopaceus* but averaging larger and somewhat less brilliantly glossed, but differing specifically in the presence

¹ Hellmayr (*Abh. K. Bayer. Akad. Wiss.*, vol. 22, 1906, p. 711–712) finds that a specimen in the Munich Museum supposed to be Spix's type is indistinguishable from birds from Paraguay and Matto Grosso.

of broad lanceolate mesial streaks of white on the entire interscapulum, wing-coverts and to a more or less extent on the alula, a small white spot at the base of the secondaries, and much greater extent and development of the white markings on the breast and abdomen.

Locality	No. specimens	Measurements.		
		Wing	Tarsus	Culmen
<i>Males</i>				
Florida.....	10	300-325 (313.4)	108-140 (129.5)	116-135 (125.7)
Isle of Pines....	1	306	115	110
Cuba.....	1	322	124	131
<i>Females</i>				
Florida.....	4	303-316 (305.25)	111-135 (125.79)	117-126 (120)
Cuba.....	2	297-307 (300.5)	105-132 (118.5)	100-109 (104.5)
<i>Not sexed</i>				
Jamaica.....	1	300	101	95

Range.—Southern Georgia and Florida Peninsula (casual north to coast of South Carolina), Cuba, Isle of Pines and Jamaica.

Specimens examined.—FLORIDA: near Blue Springs, 1 ?; Brevard Co., 1 ♂; Everglades, 1 chick; Florida Keys, 2 ♀; Fort Myers, 2 ♂; Hawkinsville, 2 ?; Kissimee River, 1 ♂; Lake Dexter, 1 ?; Lake Washington, 1 ?; Manatee Co., 3 ♂; Sanford, 1 ?; St. John's River, 5 ♂; Wekiva River, 2 ♂, 1 ♀; no locality, 1 ♀, 1 ?. CUBA: Cienega de Zapata, 1 ♂, 1 ♀; Aguada de Pasajeros, 1 ♀, 1 ?. ISLE OF PINES: Cienega, 1 ♂. JAMAICA: Great Salt Pond, 1 ?.

Remarks.—After carefully comparing a series of birds from Cuba and Jamaica with a long series from Florida, I cannot find a single character by which they may be differentiated. It is true that specimens from the islands mentioned average smaller, but these differences are slight, and since the birds are otherwise identical I am obliged to disagree with the conclusion reached by Messrs. Miller and Griscom¹ (who, by the way, do not seem to have examined any Cuban material) that *Notherodius holostictus* Cabanis can be maintained.

Aramus pictus elucus, subsp. nov.

Aramus giganteus auct. nec Bonaparte.

Aramus pictus auct. nec "Bartram," necnon Meyer.

Aramus vociferus auct. nec Latham.

Aramus holostictus auct. nec Cabanis.

Type.—Adult ♀, No. 70021, collection Museum of Comparative Zoology, Sosúa, Dominican Republic, 22 March, 1916. Collected by James L. Peters (orig. no. 883).

Characters.—Similar to *Aramus pictus pictus* (Meyer) but with the white markings of the interscapular region less extensive, and absent or reduced to mere narrow shaft stripes on the wing-coverts; averaging smaller.

Males	No. specimens	Measurements.		
		Wing	Tarsus	Culmen
Porto Rico.....	1	294	105	105

¹ Am. Mus. Novit., no. 25, 7 Dec. 1921, pp. 12 and 13.

<i>Females</i>		<i>Wing</i>	<i>Tarsus</i>	<i>Culmen</i>
Haiti.....	1 (type)	291	99	99
Miller and Griscom give for 2 ♀ from Haiti.....		304-309	101-109	95-99
<i>Not sexed</i>				
Porto Rico.....	2	273-285	96-104	91-99

Range.—Islands of Haiti and Porto Rico, Greater Antilles.

Specimens examined.—HAITI: DOMINICAN REPUBLIC, Sosúa, 1 ♀. PORTO RICO: Utuado, 1 ♂ (U. S. Biol. Surv.); north side 2 ? (U. S. Nat. Mus.).

Aramus pictus dolosus, subsp. nov.

Aramus giganteus auct. nec Bonaparte.

Aramus holostictus auct. nec Cabanis.

Aramus pictus "Bartram" auct.

Aramus vociferus auct. nec Latham.

Aramus guarana auct. nec Wagler.

Type.—Adult ♂, No. 54162, collection Museum of Comparative Zoölogy, Bolson, Costa Rica, 25 December, 1907. Collected by C. F. Underwood.

Characters.—Similar to *Aramus pictus pictus* (Meyer) but with white area at the base of the secondaries more developed and extending along the outer web next the shaft for nearly 140 millimeters. This extension of the white area along the secondaries is entirely absent in the material examined representative of the two preceding forms of *Aramus pictus*, and makes an excellent and constant character, though I have been unable to detect any other means by which the race may be differentiated.

		<i>Measurements.</i>			
		<i>No.</i>			
		<i>Speci-</i>	<i>Wing</i>	<i>Tarsus</i>	<i>Culmen</i>
		<i>mens</i>			
<i>Locality</i>					
<i>Males</i>					
Costa Rica.....	2	318-330	130-135	127	
Mexico.....	2	315-333	126-135	123-126	
<i>Females</i>					
British Honduras.....	1	300	117	111	
(sexed ♂, ♀ by measurement)					
Costa Rica.....	1	308	117	102	
Mexico.....	1	304	119	115	
<i>Not sexed</i>					
(♂ by measurement)					
Mexico.....	1	325	120	122	

Range.—Central Mexico south to Costa Rica and Panama, on both east and west sides.

Specimens examined.—MEXICO: Vera Cruz, Tlacotalpan, 1 ♀, (U. S. Biol. Surv.). OAXACA [Tehuantepec]: Sta. Efigenia, 1 ♂ (M. C. Z.), 1 ♂ (U. S. Biol. Surv.); Huilotepic, 1 (U. S. Biol. Surv.). BRITISH HONDURAS: Belize, 1 ♂ [= ♀], (U. S. Nat. Mus.). COSTA RICA: Bolson, 1 ♂, 1 ♀; La Palma, 1 ? (U. S. Nat. Mus.).

Remarks.—This series shows a good deal of variation in the amount of white on the interscapulars and wing-coverts; in some specimens it is reduced almost as much as in *elucus*, while in others it shows a greater development than in *pictus*.

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A NEW *GEOSITTA* FROM WESTERN ARGENTINA.

BY JAMES L. PETERS

SOON after I had listed a *Geositta* taken by me in northern Patagonia (Bull. Mus. Comp. Zoöl., vol. 65, p. 312, May, 1923) as *Geositta cucicularia cucicularia* (Vieillot), I became convinced that in reality it represented a new form. In the spring of 1924 I had the opportunity of showing the specimens to Dr. C. E. Hellmayr, who compared them critically with all the related forms, and pronounced my bird to be undescribed. I therefore take pleasure in naming it

***Geositta cucicularia hellmayri*, subsp. nov.**

Type, adult male, No. 85339 Museum of Comparative Zoölogy, from Huanuluan, Argentina; collected September 25, 1920, by J. L. Peters.

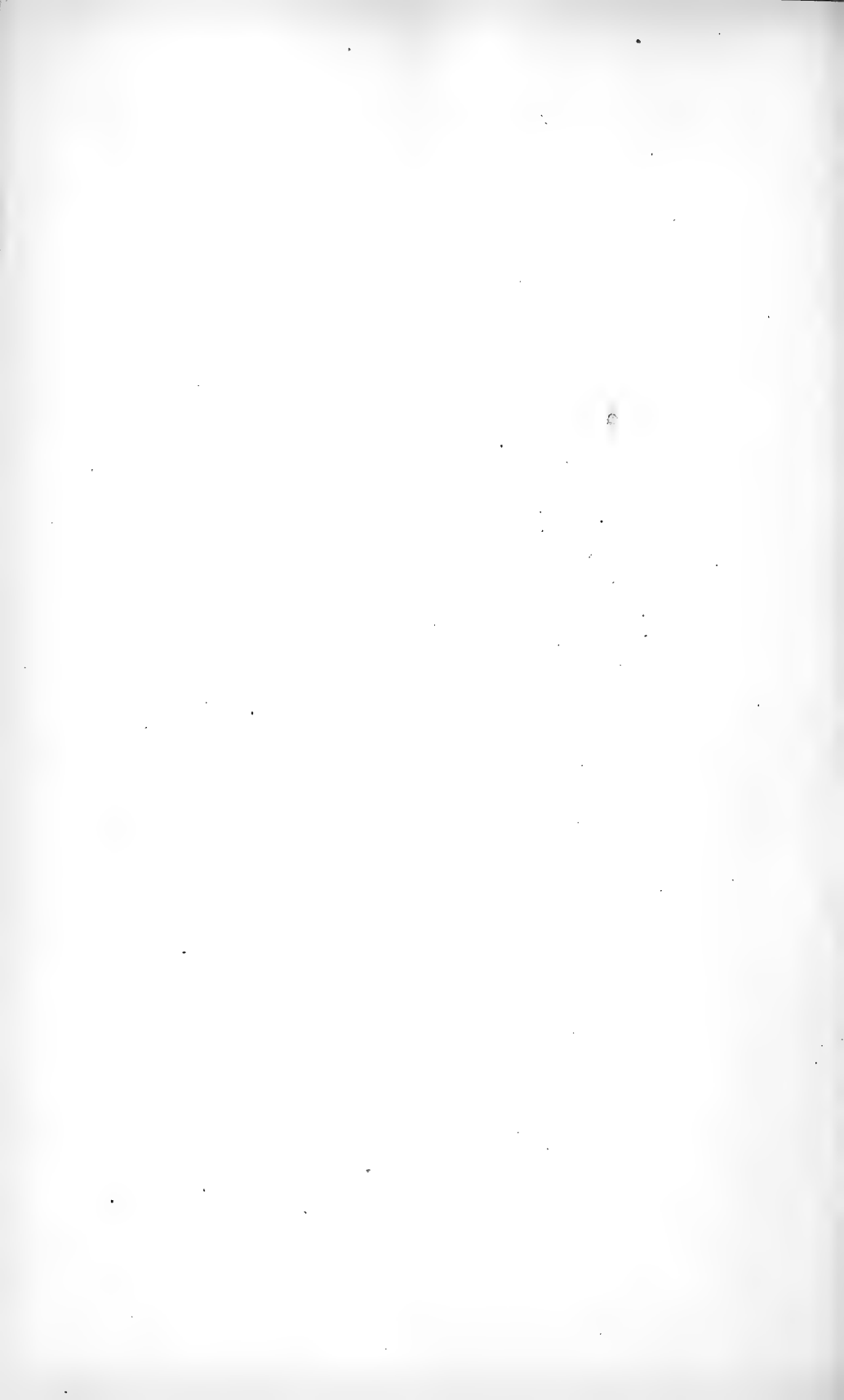
Characters.—Similar to *Geositta cucicularia cucicularia* of eastern Argentina, but larger and paler above and with the light bases of intermediate series of upper tail-coverts of greater extent and forming a poorly defined bar or patch.

Measurements.—Type and Topotypes: ADULT MALE (seven specimens), wing, 97.5 mm. (93 to 101); tail-feathers, 53 (51 to 54); tarsus, 21.5 (21 to 23); culmen to base of forehead, 21 (20 to 22). ADULT FEMALE (four specimens), wing, 94 (88 to 97); tail-feathers, 51 (48 to 53); tarsus, 21 (20 to 22); culmen to base of forehead, 20 (19 to 21).

Range.—Western Rio Negro Province and probably most of arid western Argentina.

Compared with *Geositta c. fissirostris* of central Chili it is similar and about intermediate between that form and *G. c. frobeni* of northwestern Argentina, Bolivia and northwestern Peru; nearest to the latter and agreeing with it in size, in coloration of upper tail-coverts and in reduction of the dusky spotting on the chest, but differing in much paler, sandy-grayish brown, instead of earthy-brown upper parts.

From *G. c. fissirostris* it differs in larger size, almost creamy-white upper tail-coverts, less well-developed pectoral spotting and paler basal portion of tail.



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A NEW BLUE WATER-THRUSH FROM CHINA.

BY OUTRAM BANGS AND THOMAS E. PENARD.

SPECIMENS of *Myophonus caeruleus* collected in 1907 by the late W. R. Zappey in the Provinces of Hupeh and Szechwan, China, represent an undescribed form which we propose to name.

Myophonus caeruleus immansuetus, subsp. nov.

Type.—Adult male, Museum of Comparative Zoölogy, no. 50,653, from Ichang, Province of Hupeh, China. 28 March, 1907. Collected by W. R. Zappey.

Subspecific characters.—Similar to *Myophonus caeruleus caeruleus* (Scopoli) and of about the same size, but duller in color, less lustrous, the shining tips of the feathers not so deep purple, more grayish blue, and the ground color also less bluish, producing a much less brilliantly colored bird.

Measurements of the type.—Wing, 175.0 mm.; tail, 121.0; tarsus, 54.5; culmen to base, 29.0.

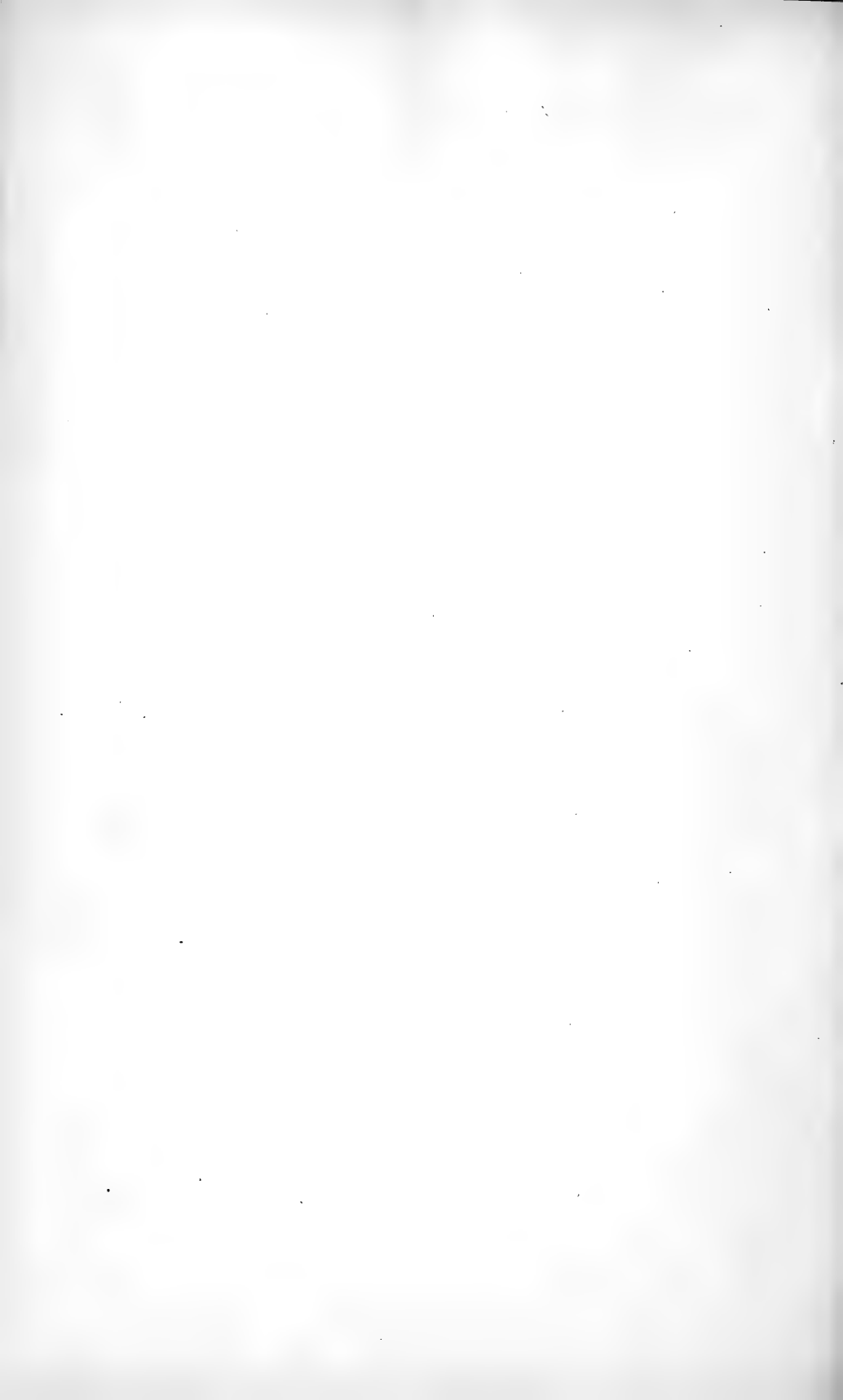
Specimens examined.—*M. c. caeruleus*, seven: FUKIEN, 4 ♂♂, 1 ♀. KWANG-TUNG: road between Hongkong and Canton, 1 ♂. YÜNNAN: Mengtze, 1 ♂.

M. c. immansuetus, six: HUPEH, Ichang, 1 ♂. SZECHWAN: Kiating, 1 ♂, 1 ♀; Ni-tow, 1 ♂; Wa-shan, 1 ♀; Husi-chow-hsien, 1 ♂.

Remarks.—Sonnerat's description, upon which Scopoli (*Deliciae Florae et Faunae Insubricaе*, 1786, p. 88, sp. 42) based his *Gracula caerulea*, applies to the brilliantly colored southern bird. Very properly Stresemann has, in 1923, restricted the name *Myophonus caeruleus caeruleus* (Scopoli) to birds from the Province Kwang-tung, the vicinity of Canton. Sonnerat is known to have visited that province.

There is apparently no name in synonymy applicable to the duller-colored northern bird. The names *Myophonus violaceus* (Gmelin) (*Syst. Nat.*, 1789, 2, p. 829) and *Myophonus nitidus* Gray (*Zoöl. Miscell.*, 1844, p. 1) both apply to the southern bird. So does *Myophonus brevirostris* Lafresnaye (*Rev. Mag. Zoöl.*, 1852, p. 460), the two cotypes of which we have examined. Notwithstanding the great age of the two Lafresnaye specimens, they can readily be distinguished from the less lustrous northern bird.

The specimen from Mengtze, Province of Yunnan, is in abraded plumage, and probably for that reason much duller than those from Fukien and Kwang-tung. It is, nevertheless, distinguishable from the northern bird, and we therefore place it with typical *caeruleus*.



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AN UNDESCRIBED RACE OF PHAINOPEPLA.

BY JOSSELYN VAN TYNE.

A SERIES of *Phainopeplas* from San Luis Potosi recently received at the Museum of Comparative Zoölogy is distinctly different from the form occurring in California, Arizona, and north-western Mexico. The San Luis Potosi birds represent the typical form described by Swainson (*Animals in Menag.*, 1838, p. 285) and by Lesson (*Rev. Zoölogique*, 1839, p. 42). The northern form may be known as:

***Phainopepla nitens lepida*, subsp. nov.**

Type.—Adult male, No. 200,653, Museum of Comparative Zoölogy, from Riverside, California, 14 May, 1878. Collected by Frank Stephens.

Characters.—Similar to *Phainopepla nitens nitens* (Swainson) but decidedly smaller. This is shown best in the wing- and tail-measurements, the former affording the most constant character. Not one of the seventy-three adult males of this race examined has as long a wing as the smallest of the seven males available from San Luis Potosi. As indicated in the following table of measurements the wing of the male *lepida* averages only 92.3 mm. as compared with 99.3 in the typical form and similarly the tail measures 93.2 mm. against 100.7 in the latter.

MEASUREMENTS

Phainopepla nitens nitens (Swainson)

Locality	No. speci- mens	Wing	Tail
Males:			
San Luis Potosi.....	7	99.3 (98-103)	100.7 (96-105)
Durango.....	1	99	98
Females:			
San Luis Potosi.....	1	95	96
Vera Cruz (?).....	1	97	98

Phainopepla nitens lepida, subsp. nov.

Males:			
California.....	28	92.6 (88-96)	93.4 (87-100)
Lower California.....	21	92.2 (87-95)	93. (86-96)
Arizona.....	12	92.4 (89-95)	93. (87-98)
Sonora.....	12	92.1 (90-95)	93.6 (90-98)
Females:			
California.....	16	89.7 (87-94)	91.3 (84-92)
Lower California.....	13	91. (89-95)	89.8 (83-96)
Arizona.....	6	89.8 (87-93)	86.1 (82-93)
Sonora.....	5	90.2 (88-93)	88.8 (86-93)

Remarks.—I am greatly indebted to Mr. Outram Bangs of the Museum of Comparative Zoölogy for his generous assistance in the preparation of this paper. All of the specimens described are in the collection of the Museum of Comparative Zoölogy, except one from Durango, which I examined in the collection of the University of Michigan Museum of Zoölogy.

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THE GENUS *CHALCOMYIA* (DIPTERA: SYRPHIDAE).

BY RAYMOND C. SHANNON.

THE genus *Chalcomyia* Williston (Bull. Brooklyn Ent. Soc., vol. 7, p. 133, 1885) appears to be peculiar to North America. It was erected for *Myiolepta aerea* Loew and defined principally on the basis of: antenna short, with dorsal arista; marginal cell open; anterior (discal) cross-vein distinctly before the middle of the discal cell, usually rectangular; face black without tubercle; scutellum unusually large, nearly square; males dichoptic. The two last characters are peculiar to *Chalcomyia*, as hitherto known, and easily suffice to define the genus.

A second species, *cyanea*, was added by Smith, although the scutellum in this species is not as well developed as in the genotype and the face of the male has a slight tubercle. Two additional species are now at hand which are still more aberrant. The one, received from Mr. C. W. Johnson, is represented only by the female and hence one of the generic characters found in the male sex, *i.e.*, dichoptic eyes, is not available. The scutellum is noticeably broader than long and the discal cross-vein is nearly at the middle of the discal cell. The species is strikingly like the *Xylotae* and one is at first inclined to locate it in the *Xylotinae*. However, the discal cross-vein is rectangular as in the *Chilosinae* and the abdomen is broadly oval and flat as in *Chalcomyia aerea* female (rather elongate and parallel-sided in *Xylota*); the head is distinctly triangular and has a well-developed antennal prominence as in *Chalcomyia aerea* and probably the male will be found to have dichoptic eyes (holoptic in *Xylota*).

The fourth species, both sexes, was standing in Dr. Aldrich's collection labeled "new species." The eyes of the male approach each other very closely; face concave and without tubercle in both sexes; scutellum distinctly longer than broad; metasternum pilose; body much more slender than in other species; petiole beyond first posterior cell nearly as long as discal cross-vein. The inclusion of these species in *Chalcomyia* necessitates a reconsideration of the genus.

The *Chilosinae* and *Xylotinae* are intergradant and their separation is more or less arbitrarily fixed on the basis of certain characters. A number of genera, three of which concern us here, *Myiolepta*, *Chalcomyia* and *Cynorhinella*, occupy a rather intermediate position between the two subfamilies. The latter two

genera especially are composed of a small number of aberrant species (*Chalcomyia aerea* Loew, *cyanea* Smith, *anomala*, new species, and *depressa*, new species, and *Cynorhinella canadensis* Curran, *bella* Williston and *longinasus* Shannon) which do not have a close uniformity among themselves and at the same time act as intermediates between allied genera of both subfamilies. According to our present understanding of the Chilosiinae, this group now being considered, *Myiolepta*, etc., comes within its limits, chiefly due to the position of the discal cross-vein, *i.e.*, discal cross-vein rectangular and joining the discal cell before its middle (usually oblique and joining the discal cell at or beyond its middle in *Xylotinae*).

Both *Chalcomyia* and *Cynorhinella* were established on a single species each, which was of a rather extreme type, their peculiar characters forming the basis of the descriptions. The new species which have been added to them are not all as extreme in these peculiar characteristics, hence the old characters do not suffice to key them and it is necessary to redefine them.

Myiolepta, *sensu stricto*, *Chalcomyia* and *Cynorhinella* are separated from other Chilosiina genera by: face black with or without tubercle either in the male or in both sexes; body pile not developed scale-like; petiole beyond first posterior cell usually much shorter than length of discal cross-vein.

- A¹. Head not distinctly triangular, usually broadly elliptical; face tuberculate in the male; third and fourth veins joining practically at wing margin; second vein turned abruptly upward at tip. *Myiolepta*.
- A². Head distinctly triangular.
- B¹. Face not produced downward; tuberculate (as far as known) only in male of *cyanea*; a distinct petiole beyond first posterior cell, rarely as long as discal cross-vein; second vein distinctly curved at tip. *Chalcomyia*.
- B². Face much produced downward; tuberculate in both sexes (as far as known); third and fourth veins joining practically at wing margin; second vein straight or slightly curved at tip. *Cynorhinella*.

The immature stages of *Chalcomyia aerea* are passed in rotting logs. The other species probably have similar habits.

Table of Species of Chalcomyia.

- A¹. Greenish bronze, clothed with short yellow pile; tibiae and tarsi largely yellow; scutellum subquadrate; *male*: face without tubercle; eyes well separated, sides of front parallel on upper half.
- B¹. Discal cross-vein joining discal cell much before its middle; posterior cross-vein much less than the section of fourth vein above it.
- C¹. Thorax flattened above; abdomen constricted basally; hind femora of male and female much swollen; *male*: face without tubercle; eyes distinctly converging and rather closely approximated. *depressa*, new species.
- C². Thorax not flattened; abdomen broadened basally; hind femora very slightly swollen; *male*: face with slight tubercle; eyes slightly converging, well separated. *cyanea* Smith.
- B². Discal cross-vein joining discal cell nearly at its middle; posterior cross-vein subequal to section of fourth vein above it. *anomala*, new species.

Chalcomyia aerea Loew.

This species was described by Loew (Cent., no. 10, p. 53) from Illinois. It has been reported from Nebraska, Ohio, Massachusetts, New York, Pennsylvania, Maryland, Virginia and North Carolina.

Chalcomyia cyanea Smith.

Chalcomyia cyaneus Smith, Proc. Ent. Soc. Washington, vol. 14, p. 119, 1912.
Chalcomyia calcitrans Curran, Can. Ent., vol. 53, p. 260, 1921.

Only males of this species are known. Originally described from Franconia, New Hampshire, and later recorded (as *calcitrans* Curran) from Orillia and McDiarmid, Ontario.

Chalcomyia anomala, new species.

Female.—Medium-sized, black species, 9 mm. Head, frontal aspect, triangular; front at vertex as broad as length of antenna; widening downward, and at base much broader than length of arista; antenna and arista blackish; face deeply concave in profile; antennal base projecting beyond epistoma; body pile short, pale, inconspicuous; scutellum well developed, its margin rimmed; abdomen broadly oval, flat; wings smoky, darkened basally; discal cross-vein slightly clouded; discal cross-vein joining discal cell just before its middle, nearly straight and perpendicular; posterior cross-vein subequal to section of fourth vein above it; squama white, plumula brownish; halteres orange.

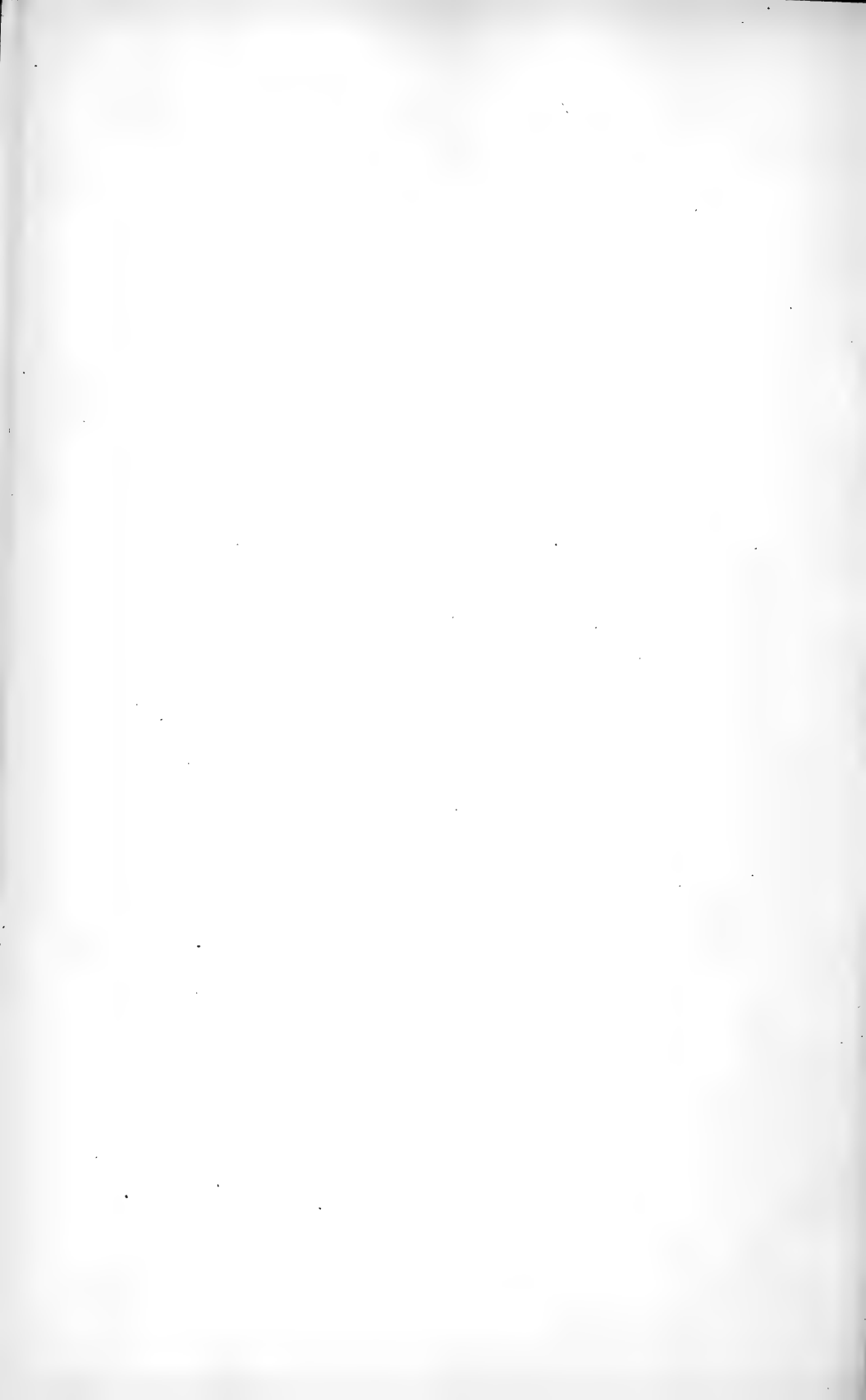
Holotype, female, Clementon, New Jersey, May 14 (C. W. Johnson, in his collection). I wish to thank Mr. Johnson for his kind favor in lending me this specimen for study.

Chalcomyia depressa, new species.

Description.—This species may be easily recognized by its entire bluish-black color of body and black legs; small and brownish antennae; short and yellowish arista; flattened thoracic dorsum; abdomen somewhat constricted basally, broader behind; second and third tergites opaque posteriorly; smoky wings; tip of first posterior cell not acute, the petiole beyond nearly as long as discal cross-vein; pile very inconspicuous. Other characters are in the key.

Type locality.—Craig Mountains, Idaho.

Type.—Cat. No. 27,835, U. S. National Museum. Holotype, male, Craig Mountains, Idaho (J. M. Aldrich). Allotype, female, Mt. Moscow, Idaho, July 1, 1909 (J. M. Aldrich).



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A NEW FROG AND A NEW SNAKE FROM PANAMA.

BY THOMAS BARBOUR.

AMONG collections of reptiles and amphibians, made at the Barro Colorado Island Laboratory in Gatun Lake by Messrs. W. S. Brooks, E. Wigglesworth and the writer, are five specimens of a new frog related to a comparatively little-known species, *Rana warschewitschii* (Schmidt), from Costa Rica and extreme western Panama. The celebrated Polish explorer, von Warszewicz, discovered the types near Chiriqui Volcano, in a moist foggy region about 6000 or 7000 feet above sea level. Apparently only the type, probably still in Cracow, was taken and was amply described and reasonably well figured by Schmidt (Denkschr. K. Akad. Wiss. Wien, vol. 14, p. 241, pl. 1, fig. 1-4, 1858). The species was later described as *Rana caeruleopunctata* by Steindachner and was fully discussed by Boulenger in his American Frogs of the Genus *Rana* (Proc. Amer. Acad. Arts and Sci., vol. 55, p. 478, 1920). This frog has a wider range than Boulenger supposed. The type came from the Volcán de Chiriquí; Dr. E. R. Dunn and Mr. Chester B. Duryea collected a beautiful series at Suretka in the Talamanca Valley, Costa Rica, near the Panamanian border on the Atlantic coastal plain. In 1920, Dr. Dunn found it sparingly at Navarro in Costa Rica, altitude about 4000 feet. Boulenger had records for Nicaragua based upon Cope's and Noble's writings, which he cites, and from Bebedero, San Carlos and La Palma in Costa Rica. In discussing *Rana caeruleopunctata*, Boulenger remarks that while the British Museum had received large collections from Costa Rica it had never received *Rana palmipes* from that country. The reason for this was that these collections were made in the highlands while *Rana palmipes* is a species characteristic of the coastal plain. The Museum of Comparative Zoölogy has specimens from along the Caribbean littoral from Mexico to British Guiana and along the Pacific from eastern Panama and from the interior of Colombia, Brazil and Peru. There are examples from Zent, Guapiles, Monteverde and Suretka, Costa Rica, mostly taken by Dr. Dunn during his fruitful explorations.

The new frog is named in honor of Mr. James Zetek, the diligent resident custodian of the Barro Colorado Island Laboratory of the Institute for Research in Tropical America.

Rana zeteki, sp. nov.

Type.—No. 10031, Museum of Comparative Zoölogy, from Barro Colorado Island, Gatun Lake, Canal Zone of Panama. March, 1924. Four paratypes.

Diagnosis.—A *Rana* closely related to *Rana warschewitschii* (Schmidt) = *Rana caeruleopunctata* (auct.) and differing conspicuously in having a wholly black throat, chest and upper belly instead of an ashy-gray venter; dark, not pink, anterior aspects of the thighs; inconspicuously instead of heavily cross-barred tibia; the white stripe on the upper lip extending to beneath the eye instead of to the tip of the snout; the dorsum much less coarsely granular; the feet and webs largely black instead of largely coral pink; a distinctly shorter hind leg and more massive thigh.

It is hoped that future collecting in Panama may make it possible to say whether this species gradually approaches *Rana warschewitschii* in the unexplored regions of Panama in Veraguas and the western part of the provinces of Colon and eastern Bocas del Toro. The new type may be a subspecies of the older form but it may equally well be wholly distinct. It is hoped that this and other species may be discussed in a future account of the herpetology of this extraordinary biological reserve.

This February (1925) while at Barro Colorado Island, an Indian boy engaged in digging out a stump near the laboratory building came upon a small snake. At the time I thought it was a *Leptocalamus sclateri* Boulenger, so white was its head, but later upon examining it carefully it appears to be a very peculiar species of *Tantilla*, apparently with no very near allies. It may be called

Tantilla albiceps, sp. nov.

Type.—No. 20600, Museum of Comparative Zoölogy, from Barro Colorado Island, Gatun Lake, Canal Zone of Panama. Barbour collection.

Diagnosis.—A small very slender *Tantilla* with head and nape almost wholly white and with a very high count of ventrals and subcaudals.

Description.—Head long, flat, depressed, with a snout slightly projecting, blunt, almost square, in outline; rostral much broader than high, extending on to top of head for a distance nearly equal to internasal suture; internasal suture a little shorter than the prefrontal suture; frontal broad, roughly hexagonal, about one-third longer than broad; its length greater than the distance from the tip of the snout; nostril between two nasals, posterior nasal barely in contact with the single preocular; one postocular about the size of the eye or a little larger; temporals 1 + 1, the anterior the larger; 7 supralabials, 3d and 4th entering the eye; 6 lower labials, the first pair separated by the mental; two pairs of anterior chin shields, about equal in size; scales in fifteen rows, without apical pits; ventrals 185; anal divided; subcaudals 62 and the extreme tip of the tail may be missing. Length of body 164 mm., tail 48 mm.

Color as in life.—Head, nape, belly, under surface and tip of tail ivory white, a faint dusky spot surrounding each eye and extending across the head as two faint lines on each side of the fronto-prefrontal suture; dorsal surfaces slaty olive; on the lower scale-rows the dark color shows as innumerable dots with the white appearing between; a cluster of dark dots on the outer end of each ventral.

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THE TIME OF SUBMERGENCE NECESSARY TO
DROWN ALLIGATORS AND TURTLES.

BY GEORGE H. PARKER.
(Zoölogical Laboratory, Harvard University.)

THE waters of the Gatun Lake region are becoming infested with the salt-water crocodile, *Crocodylus-acutus* Cuvier, which is competing vigorously with the Central-American cayman, *Cayman sclerops* (Schneider). This cayman in the adult state is now seldom seen about the banks of the great lake and its affluent rivers but may still be found in the smaller streams and forest pools. While I was at the Barro Colorado Island Laboratory in Gatun Lake, Panama Canal, I took the opportunity of testing the caymans for the length of time they could remain submerged in water. I had previously carried out somewhat similar observations on the Florida manatee (Parker, 1922). The manatee is of course a warm-blooded animal and remains under water only a relatively short period, the longest voluntary submergence observed being 16 minutes and 20 seconds. With cold-blooded forms, like the caymans, much longer periods would naturally be expected. Lumsden (1923, p. 365) states that tortoises, turtles, alligators, and crocodiles sometimes remain under water for an hour at a time and even when on land they retain each breath for five to twenty minutes. He remarks further (1924, p. 259) that tortoises resist attempts to chloroform them by simply refusing to breathe for two to three hours at a stretch. These records support the prevailing idea that cold-blooded, air-breathing animals may remain long periods under water without suffocation.

During my stay in Panama I succeeded in testing this capacity in five caymans which ranged in length from 27 cm. to 86 cm. Notwithstanding the differences in size all five animals behaved in much the same way.

The caymans were submerged under a wire net in a large glass aquarium so that, though they had freedom to move about, they could not reach the surface of the water to take air. Their activities could be easily followed through the glass walls of the aquarium. Immediately after submergence the caymans discharged a number of bubbles of air from the nostrils and for some time thereafter they swam about endeavoring to reach the surface. This period of unsuccessful searching was commonly followed by a lengthy interval of relative quiescence interrupted

now and then by agitated swimming during which in some instances the animals emitted a succession of squeaking noises. Finally the caymans became passive, discharged considerable air from the mouth, and dropped to the bottom where they soon died. During the whole period of submergence their activities were as a rule carried out quietly and without any movements that could be called convulsive. The shortest period in which drowning occurred was 34 minutes, the longest 72 minutes and the average for the five tests was 54 minutes. I conclude, therefore, that caymans on being submerged may drown in a little less than an hour.

This period seemed to me surprisingly short and yet I had no reason to suspect the accuracy of my observations. After each cayman had suffered what was supposed to be death by drowning it was taken out of the water and left for recovery in the air but none ever revived. The drowning was unquestionable.

Several good observers who were familiar with the habits of our southern alligator, *Alligator mississippiensis* (Daudin), assured me that these animals could remain under water without drowning for periods much longer than those recorded for the caymans. I therefore attempted by methods like those just described to test the drowning of alligators. Through the kindness of Dr. Thomas Barbour I was enabled to work on four living alligators from Florida. All were small individuals measuring in length about 26 cm. each. They were submerged singly in an aquarium arranged in the same way as in the tests with the caymans. On the whole the alligators were more continually active than were the caymans. The alligators often made squeaking noises but eventually became quiet and sluggish and finally subsided to the bottom of the aquarium where they died. It was impossible to determine accurately the exact moment of death but judged by their irresponsiveness to stimuli an approximation to this could be made. Based upon this approximation the periods necessary for drowning the alligators varied from 5 hours and 20 minutes to 6 hours and 5 minutes and averaged for the four animals 5 hours and about 40 minutes. This length of time was more in accord with what had been expected, and is in striking contrast with the times recorded for the caymans. I know of no reason, however, for any inaccuracy in the tests on the caymans and I conclude, therefore, that *Caiman sclerops* is quickly drowned and that *Alligator mississippiensis* may resist this fate for from five to six hours.

Neither the cayman nor the alligator gave evidence of breathing in any way except by lungs. Water tortoises have in addition to pulmonary respiration, oral and anal respiration. Oral respiration is possible in consequence of the highly vascular condition of the surfaces of the mouth and pharynx. S. H. Gage and S. P. Gage (1886) have studied oral respiration in the soft-shelled tortoises, *Amyda* and *Aspidonectes*, and have noted that these animals will remain under water voluntarily as long

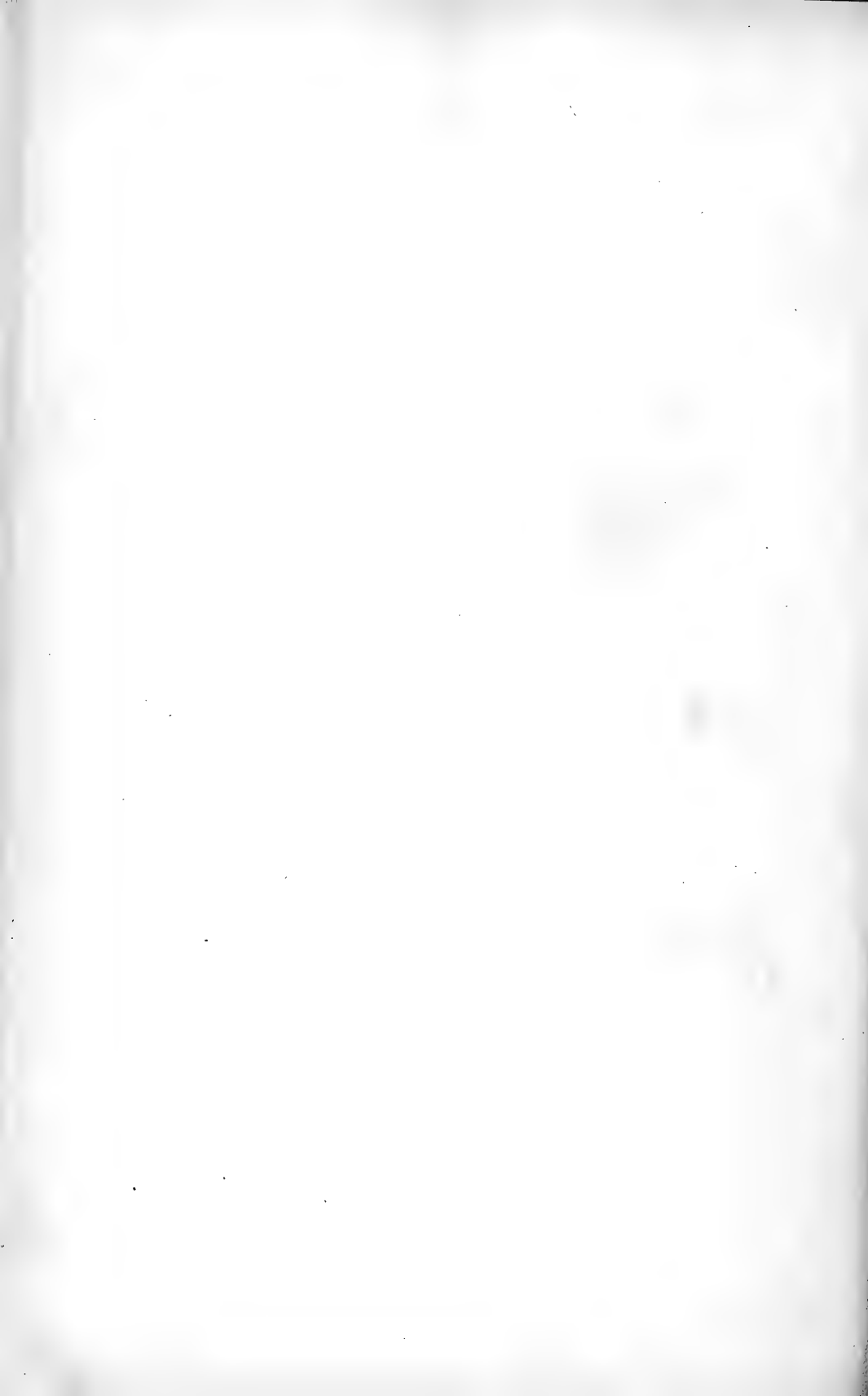
as ten hours. Gadow (1909, p. 330) has called attention to the importance of the so-called accessory bladders in water tortoises as organs for anal respiration and has explained in this way the high vascularity of their walls. By means of oral and of anal respiration turtles may be expected to remain under water much longer than alligators or other like forms, and such seems to be the case, for I know of no evidence to show that any alligators will remain unrestrained under water for ten hours as recorded for turtles.

Through the kindness of Dr. C. H. Townsend, Director of the New York Aquarium, I was enabled to make observations on the submergence periods of a number of marine turtles. These included the green turtle, *Chelonia mydas* (Linn.), the hawk's-bill, *Eretmochelys imbricata* (Linn.), the loggerhead, *Caretta caretta* (Linn.) and Kemp's turtle, *Caretta kempii* (Garman). In none of these turtles did I observe a voluntary submergence that lasted over 40 minutes though in the Berlin Aquarium I once timed a loggerhead that remained voluntarily under water for a period of 64 minutes. During much of this time the loggerhead exhibited oral respiration. At the New York Aquarium I tested the drowning period of a very active Kemp's turtle and found it to be only a little over an hour and a half. The shortness of this period was probably due to the incessant activity of the turtle whereby it must have used up rapidly its store of oxygen. The voluntary submergence period of over an hour for the loggerhead already noted was associated with general quiescence, a state of affairs that must be characteristic of the months of submergence that occur when water tortoises hibernate.

Whether marine turtles are capable of anal respiration or not I do not know, but some of them certainly employ oral respiration and this together with anal respiration is probably what enables turtles in general to remain longer under water than is possible with caymans and with alligators.

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A NEW TREE-TOAD FROM JAMAICA.¹

BY EMMETT R. DUNN.

MORE intimate knowledge of Salientia in the field has resulted of late in a considerable increase in the number of species known to inhabit any given locality; and while this is largely on account of the discovery of actual novelties, much of it comes from the realization that variation in these forms is not so excessive as had been supposed and that "varieties" and "young" are often perfectly independent species. These facts are elicited especially by observation of habits, by attention to the characteristic calls, and by collection of large series. No better example of the value of large series can be given than the present, when 119 specimens of a small and very distinct new *Hyla* were collected by Dr. and Mrs. H. H. Wilder during a two weeks' sojourn in Jamaica last March. It may be very appropriately called

Hyla wilderi, sp. nov.

Type.—No. 10500, Museum of Comparative Zoölogy, adult male. Collected by Dr. and Mrs. H. H. Wilder. March, 1925.

Type locality.—Moneague, Saint Ann Parish, Jamaica; altitude 1200 feet.

Range.—Probably widespread in the island. Recorded from Mandeville by Barbour (Bull. Mus. Comp. Zoöl., vol. 52, p. 288, 1910).

Diagnosis.—A small *Hyla* with skin of head free from cranium; fingers free; toes one-third webbed (two phalanges of IV free); vomerine teeth in two small patches between the choanae and on a line with their posterior borders; light Nile green; bones green in life; male with a black thumb-pad made up of about 25 conical points; female with a yellow interocular band. Length from snout to vent 29 mm.

Description of type.—Tongue broader than long, slightly emarginate behind; vomerine teeth in two groups the size of the choanae, equidistant from choanae and from each other, on a level with the posterior margin of the former; head broader than long; nostrils at the tip of the snout; the distance from mid-point of snout to nostril contained more than twice in the distance from nostril to eye; snout rounded; interorbital width equals the diameter of the eyes; no indication of ossification in derm of head; a supra-tympanic fold; tympanum distinct, directed upward, distant one-third its diameter from eye, equal to one-third the diameter of the eye; canthus rostralis rounded, the loreal region slightly concave; heel reaching hind edge of eye; digits with disks slightly smaller than tympanum; fingers free; toes one-third webbed, two phalanges of IV free, one phalanx of II, III, and V free, I free. Thumb with a black horny patch on inner edge that consists of about 25 conical points fused at their bases; skin finely granular, almost smooth; belly and

¹ Contribution from the Smith College Department of Zoölogy, No. 129.

thighs coarsely granular; no dorso-lateral fold; a subgular vocal sac. Color light green above, darkest on head; white below; bones green, the tibia showing through the transparent under skin. Tip of snout to vent 27 mm.; tip of snout to posterior border of tympanum 8; width of head 10; arm 14; leg 38; tibia 13.

Variation.—Females lack the thumb-pad. In most specimens (63%) there is a well-developed interocular stripe of yellow with dark edges. This is correlated with sex for of the 28 specimens with thumb-pads only 6 had well-developed stripes, and of 44 specimens over 25 mm. long without thumb-pads, only 6 did not have a well-developed stripe. The specimens with thumb-pads were 24–27 mm. long. A few had the pad represented by isolated black cones. The largest specimens had no pads and reached a length of 29 mm.; the smallest one collected was 15 mm. long.

Habits.—All the specimens were taken from the “wild pines” (Bromeliads), where the larger *Hyla brunnea* was also occasionally found. The natives called the new form “Spring Chickens” reserving the name “Tree Toad” for *brunnea*.

Remarks.—This form differs from the Jamaican *brunnea* and *lichenata*, the Haitian *dominicensis* and the Cuban *septentrionalis* in not having the skin of the head adherent to the cranium, as well as in the peculiar thumb-pad of the male, the weaker vomerine teeth and less-developed webs.

From the Haitian *heilprini* and *pulchrilineata* which have the head-skin similarly free, it differs in color, in weaker vomerines, in style of thumb-pad, and in weaker webbing. In the oblique tympanum and the color it somewhat resembles *heilprini*. In size, weaker vomerines, and less-extensive webbing it resembles *pulchrilineata*. The male apparatus of *heilprini* is a dagger-shaped prepollex, that of *pulchrilineata* is a flat horny pad (as in *septentrionalis*, *dominicensis* and *brunnea*), while that of *wilderi* is a very rugose affair. *Pulchrilineata*, too, has the chest and throat coarsely granular, while the chest and throat of *wilderi* are smooth. It is probably most closely related to *pulchrilineata*, and runs neatly to that species in Nieden's key to the genus. It is similar in proportions and in vomerine teeth to *brunnea* and differs from it only slightly in extent of webbing, and this, in connection with its delicate and youthful appearance and its small size, led me to consider it the young of *brunnea* until I noticed the thumb-pad of the male. The same opinion was held by Barbour (*l.c.*), who says of *brunnea*: “The young of this species show a peculiar dichromatic condition. They may be generally dark in color, *i.e.* rather like the adults; or they may be light yellow, almost transparent, amber-like, with a broad, white-edged, golden metallic band between the eyes.” These light specimens, which came from Mandeville, belong to the present species, and ten of them are in the collection of the Museum of Comparative Zoölogy.

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NEW FROGS FROM CUBA.¹

BY EMMETT R. DUNN.

I WAS so fortunate last year as to be able to spend nearly two months at the Harvard Biological Station on the Atkins estate at Soledad, near Cienfuegos, on the southern coast of Cuba. There and in the nearby Trinidad Mountains I observed the habits and calls of several species of *Eleutherodactylus*, and collected a number of specimens. The present descriptions are to be considered as preliminary accounts of the more striking novelties. When the status of *E. varians* shall have been settled it will be possible to decide the status of several more problematical forms that were taken.

I am indebted to Dr. Thomas Barbour for the opportunity of making the trip and to the officials of the Central and of the various Colonias for much hospitality and assistance.

At Soledad itself, *Eleutherodactylus ricordii* and *E. cuneatus* were common species. In the mountains *E. dimidiatus*, famous throughout that region as the "kolín", was the prevalent form. Three other forms were taken in or near Soledad itself which appear to be undescribed. The first of these is a tiny grass-haunting species which seems to be widespread and common in Cuba, as I have seen specimens in collections from Santiago, Matanzas, La Modesta, and Havana. I take pleasure in naming it after a hospitable friend, Mr. James B. Varley of Guabairo, who helped me collect the first I saw.

Eleutherodactylus varleyi, sp. nov.

Type.—Adult male, Museum of Comparative Zoölogy, No. 10601, from Soledad, Cuba. Collected by E. R. Dunn. August, 1924.

Range.—Known from several localities in eastern and central Cuba.

Diagnosis.—Allied to *E. minutus* and *E. abbotti* of Santo Domingo. Toes free; disks very small; belly granular; back with scattered warts, and a dorso-lateral line of warts; throat and chest inflatable; a white mark below eye.

Description (Mus. Comp. Zoöl., No. 10561, adult male).—Head slightly longer than broad, narrower than body; distance between anterior corner of eye and nostril greater than the diameter of the eye, equal to interorbital

¹ Contributions from the Department of Zoölogy, Smith College, No. 130.

width; upper eyelid much narrower than interorbital width; distance between nostril and snout contained two and one-half times in distance from nostril to eye; *canthus rostralis* rounded; loreal region slightly convex; tympanum distinct, two-thirds the diameter of the eye, separated from the eye by less than one-half its own diameter; heels touch when legs are at right angles to the body; digits scarcely dilated; no webs; second finger longer than first; no tarsal fold; metatarsal tubercles poorly developed; a series of elongate glandular elevations forms a dorso-lateral fold from tympanum to groin; sides below this with lines of glands; a few smaller glands on back, especially two such on the scapular region; center of belly smooth, sides coarsely granular; throat and chest developed into vocal sac; a discoidal ventral fold; under sides of thighs heavily granular; vomerine teeth from outer edge of choanae curving inward, inner end at level of outer, separated from fellow by two-thirds length of series, and from choanae by one-third length of series. Color, light brown; band between eyes, warts on shoulders and band in front of sacrum, dark; two bars on tibia; a white line under eye; a white spot at hinder, lower corner of tympanum; sides pale; below white. Length 14 mm.; head 5; tibia 7; leg 19; arm 7.5.

Variation.—Several specimens have an inverted V on shoulders; vomerine teeth may begin below middle of choanae, and be separated from those of opposite side by one-half length of series and from choanae by same distance.

Paratypes: Mus. Comp. Zool. Nos. 10599–600, 105602, from Soledad; 10603–4 from Guabairo.

The species around Soledad which is arboreal and whose call can be heard in loud choruses for some distance, is clearly related to *E. auriculatus* from eastern Cuba, but is as clearly different. The diagnostic characters must be understood as applying to specimens from Oriente and from Soledad, and not necessarily applying to the Santo Domingan or Porto Rican forms.

Eleutherodactylus sonans, sp. nov.

Type.—Adult male, Museum of Comparative Zoölogy, No. 10609, from Soledad, Cuba. Collected by E. R. Dunn. July–August, 1924.

Diagnosis.—Closely related to *E. auriculatus*, but differing in its smaller size; smaller tympanum (one-third rather than one-half the diameter of the eye); disks of fingers and toes not all same size, largest equal the tympanum in diameter rather than one-third its diameter; heel not to middle of eye; heels barely touching when appressed; tip of toe V not reaching penultimate tubercle of toe IV, instead of beyond it; tip of toe I not reaching disk of toe II; vomerine series shorter.

Description (Mus. Comp. Zool., No. 10609, adult male).—Head as long as broad, broader than body; distance from eye to nostril shorter than diameter of eye and equal to interorbital space; equal to twice the distance from snout to nostril; *canthus rostralis* sharp; lores flat, sloping; tympanum one-third the diameter of eye, separated from eye by its own diameter; heels touching when appressed; heel reaching to eye; disks of fingers III and IV, and of toe IV as large as tympanum, twice as large as disks of fingers I and II and toes I, II, III, and V; tip of toe V not reaching penultimate tubercle of toe IV; tip of toe I reaching disk of toe II; finely rugose above; two scapular warts; a supra-tympanic fold; a short fold obliquely upward from tympanum to middle of side followed by warts forming a curved dorso-lateral fold convex upward; belly granular; a fold across chest; a subgular vocal sac; vomerine teeth beginning in from inner edge of choanae; separated from fellow by one and one-half times length of series and from nares by same distance. Color, dark brown; a

light canthal line; lores dark; a black supra-tympanic mark; a dark interorbital bar; gular pouch with black dots; sides darker than back; belly light. Total length 19 mm.; head 6.

Variation.—Another specimen has a light dorsal line, forking on to thighs; indistinct light bars on legs. Still another animal is light gray instead of dark brown. In all these the dark markings are the same.

Paratypes: Mus. Comp. Zoöl., Nos. 10605-8, 10610-3.

At Guabairo, one of the Colonias appertaining to the Central Soledad, in dry hill-forest, a large and beautiful frog with brilliant markings of scarlet and black was found. It is related to *E. ricordii* and to *E. cuneatus* and there has been considerable confusion in the past in regard to the three. *E. ricordii* is a small form in which there is no web, the heels do not overlap, there is no red in the coloration, no dorso-lateral fold, no W-shaped scapular fold, and in which fingers III and IV have perceptibly larger disks. *E. cuneatus* is a larger form with toes webbed at the base, heels not overlapping, no red, a dorso-lateral fold, a W-shaped scapular fold, fingers III and IV with slightly larger disks. The third is large, has no webs, the heels overlap, the thighs are red, there is a dorso-lateral fold, no W-shaped scapular fold, fingers III and IV are without larger disks. The habits, habitats and calls of the three are markedly different. *E. cuneatus* has a tendency to be aquatic. All three occur throughout Cuba, although *E. ricordii* seems to keep to lower altitudes. The type of *E. cuneatus* (U. S. Nat. Mus., No. 5702) has been examined. Stejneger (Proc. U. S. Nat. Mus., vol. 53, p. 262, fig. 8-12, 1917) employs the name *cuneatus* correctly, while Barbour (Mem. Mus. Comp. Zoöl., vol. 44, p. 244, 1914, and vol. 47, p. 105, pl. 13, fig. 9-11, 1919) and Schmidt (Proc. Linn. Soc. New York, vol. 33, p. 5, 1920) use *cuneatus* for the red-legged form and have considered true *cuneatus* specimens as large *ricordii*, to which, indeed, they bear much resemblance, and with which they are ordinarily found associating.

The brilliantly colored form therefore lacks a name and it seems appropriate to christen it in honor of Mr. Edwin F. Atkins, who, by the establishment of the Harvard Biological Station, has given a great impetus to the study of Cuban, and of tropical, biology.

Eleutherodactylus atkinsi, sp. nov.

Type.—Adult male, Museum of Comparative Zoölogy, No. 10587, from Colonia Guabairo, near Cienfuegos, Cuba. Collected by E. R. Dunn. August 18, 1924.

Range.—Throughout the island.

Diagnosis.—Allied to *E. ricordii* and to *E. cuneatus*, but heels overlapping when appressed; concealed surfaces of thighs red; no webs between toes; none of the fingers with perceptible disks.

Description (Mus. Comp. Zoöl., No. 10587, adult male).—Head as long as broad, narrower than body; distance from eye to nostril greater than diameter of eye, greater than interorbital width, three times distance from nostril to snout; *canthus rostralis* blunt; lores flat, sloping; tympanum three-fourths diameter of eye; eye to tympanum equals one-third diameter of tympanum; heels overlap slightly when appressed; heel reaches eye; disks scarcely enlarged; toes free; no tarsal fold; skin granular above; a supra-tympanic fold; an oblique fold from tympanum downward to middle of side; a discoidal ventral fold; throat, chest and belly smooth; thighs granular below; vomerine teeth in long series beginning beyond outer edge of choanae, curving in and back, separated by width of choanae, and closer to choanae than to each other. Color, reddish brown above; lores, supra-tympanic mark, interorbital bar, supra-scapular bar and supra-sacral bar black; tibia with lighter bars; a black spot on groin and another on base of thigh; concealed surfaces of thighs red. Length 31 mm.; head 10.

Variation.—A female is 39 mm. long, and has the tympanum two-thirds the diameter of the eye. There may be a dorso-lateral light line, and a dorso-lateral row of warts; the general color may be pale gray instead of reddish brown. Specimens from Oriente seem to have the black spot on the thigh poorly or not at all developed. Specimens from Pinar del Rio have no black on thigh or on groin. These may represent races but it would be premature to distinguish them at present.

Paratypes: Mus. Comp. Zoöl., Nos. 10536, 10588–98.

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A NEW CUBAN ANOLIS.

BY THOMAS BARBOUR.

It has been the fashion latterly to describe Anoles from Cuba for Dr. Ernst Ahl has described no less than five species in 1924 and 1925. Thanks to his great kindness I have before me excellent photographs of the top and side of the head and the mid-dorsal area of his specimens. All came from the Gundlach collection and bore no more definite data than just "Cuba." The following notes based on a comparison of the photographs with certain types and other authentic specimens in the Museum of Comparative Zoölogy have indicated the following conclusions which must be considered provisional until the types themselves can be examined.

1. *Anolis muelleri* Ahl, Archiv f. Naturg., vol. 90, p. 247, 1924, = *Anolis homolechis* Cope.

2. *Anolis abatus* Ahl, l. c., p. 248. Male cotype should be holotype of this apparently valid species. The female cotype is wholly distinct and represents the species described below as new.

3. *Anolis callivurus* Ahl, l. c., p. 249, = an old male of *Anolis quadriocellifer* Barbour and Ramsden.

4. *Anolis mertensi* Ahl, Zoöl. Anz., vol. 62, p. 86, 1925, = a species probably valid.

5. *Anolis cubanus* Ahl,¹ l. c., p. 87 = *Anolis mestrei* Barbour..

Last summer Dr. E. R. Dunn worked at the Biological Laboratory at Soledad, Cuba, maintained as a branch, supported by the Atkins Foundation, of the Harvard Institute for Tropical Biology and Medicine. He studied principally the Eleutherodactyli which had not been done in Cuba, intensively and during the summer rains. During a trip into the Trinidad Mountains he obtained three specimens of a lizard which at once appeared to be new and which agree exactly with the photographs of the female cotype of *Anolis abatus* Ahl. In recognition of Dr. Ahl's kindness in aiding my investigations of the Anoles of the Berlin Museum it is a pleasure to name this species for him. It may be called

¹ It may be added that *Anolis catenifer* Ahl from "Brazil" is identical with old male specimens of *Anolis punctatus*.

Anolis ahli, sp. nov.

Type.—A male, Museum of Comparative Zoölogy, No. 19905, from near the Hydro-electric Plant, Trinidad Mts., Cuba: altitude 1500 feet. Professor Emmett R. Dunn, collector. August 7, 1924.

Diagnosis.—A medium-sized *Anolis* with smooth ventrals, a white dewlap with a large rose-colored basal spot, with no mid-dorsal scales much enlarged and with the scales of the whole preocular and upper nasal surfaces unusually uniform in size and sharply and uniformly uni- or pluricarinate.

Description.—Top of head with two rather faintly indicated diverging frontal ridges and two still more faintly indicated continuing and converging prefrontal ridges, enclosing a slight frontal trough; head-scales all keeled, unicarinate or tricarinate; rostral low and very wide, lower than mental; about eight or nine scales separating the nostrils; supra-ocular semicircles separated by at least two and often three scales; occipital small, about half the size of the ear-opening or less and separated from the supra-ocular semicircles by five or six scales which have rather low keels and thus appear more rugose than carinate; supra-ocular disk composed of nine to thirteen enlarged polygonal scales which are distinctly keeled, the disk separated from the semicircles by one row of granules but elsewhere surrounded by two or more rows; *canthus rostralis* distinct and sharp, beginning with a long narrow scale over the upper anterior margin of the eye and preceded by six canthals between this scale and the nostril; the last two canthals next the nostril are very small; reaching posteriorly from the large elongate scale above the anterior border of the eye are three sharp, elongate, oblique scales forming a superciliary ridge which only extends over about two-thirds of the total length of the orbit; five loreal rows, the two lower rows especially with keels along the inferior margins; seven supra-labials, the suture between the fifth and sixth being under the center of the eye; temporals finely granular especially in the central part of the area; a faintly indicated supra-temporal line composed of two series of slightly enlarged granules; dorsals minute, inclined to imbricate, pointed or keeled, a few mid-dorsal scales very slightly enlarged; ventral scales much larger, imbricate, smooth; scales of the anterior aspect of the forearm much enlarged, slightly larger even than ventrals, sharply keeled; those of anterior aspect of femur similar but slightly larger; scales of fingers and toes broad, strap-like and sharply carinate; about 25 lamellae under phalanges II and III of the fourth toe; digital expansions narrow and ill developed; tail strongly compressed, "without a fin," verticellate, the enlarged row limiting each segment being separated by about six or seven smaller keeled scales; scales on upper edge of tail in a single row, raised and spinous, those corresponding to the limiting rows being enlarged and projecting upward and each of these large scales on the top of the tail separated by about three of lesser size; a few slightly enlarged postanal scales. A distinct dermal fold on neck.

Color.—Brown above, whitish beneath; the whole chin striate and punctate with dusky brown; ventrals with very minute brown dots; dewlap white, its anterior border ivory white; a large rich, old-rose basal spot covering about three-fourths of the total area of the dewlap.

Besides the type there is another male specimen and a female essentially similar in every detail.

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THE CRANE-FLIES (TIPULIDAE) OF NEW ENGLAND: FIRST
SUPPLEMENTARY LIST.

BY CHARLES P. ALEXANDER.

THE appearance in press of Mr. C. W. Johnson's monumental work on the Diptera of New England (Occas. Papers Boston Soc. Nat. Hist., vol. 7, no. 15, p. 1-326, 1925) has proved a great incentive to further detailed work on this fauna. In this paper Mr. Johnson lists 1 Tanyderid, 3 Ptychopterids and 9 Anisopodids, in addition to the main list of 264 species of Tipulids. During the season of 1925, the writer collected intensively in western Massachusetts, in Area 23 (the Berkshire Area) and Area 24 (the Connecticut River Valley Area). As a result of this detailed collecting with certain definite groups in view, 13 species of Tipulidae may now be added to the basic list. In the present small paper the writer wishes to record these additions, discuss briefly the collections made at Lake May in the Berkshires, and describe two novelties that are included in the list of additions.

ADDITIONS TO THE TIPULIDAE OF NEW ENGLAND.

265. *Dicranomyia diversa* O. S.

Whately Glen, Franklin Co., May 22, 1925; Lake May, Berkshire Co., June 13, 1925.

266. *D. profunda*, sp. n.

Lake May, Berkshire Co., June 20-30, 1925; Ellsworth, Hancock Co., Maine, July 30, 1913 (*C. J. Stanwood*).

267. *D. sphagnicola*, sp. n.

Lake May, Berkshire Co., July 1, 1925.

268. *Gonomyia (Ptilostena) mathesoni* Alex.

Whately Glen, Franklin Co., June 7, 1925; Lake May, Berkshire Co., June 26, 1925.

269. *G. (Gonomyia) bidentata* Alex. (Occas. Papers Mus. Zoöl., Univ. Michigan, 127: 3-4, 1922).

Orient Springs, Hampshire Co., July 24, 1925; Mt. Toby, Franklin Co., altitude 600-700 feet, July 28, 1925.

The occurrence of this fly in Massachusetts was quite unexpected since it was known hitherto only from the Clifty Ravine, at Hanover, in southern Indiana.

270. *G. (G.) noveboracensis* Alex.

Whately Glen, Franklin Co., May 22, 1925.

271. *Molophilus (Molophilus) quadrispinosus* Alex.

Whately Glen, Franklin Co., June 7, 1925.

272. *Ormosia bilineata* Dietz.

Whately Glen, Franklin Co., May 22, 1925; Orient Springs, Hampshire Co., June 3, 1925.

273. *Adelphomyia pleuralis* Dietz (Trans. Amer. Ent. Soc., 47: 251-252, 1921).

Orient Springs, Hampshire Co., July 9-24, 1925; Mt. Toby, Franklin Co., altitude 700 feet, July 28, 1925.

274. *Limnophila albipes* Leond. (Ent. News, 24: 248-249, fig., 1913).

Orient Springs, Hampshire Co., July 24, 1925.

275. *L. laricicola* Alex.

Lake May, Berkshire Co., June 12, 1925; in sphagnum bog. This very rare fly was hitherto known only from the badly damaged type male, taken in the southern Adirondacks of New York under exactly similar conditions.

276. *Nephrotoma brevioricornis* (Doane).

Lake May, Berkshire Co., June 23, 1925.

277. *Tipula aprilina* Alex.

Dwight, Hampshire Co., May 31, 1925; in open swamp.

As representative of the June fauna of the Berkshires, the conditions obtaining at Lake May are here described:

LAKE MAY (GOOSE POND), BERKSHIRE CO., MASSACHUSETTS.

The writer and Mrs. Alexander spent the three weeks between June 11 and July 2, 1925, at Lake May in the Berkshires, not far from East Lee. The Tipulid fauna was found to be richly developed and several additions to the Massachusetts list were secured. In the accompanying list, the various specimens were taken in the woods in the vicinity of the lake except where more specific localities are described. The altitude of Lake May is 1500 feet and the material was secured at this approximate altitude. Two localities, discussed in the text as "Bog" and "Stream" should be explained in greater detail.

Stream.—A small stream that arises in cold springs north of the lake offers exceptionally fine collecting where it traverses the Bassett property, about one-half mile from the lake. Here the stream forms a series of small cascades and rapids over densely moss-covered rocks, moderately shaded by hemlock, yellow and white birch, butternut and willow. At this season of the year the herbage is chiefly of interrupted and sensitive ferns, seedling *Impatiens* and scattered remnants of the spring flora, as *Tiarella*, *Smilacina* and others. The crane-flies were mostly swept from this rank herbage.

Bog.—Near the headwaters of the above stream, on the higher northwest banks of the lake is a small boggy area that is fed by cold springs. There is much sphagnum with some sun-dew but no larch or pitcher-plants. Scattered hummocks of dry earth support a dense growth of hemlock, red maple, etc., with dense clusters of mountain laurel that is in full flower at this season.

The elevated hummocks are carpeted with dense beds of dwarf cornel, gold-thread, etc., with scattered remnants of other spring plants, as *Clintonia*, star-flower and others. In the boggy areas are many sensitive, interrupted and other ferns and several species of *Carex*. Most of the crane-flies designated under this caption were swept from this hummock vegetation.

- Ptychoptera rufocincta* O. S. Stream, June 21.
Bittacomorphella jonesi (Johns.). Stream, June 26.
Rhipidia (*Rhipidia*) *maculata* Meig. Stream, June 22-30.
Dicranomyia diversa O. S. Stream, June 13.
D. globithorax O. S. Stream, June 17.
D. halterata O. S. Bog, June 12-30.
D. immodesta O. S. June 13-30.
D. liberta O. S. June 16-30.
D. longipennis (Schumm.). Bog, June 17.
D. morioides O. S. Common along stream, June 17-30.
D. profunda, sp. n. Bog, June 20-30.
D. pubipennis O. S. Stream, June 13-30.
D. sphagnicola, sp. n. Bog, July 1.
Limonia indigena (O. S.). Stream, June 21-30.
L. solitaria (O. S.). Stream and woods, June 21-30.
Elephantomyia westwoodi O. S. Woods, June 18-July 1.
Rhabdomastix (*Sacandaga*) *flava* (Alex.). Wood-road, June 26.
Gonomyia (*Ptilostena*) *blanda* O. S. June 21-30.
G. (P.) mathesoni Alex. Mountain Mill Stream, June 26.
G. (Gonomyia) probably *florens* Alex. Stream, one ♀, June 23.
G. (G.) subcinerea O. S. Stream, June 22-30.
Helobia hybrida (Meig.). Stream, June 22-30.
Molophilus cramptoni Alex. Abundant, stream, June 22-July 1.
M. hirtipennis (O. S.). Swampy area near east end of lake, June 12.
M. pubipennis (O. S.). Stream, June 15-30; common, almost all males in bog, July 1, 1925.
Erioptera chrysocoma O. S. Bog, June 12.
E. septemtrionis O. S. Bog, June 18.
E. stigmatica O. S. Stream, June 26-30.
Ormosia deviata Dietz. Bog, July 1.
O. meigenii (O. S.). Stream, June 13-20.
Ulomorpha pilosella O. S. Stream, June 17.
Pilaria quadrata (O. S.). Woods, June 14.
P. stanwoodae (Alex.). Bog, June 13-July 1.
Pseudolimnophila inornata (O. S.). Bog, June 17.
P. noveboracensis (Alex.). Bog, July 1.
P. toxoneura (O. S.). June 12-30.
Epiphragma fascipennis (Say). June 12-July 1.
Limnophila (*Dicranophragma*) *fuscovaria* O. S. Bog, abundant, June 12-July 1.
L. (Prionolabis) munda O. S. Bog, June 13.
L. (P.) rufibasis O. S. Woods, stream, June 12-20.

- L. (Ephelia) johnsoni* Alex. One ♂, stream, June 30.
L. (Phylidorea) adusta O. S. Woods, June 16.
L. (P.) lutea Doane. Swampy area near east end of lake, June 12.
L. areolata O. S. Common and very characteristic, woods and bogs, June 12–July 1.
L. brevifurca O. S. Bog, June 12.
L. laricicola Alex. Bog, June 12.
L. lentia O. S. Stream, June 13–26.
L. subcostata Alex. Stream, June 13.
L. sylvia Alex. Stream, June 15.
Adelphomyia minuta Alex. Bog, June 12.
Tricyphona calcar (O. S.). June 12–16.
T. inconstans (O. S.). June 12–30.
T. vernalis (O. S.). Stream, abundant, June 15–30.
Rhaphidolabina flaveola (O. S.). Stream, June 15–25.
Rhaphidolabis (Rhaphidolabis) forceps Alex. Stream, June 13–20.
Phalacrocer a tipulina O. S. Bog, June 12.
Liogma nodicornis (O. S.). Bog, June 12–20.
Dolichopeza americana Ndm. Stream, June 13–20.
Oropeza albipes Johns. Bog and woods, June 12–30.
O. obscura Johns. In out-houses, June 25–July 1.
O. venosa Johns. At spring, June 17–30.
Nephrotoma brevioricornis Doane. Woods, June 23.
N. euceroide s Alex. Stream, June 22.
N. ferruginea (F.). June 12–July 1.
N. lugens (Lw.). Along wood-roads, June 15–20.
N. incurva (Lw.). Stream, June 26.
N. tenuis (Lw.). June 18–30.
N. virescens (Lw.). Woods along lake shore, June 14–16.
Tipula (Trichotipula) oropezoides Johns. Bog, June 12.
Tipula (Tipula) angulata Lw. Stream, June 21.
T. apicalis Lw. June 12–July 1. Very common and characteristic. The males swarm in small numbers about 10 to 15 feet above the ground, among the lower limbs of small beech trees. Numerous wings were found in spider webs at intervals along the beech limbs. A few were captured *in copula* resting on the sides of buildings. It seems that the larvae must live in the rather dry soil along the lake shore.
T. bicornis Forbes. June 12–21.
T. cayuga Alex. Stream, June 15–25.
T. collaris Say. Stream, June 15.
T. fuliginosa (Say). In woods, June 17–25, all males.
T. hermannia Alex. Stream and woods, June 15–July 1.
T. iroquois Alex. Stream, June 15.
T. latipennis Lw. Stream, June 30.
T. longiventris Lw. Woods, June 12–25.
T. macrolabis Lw. Woods, June 13–20.
T. monticola Alex. Woods, June 12–23.
T. nobilis (Lw.). Woods, June 12.

- T. parshleyi* Alex. Stream, June 15.
T. senega Alex. Woods, June 12-20.
T. strepens Lw. Stream, June 13-15.
T. submaculata Lw. Stream and woods, June 22-July 1.
T. tephrocephala Lw. Stream and woods, June 13-26.
T. trivittata Say. Woods, June 12-30.
T. valida Lw. Woods, June 12-20.

DESCRIPTION OF NEW SPECIES.

Dicranomyia profunda, sp. n.

General coloration yellow to yellowish brown; antennae dark throughout; halteres short; tips of femora narrowly infuscated; wings with a yellow tinge, the radial cells more infused; vein Sc_1 long.

Male.—Length about 5.5 mm.; wing 6.5 mm.

Female.—Length about 6.5 mm.; wing 7.2-7.4 mm.

Rostrum and palpi brown. Antennae short, dark brown, the extreme base of the first segment a trifle paler; flagellar segments short-oval. Head brownish gray; vertex (male) between eyes a little wider than the first scapal segment.

Pronotum and mesonotum yellowish testaceous to light yellowish brown, the surface with a yellow pollen, lighter colored in the female. Pleura concolorous. Halteres short, pale, the knobs a trifle darker. Legs with the coxae and trochanters yellowish; femora yellow, the tips narrowly but conspicuously dark brown; tibiae yellowish testaceous, the tips narrowly and indistinctly darker; tarsal segments brownish yellow, narrowly tipped with dark brown, the terminal segments uniformly dark brown. Wings with a strong yellowish tinge, the costal region more saturated; stigma oval, only slightly more brownish than the ground-color, the two ends darker than the middle; wing-apex in outer ends of radial cells distinctly darkened; in some specimens a spot at origin of R_s and narrow seams along cord and outer end of cell $1st\ M_2$ infused; veins darker than the ground-color. Venation: Sc short, Sc_1 ending opposite or a short distance before the origin of R_s , Sc_2 some distance from its tip, in some cases not evident; Sc_2 alone approximately one-half the length of R_s ; cell $1st\ M_2$ relatively elongate, longer than vein M_4 beyond it; $m-cu$ at fork of M .

Abdominal tergites brown, the sternites more yellowish, especially the basal segments. Male hypopygium with the median area of the ninth tergite without setae. Basistyle with the mesal lobe very large and fleshy. Ventral dististyle large and fleshy, two to three times the size of basistyle; rostrum short with two nearly basal spines, these short, stout, straight, their tips acute, placed close together, the rostrum beyond them shorter than the length of a single spine. Dorsal dististyle a strongly curved sickle-shaped hook, gradually narrowed to the apex which is narrowly rounded. Mesal lobe of gonapophyses conspicuous. Ovipositor with the tergal valves slender, only gently upcurved.

Habitat.—Massachusetts, Maine.

Holotype, male, Lake May, Berkshire Co., Massachusetts, altitude 1500 feet, June 30, 1925 (*Alexander*). *Allotopotype*, female, June 20, 1925. *Paratype*, female, Ellsworth, Hancock Co., Maine, July 30, 1913 (*C. J. Starwood*).

By existing keys, the present species would run to *Dicranomyia gracilis* Doane, a very different fly. *Dicranomyia profunda* is told by the narrowly dark-tipped femora and the distinct clouding in the apices of the radial cells of the wings.

Dicranomyia sphagnicola, sp. n.

General coloration brown, the rostrum and antennae black; halteres elongate; wings with a faint brown tinge, the stigma only a little darker; Sc_1 long; male hypopygium complicated in structure, spines of the ventral dististyle placed beyond midlength of the rostriform appendage.

Male.—Length about 4.5 mm.; wing 5.5 mm.

Female.—Length about 6 mm.; wing 6.5 mm.

Rostrum and palpi black. Antennae black throughout; flagellar segments oval with relatively short and inconspicuous verticils. Head dark brown, the orbits broadly more grayish; anterior vertex wider than the first scapal segment.

Pronotum dark brown. Mesonotal praescutum with a broad dark-brown median stripe, the lateral stripes paler and ill-defined; lateral margins of praescutum with a sparse yellowish pollen; scutal lobes infuscated; scutellum pale medially, the sides weakly infuscated; postnotum testaceous brown, sparsely pruinose. Pleura pale, sparsely pruinose, the sternopleurite a little darkened. Halteres elongate, dark brown, the extreme base of stem paler. Legs with the coxae and trochanters pale, the fore coxae in some specimens a little more infuscated; remainder of legs dark brown, the tarsi passing into brownish black. Wings with a faint brownish tinge, the stigma only a little darker; veins dark brown. Venation: *Sc* short, *Sc*₁ ending opposite or before the origin of *Rs*, *Sc*₂ some distance from the tip of *Sc*₁, the latter alone longer than the stigma; *Rs* about one-half longer than the outer deflection of *R*₄₊₅; *m-cu* at or before the fork of *M*.

Abdominal tergites dark brown, the basal sternites more yellowish; hypopygium dark. Male hypopygium with the ninth tergite nearly transverse, the lateral angles with scattered setae, the caudal margin on either side of median line with a small circular area set with 6 to 7 long setae, the tips of which are decussate at the median line. Basistyle very complex in structure, the mesal face produced into a slender blackened rod that is slightly expanded at tip, and a stouter lobe that is provided apically with dense tufts of long yellow setae arranged in rows. Ventral dististyle fleshy, the mesal face at base produced into a long, slender rostriform appendage that is dilated on the cephalic face at base; rostral spines two, placed beyond midlength of rostrum, subequal, straight, their tips acute, the spines lying subappressed to the rostrum; remainder of dististyle fleshy, setiferous. Dorsal dististyle a very gently curved chitinized rod that narrows to the long acute tip. Mesal lobes of gonapophyses short and low. Ovipositor with the tergal valves very small, slender, gently upcurved to the acute tips.

Habitat.—Massachusetts.

Holotype, male, Lake May, Berkshire Co., altitude 1500 feet, July 1, 1925 (Alexander). *Allotopotype*, female. *Paratopotypes*, 3 males.

By existing keys, the species runs to *Dicranomyia halterata* O. S., a larger fly with confluent praescutal stripes and a very different male hypopygium. This interesting fly was taken in a sphagnum bog, associated with other characteristic crane-flies that were indicated on a previous page.

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A NEW GRACKLE FROM ST. VINCENT, LESSER ANTILLES.

BY JAMES L. PETERS.

In a review of the genus *Holoquiscalus* (The Auk, vol. 38, 1921, p. 453), I discussed briefly the status of the St. Vincent Grackle (*Holoquiscalus fortirostris dispar* Clark) and hazarded the surmise that two representatives of the genus might be found to occur on that island. The material available at that time consisted only of the three skins taken in 1903 by Clark, a male and two females, one of the latter being his type of *dispar*. Both females are very close to *H. fortirostris* (Lawrence), a species characterized by small size, plumage but slightly glossed, a short, nearly straight bill, and also by the fact that the female is similar in color to the male, but duller. The one male, on the other hand, is much nearer the *lugubris* group, in which the size is greater, the plumage strongly glossed, and the bill longer and more strongly decurved, and in which the female is recognizable by its much grayer appearance.

During a short visit to St. Vincent in February, 1925, I took two male and two female *Holoquiscalus*, which, upon comparison with the three specimens previously referred to, confirmed my early suspicions. The females are very different from the type of *dispar*, being strikingly similar to the females of races of *H. lugubris* found on the islands both north and south of St. Vincent. The two males are in no way different from Clark's male, a bird that I was unable to place conclusively in my review of the genus.

Thus it appears that there are actually two species of *Holoquiscalus* occurring on St. Vincent—one of the *fortirostris* group of which only the female has ever been described, and one of the *lugubris* group which does not appear to have received a name at all.

This new race I propose to call

***Holoquiscalus lugubris contrusus*, subsp. nov.**

Type.—No. 99986, Museum of Comparative Zoölogy, adult female, from base of Bonhomme Mountains (1700 ft.), St. Vincent, Lesser Antilles. Collected February 26, 1925, by James L. Peters (orig. no. 4966).

Characters.—Adult female similar to the female of *H. l. inflexirostris* (Swainson), but smaller and much darker; upper parts with a distinct sooty wash becoming black on the rump and upper tail-coverts, and somewhat glossed on the interscapular region; under parts shading from deep mouse gray on the abdomen to light mouse gray on the throat.

The male is identical with the male of *H. l. inflexirostris* in coloration but differs in smaller size.

Measurements.—Males: wing, 119.5, 115, 112; tail, 113, 108, 107.5; bill (from base of forehead), 31.5, 31, 30.5. Females: wing, 102¹, 99; tail, 93.5¹, 86; bill, 29.5¹, 29.

¹ Type.

Range: More field work is required before the distribution of the two species on St. Vincent can be determined. Clark's three birds were taken at Kingstown at the southern end of the island. My four specimens were all secured at one place at an elevation of about 1700 feet on the windward side, southeast of the center. Possibly *dispar* will be found to inhabit only suitable sections near the sea, while *contrusus* may eventually prove to be the more common, widespread species.

In order to settle definitely the question of the identity of *Quiscalus mexicanus* Cassin and *Quiscalus rectirostris* Cassin, I made a careful examination of the types in the Academy of Natural Sciences and compared them with a small selected series representing the other forms of the genus *Holoquiscalus*. The results of this investigation show as follows:

Quiscalus mexicanus is undoubtedly one of the forms of *lugubris* inhabiting the Lesser Antilles. The type is a fully adult male in fresh plumage. The gloss of the body feathers is more violaceous, less bluish or black, than any specimens with which I have compared it, but this is probably due to exposure while still standing as a mounted specimen. Unfortunately the length of the bill, one of the best diagnostic characters, cannot be verified, since the tip of the upper mandible is broken off.

Since the bird did not come from Mexico, as was originally believed to be the case, and since it can never be positively identified, I believe that the best course is to allow the name to sink as a questionable synonym of the grackle of Guadeloupe and Martinique, as was done by Mr. Ridgway many years ago.

Quiscalus rectirostris. The type appears to represent a male not fully adult. In size it most nearly approximates *Holoquiscalus lugubris lugubris*, but the bill is even more slender than in that form. In fact the bill is so unlike that of any other specimen of the genus that there can be no doubt that this member is aberrant. The culmen is nearly straight, slightly concave anterior to the nostril, and moderately decurved for the last 2 mm. of its length; the gonys is ascending, and straight for a short terminal part of its length. My opinion is that *Quiscalus rectirostris* Cassin should be synonymized with *Quiscalus lugubris* Swainson.

I take this opportunity to express my thanks to Dr. Witmer Stone for allowing me to examine the type specimens referred to above.

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A NEW RACE OF PELZELN'S WEAVER-FINCH.

BY OUTRAM BANGS AND JOHN C. PHILLIPS.

DURING the course of a collecting and hunting trip made by one of us (Phillips) in Uganda, the West Nile region, and eastern Congo in 1924, a series of five specimens of true *Icteropsis pelzelni* was taken at Rhino Camp, West Nile, and at Damba Island, Sesse Archipelago, north end of Victoria Nyanza, Uganda. These are all small birds, agreeing in measurements with Hartlaub's account of his original specimens that came from Magungo, somewhat farther north.

On comparing our specimens with a pair of adult birds in the Museum of Comparative Zoölogy, taken by Emin Pasha at Busisi at the south end of Victoria Nyanza, we found the latter to be a good deal larger, though similar in color.

Later we submitted the whole series to Dr. James P. Chapin for comparison with the material in the American Museum of Natural History, and asked for his opinion. He replied that he agreed with us that the southern form was well worth naming; we therefore propose to call it

***Icteropsis pelzelni tuta*, subsp. nov.**

Type.—No. 65370, Museum of Comparative Zoölogy, adult male, from Busisi, Tanganyika Territory (late German East Africa), at south end of Victoria Nyanza. Collected October 1, 1890, by Emin Pasha.

Characters.—Similar to *Icteropsis pelzelni pelzelni* (Hartlaub) but considerably larger.

MEASUREMENTS.

No.	Sex	Locality	Wing	Tail	Tarsus	Culmen to base of forehead (tip gone)
65370	♂ ad.	Busisi, Tanganyika Terr.	66	46	19	17
65371	♀ ad.	" " "	63	44	19	17

Our five skins of *Icteropsis pelzelni pelzelni* (Hartlaub) afford the following measurements: three males, wing, 57-60; tail, 38-40; tarsus, 18-19; culmen to base of forehead, 16-17; two females, wing, 56, 58; tail, 38, 41; tarsus, 18; culmen to base of forehead, 15, 16.

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ON THE REPRESENTATIVES OF THE SEYMOURIAMORPHA,
SUPPOSED PRIMITIVE REPTILES, FROM THE UPPER
PERMIAN OF RUSSIA, AND ON THEIR
PHYLOGENETIC RELATIONS.

BY PETER P. SUSHKIN

(Member Russian Academy of Sciences; Honorary Fellow American Ornithologists' Union;
Honorary Member British Ornithologists' Union).

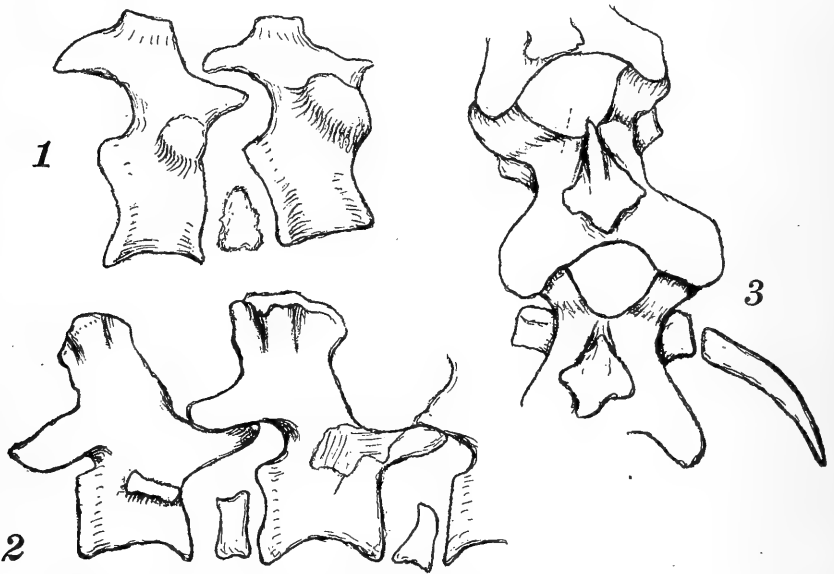
THE genus *Conodectes*, more generally known as *Seymouria*, is one of the most remarkable generalized types known and is generally considered as the most primitive Reptile. Until quite recently this genus, known only from the lowermost Permian of Texas, stood alone. A short time ago (1923), however, Professor Broili described a new genus, *Solenodonsaurus*, from the Upper Carboniferous of Bohemia. And somewhat earlier, the late Professor Amalitzki found some specimens which he recognized as related to "*Seymouria*," in the Upper Permian of North Dvina, Russia, and described them as *Kotlassia*.

Having recently reexamined his material, I have found that it contains two distinct genera. One of them, for which the name *Kotlassia* is to be retained, is very similar to *Conodectes*, since it possesses low spinous processes (text-fig. 1), a long presacral column of 26 vertebrae, and only one sacral vertebra. It differs, however, from that genus by having a more depressed skull (text-fig. 4, 5), a larger post-temporal foramen, and more rudimentary intercentra. The other differs from *Conodectes* by having a short presacral column consisting of 18 vertebrae, by possessing two sacrals, by its massive and long spinous processes, which are knobbed at their tips (text-fig. 2, 3), and by having a narrow, slitlike otic notch. I name this genus *Karpinskiosaurus*, after Professor Karpinski, President of the Russian Academy of Sciences, and consider it as the type of a new family, *Karpinskiosauridae*.

Thus the *Seymouriamorpha* were represented not only in America, but also in Europe, where they survived till the close of the Permian.

In this material I succeeded, in both *Kotlassia* and *Karpinskiosaurus*, in disclosing the stapes, which was hitherto unknown for that group. This bone (text-fig. 4, 5) has the form of a rod, with a slightly S-shaped bend, greatly thickened at its base and tapering distally; the tip is connected with the distal end of the paroccipital bar and terminates in a facet looking toward the otic notch; probably it had a connection with the tympanic membrane. But there is no connection at all with the quadrate, and the tip of the stapes lies far from that bone.

Having such a form as this, the stapes recalls essentially that of the Rhachitomous Stegocephalians and differs greatly from the Cotylosaurlike Captorhinus and, indeed, from all other primitive Reptiles—Anomodontia *sensu lato*, Pelycosauria, Ichthyosauria—in which the stapes has the form of a massive rod abutting by its distal end upon the quadrate and usually connected also with the end of the paroccipital bar. (In later Reptiles, as far as can be judged from existing forms, this connection of the stapes and quadrate is more or less distinctly repeated in the ontogeny.)



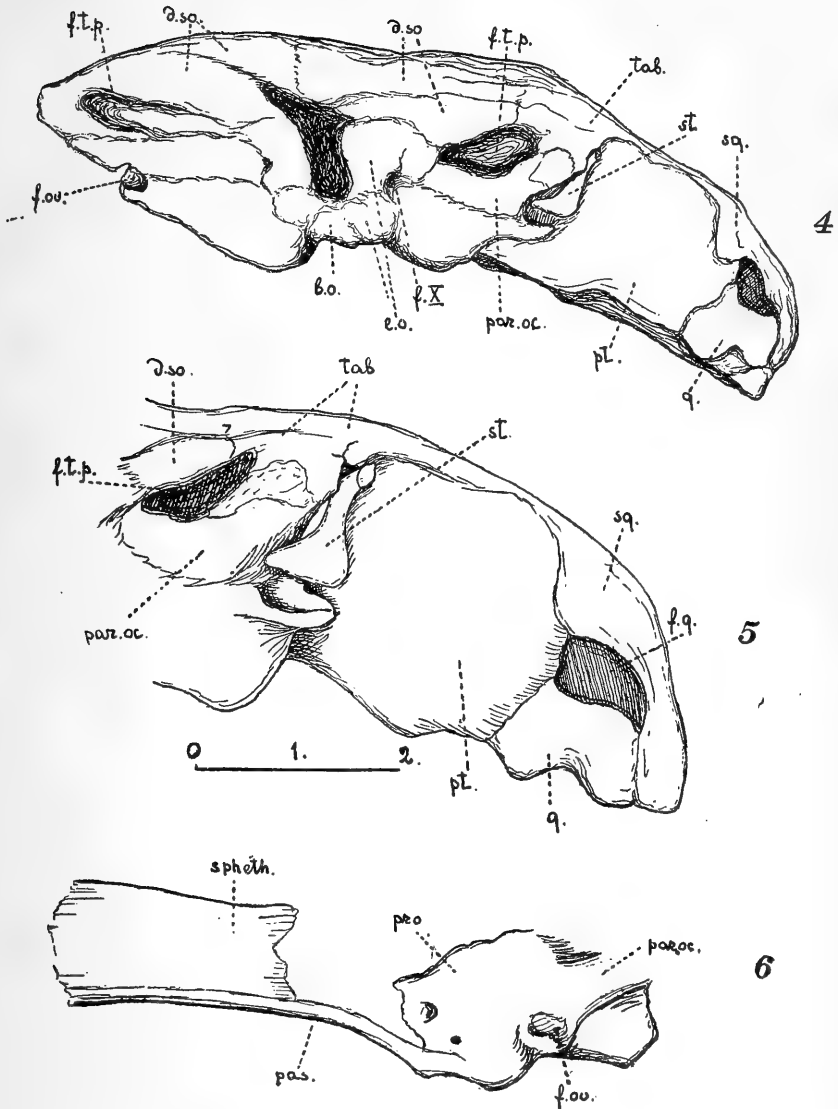
TEXT-FIG. 1. Kotlassia, middle presacral vertebrae.

TEXT-FIG. 2. Karpinskiosaurus, 17th and 18th presacral vertebrae, lateral view.

TEXT-FIG. 3. Same, dorsal view.

These features of the stapes are of prime importance for determining phylogenetic relations. The connection of the stapes with the quadrate, which we find in the primitive Reptiles, is evidently a reminiscence of the ancient hyomandibulo-quadrate junction characteristic of the fishlike ancestors of the Tetrapods. In the Rhachitomi this connection does not any longer exist. This character alone affords sufficient ground for removing the Rhachitomi from the ancestry of Reptiles and Amniotes generally, the Rhachitomi standing in this respect farther from the fishlike ancestors than the primitive Reptiles do. The same advanced condition of the stapes we find in the Seymourians.

Hence, the Seymourians are not only to be removed from the order Cotylosauria, but they cannot be regarded at all as ancestors of the Reptiles. The condition of the stapes characteristic of the primitive Reptiles cannot be derived from that of the Seymourians.

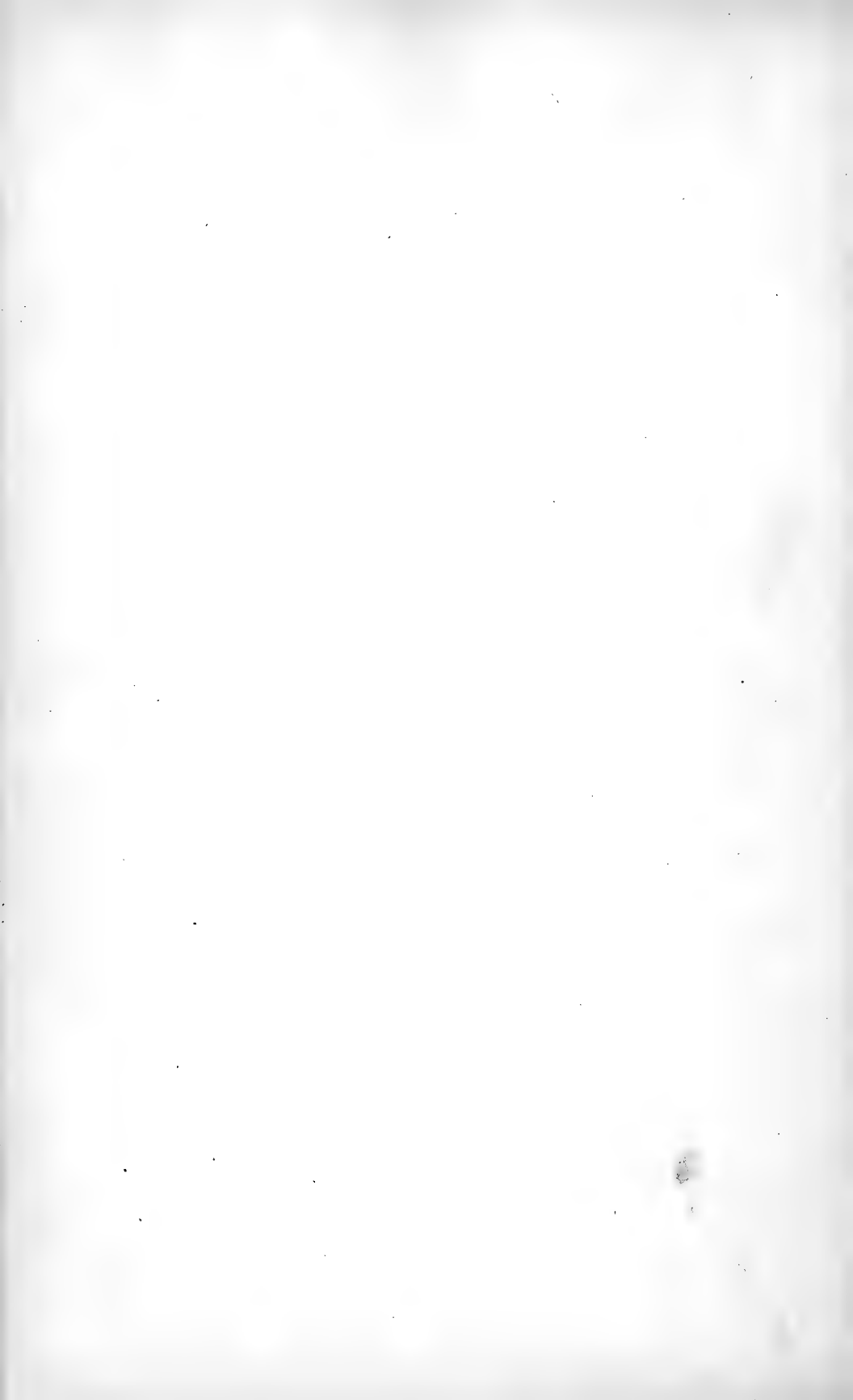


TEXT-FIG. 4. Skull of *Kotlassia*, slightly distorted, occipital view, camera drawing.

TEXT-FIG. 5. Same specimen, otic region, latero-posterior view, slightly enlarged (scale showing centimeters), camera drawing.

TEXT-FIG. 6. Same specimen, brain case, free-hand drawing.

B. o., basioccipital; *d. so.*, dermosupraoccipital; *e. o.*, exoccipital; *f. ov.*, fenestra ovalis; *f. t. p.*, post-temporal foramen; *f. q.*, quadrate foramen; *f. X*, vagus foramen; *par. oc.*, paroccipital; *pas.*, parasphenoid; *pro.*, proötic; *pt.*, pterygoid; *q.*, quadrate; *spheth.*, sphenethmoid; *sq.*, squamosal; *st.*, stapes; *tab.*, tabular.



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A NEW OYSTER FROM THE CRETACEOUS OF CUBA

BY PERCY E. RAYMOND.

AN oyster, found during the excavation for a well near the Biological Station and Botanical Gardens of Harvard University (Atkins Foundation) at Soledad, near Cienfuegos, Cuba, proves to belong to a previously unknown species.

Family OSTREIDAE Lamarck.

Genus ARCTOSTREA Pervinquière.

Arctostrea atkinsi, sp. nov.

Plate 7, fig. 1, 2.

Holotype.—No. 15000, Museum of Comparative Zoölogy. *Paratypes*, Nos. 15001 a, b.

Description.—Shell large for the genus, extraordinarily thick and massive. No complete valve is known, but large fragments lacking the hinge are lunate, narrow, and taper very gradually to a blunt distal end. The shell is of remarkable thickness, a characteristic apparently attained after almost full length was reached, by the additions of successive lamellae from hinge to tip. Each lamella was of approximately the same length and width as its predecessor, so that the shell remains flat-sided, in spite of the excessive precipitation of calcium carbonate. The outer surface is not preserved, but lamellae which must have been close to the exterior are smooth, and the shell may have been only marginally ribbed. Indications of ribs are seen in the relatively small, toothlike projections along the lateral and terminal margins. The surface may have been similar to that of *Arctostrea semiplana* (Sowerby) (see Woods, 1913, pl. 57, fig. 12a, 13; pl. 58, fig. 1-5) or *A. pristiphora* (Coquand, 1869, p. 51, pl. 17, fig. 17, 18), in which the greater part of the valve is smooth, but there are short marginal ribs which produce interlocking denticules.

Only a part of the muscle scar is shown by any specimen. It is small, far back, apparently almost marginal, and not far from the hinge.

Measurements.—In the absence of any specimen showing the hinge it is not possible to give the true length and height. These measurements are not, however, very important in such irregular shells as oysters. The fragment of a right valve used as the holotype has a length of 240 mm. as measured along the curvature of the anterior side, and is 53 mm. in greatest width. The anterior margin makes about half of a circle with a radius of about 90 mm. The crests of the marginal denticulations are about 10 mm. apart, and each is about 5 mm. high. The shell is more than 55 mm. thick near the distal end, and a transverse fracture at the proximal end shows 12 lamellae in a thickness of 10 mm.

Comparison with other species.—Very diverse opinions exist as to what constitutes a genus or species among the oysters. There seem to be valid reasons, however, for recognizing Pervinquière's (1911, p. 646) subgenus *Arctostrea*, and Douvillé (1911, p. 637-638) has shown that although there are three species of this genus in the Jurassic, it reaches its chief development in the Cretaceous. The best known is *Arctostrea carinata* (Lamarck), the type of the genus. This species has a wide distribution in Europe and

America, and is more or less variable in its characteristics, but apparently never produces shells so large, thick, or flat-sided as those from Cuba. In fact, these features serve to differentiate *Arctostrea atkinsi* from nearly all allied forms. Woods (1913, p. 342-355) has illustrated, under the name *Ostrea diluviana*, several shells belonging to *Arctostrea*. Among them are some old individuals showing considerable thickening of the valves, as in his fig. 127, p. 353, fig. 99, p. 348, or fig. 138, p. 354. None of these, however, shows the great size or flat sides of *A. atkinsi*. Coquand (1869, p. 76, pl. 29, fig. 1, 2, labelled *Ostrea colubrina*) figured as an example of *Arctostrea pectinata* (Lamarek) a very large oyster which measures 275 mm. along the curvature of the anterior margin. This specimen is of about the same size as the one from Soledad, and agrees further in having the muscle scar almost marginal. *A. pectinata* has, however, coarser ribs than *A. atkinsi*, and the sides are not flattened. The only species which I have been able to find which shows this latter characteristic is *Arctostrea rectangularis* (Roemer), as figured by Coquand (1869, p. 187, pl. 72, fig. 5-11). Roemer's (1839, pl. 18, fig. 15) original figure merely suggests a lateral flattening, but that presented by Coquand shows a shell in many respects like *A. atkinsi*. The distal portion of the right valve is flattened and nearly smooth along the middle, and the interlocking projections along the margins of the valve are of about the same size as in the shell from Cuba. *A. rectangularis* is, however, a smaller shell, and becomes much narrower distally.

Horizon and locality.—Fragments of three right valves of this species were obtained about 8 feet below the surface, during the digging of a well on the Santa Rosalia property near the Harvard Botanical Gardens on the estate of Mr. Edwin F. Atkins, south-east of Cienfuegos, Cuba. The exact horizon remains unknown, but is doubtless within some subdivision of the Cretaceous. The nearest ally, *Arctostrea rectangularis*, is found in the Neocomian, and *A. carinata* is characteristic of the Cenomanian, so that the upper part of the Lower, or the base of the Middle Cretaceous, is suggested. Similar oysters, such as *A. pristiphora* (Coquand) and *A. pectinata* (Lamarek) are, however, found in the Campanian and Santonian, so that it is not impossible that our species is really from the Upper Cretaceous. The few fossils found with the oysters have been examined by Dr. T. W. Stanton, who reports the presence of a very oblique and somewhat peculiar type of *Cucullaea*, and an Echinoid which appears to be a *Holactypus*, a genus which, according to Doctor Stanton, ranges from the Jurassic through the Comanchean. Unfortunately these two undescribed species have no great stratigraphic significance.

G. F. Matthew (1875, p. 29-30) long ago announced the presence of Cretaceous strata along the Damují, a small river entering the western end of Xagua Bay. He stated that the limestone at Constancia Landing and on the Concepcion estate, about 10 miles northwest of Cienfuegos, contains several species of *Hippurites*, *Caprinella*, and *Caprotina*, also corals, *Oliva*, *Conus*, an

oyster of the type of *O. cristata*, Echini, and sponges. Cotteau (1882 and 1897) has described six species of Cretaceous Echini from Cuba, four of which were found in the vicinity of Cienfuegos, one of them at Concepcion de Montalvo. Other writers have referred to the presence of Cretaceous rocks in the vicinity of Cienfuegos, but so far as I can learn, no detailed report on the geology or list of the fossils from the region exists.

The present locality is about 18 miles southeast of that described by Doctor Matthew.

The specimens of *Arctostrea atkinsi* were presented to the Museum of Comparative Zoölogy by Mr. Edwin F. Atkins, founder of the Harvard Biological Station and Botanical Gardens at Soledad, through Dr. Thomas Barbour. We are indebted to him for them, and to Dr. T. W. Stanton and Dr. L. W. Stephenson, who have examined the specimens and furnished references to recent papers on the Ostreidae.

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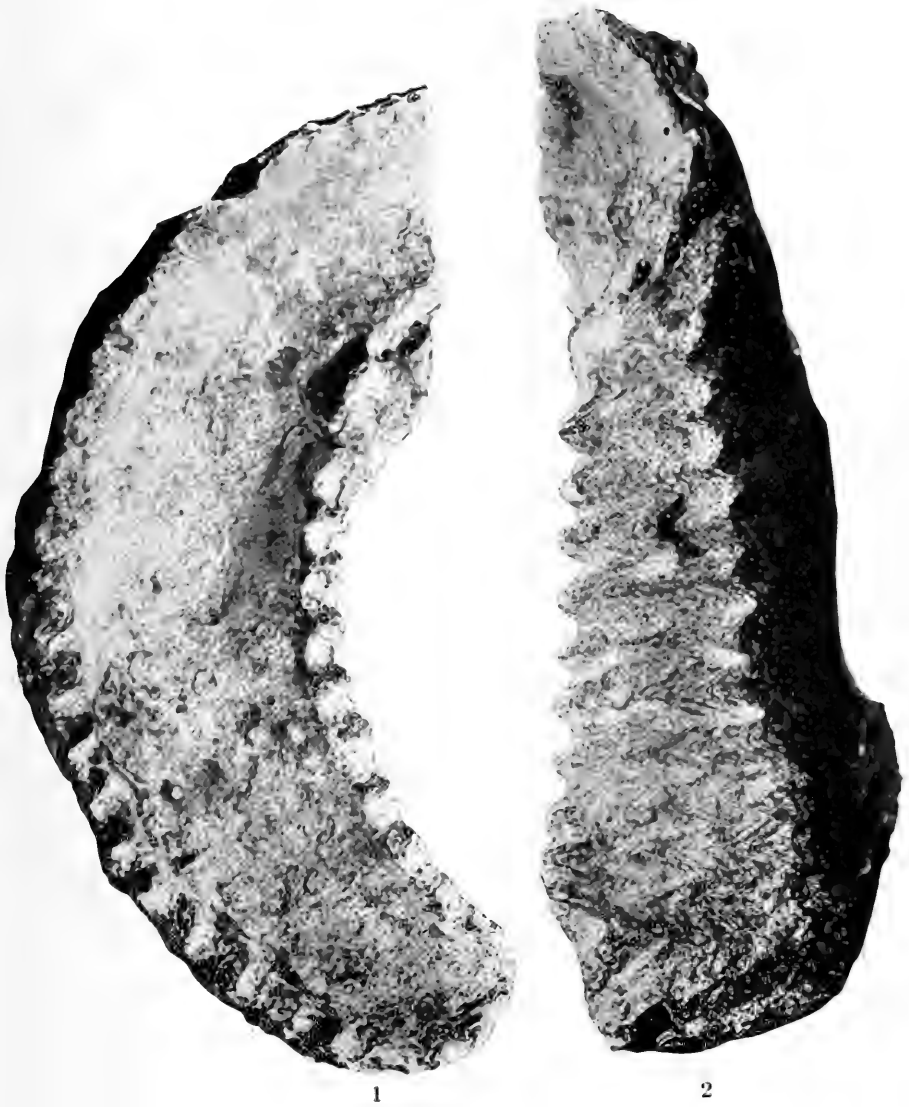
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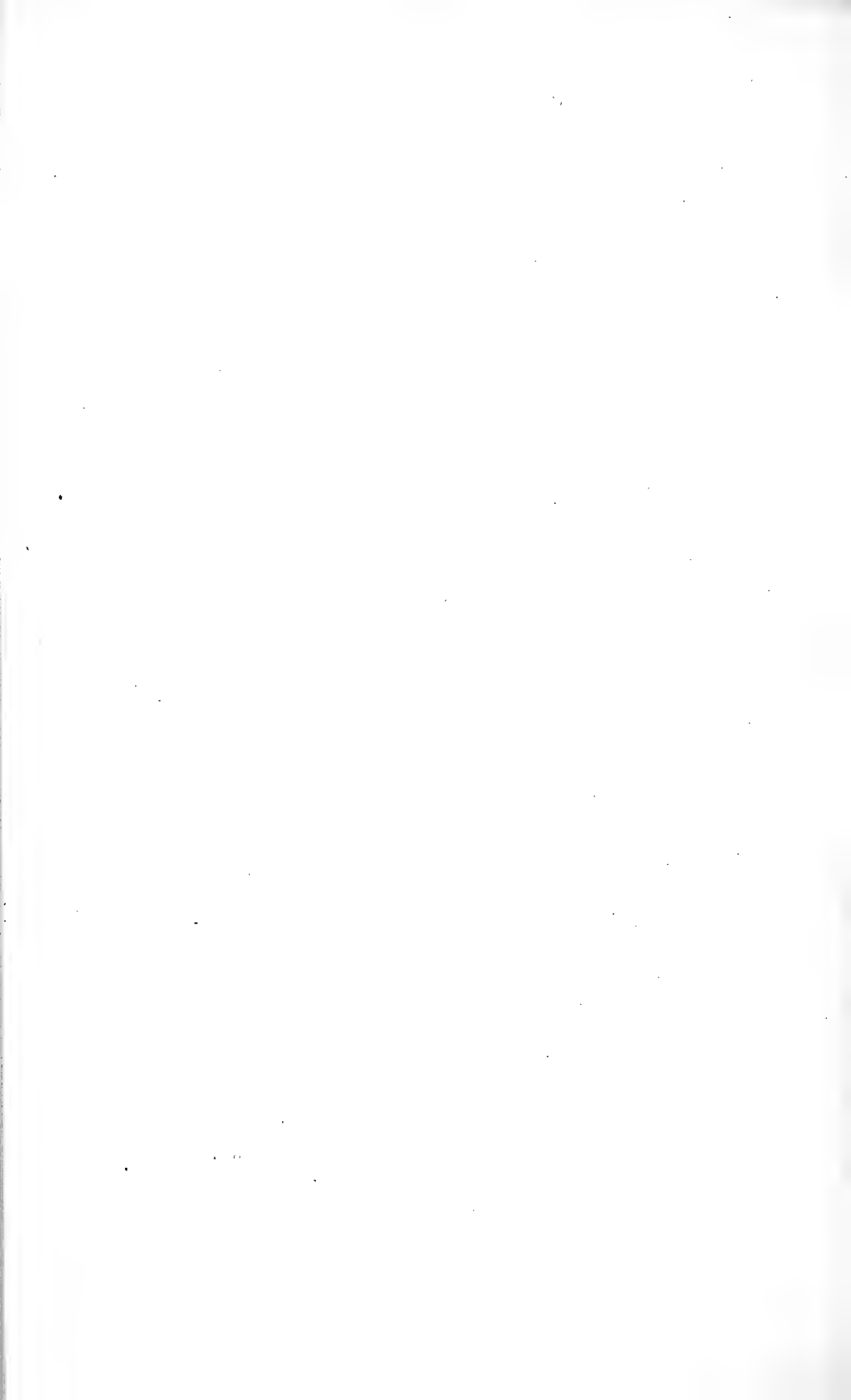
EXPLANATION OF PLATE 7.

Fig. 1. *Arctostrea atkinsi* Raymond. . Right valve, viewed from the interior, distal end below. The bases of several barnacles may be seen. Slightly over three-fourths natural size.

Fig. 2. The same specimen, viewed from the posterior (concave) side, to show the great thickness of the shell. The distal end is below. Eight-tenths natural size.



RAYMOND ON ARCTOSTREA.



Occasional Papers
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THREE NEW CICHLID FISHES OF THE GENUS *HAPLOCHROMIS*
FROM LAKE EDWARD, CENTRAL AFRICA.

BY C. TATE REGAN, F.R.S.

THE Cichlid Fishes collected by Dr. John C. Phillips in 1924 include three young examples of *Tilapia nilotica* from Lake Chankaranga, central Ankole, Uganda, and a series of about 20 *Haplochromis schubotzi* from Lake Edward, among them a uniformly blackish male of 115 mm. and another male of 85 mm. with well-defined crossbars. There are also examples of three species of *Haplochromis* which appear to be new to science.

***Haplochromis serridens*, sp. nov.**

Plate 8.

Type.—No. 31522, Museum of Comparative Zoölogy, from Lake Edward; 80 mm. in length to base of caudal.

Description.—Depth of body $2\frac{2}{3}$ in length, length of head 3. Snout curved, a little shorter than diameter of eye, which is $3\frac{1}{4}$ in length of head, equal to interorbital width, twice preorbital depth, greater than depth of cheek. Jaws equal anteriorly; maxillary extending to below anterior edge of eye; about 50 bicuspoid teeth in outer series of upper jaw, followed by 5 (in the smaller specimen) or 7 series of minute tricuspid teeth with equal cusps. Scales on cheek in 3 series. Gill-rakers, 9 or 10 on lower part of anterior arch. Pharyngeal teeth small. Scales in a longitudinal series, 31; from origin of dorsal to lateral line, 6; between pectoral and pelvic fins, 6. Dorsal XV, 9; last spine $\frac{2}{5}$ to nearly $\frac{1}{2}$ length of head. Anal III, 9; third spine a little shorter than last dorsal. Pectoral as long as or a little shorter than head, reaching anal. Caudal peduncle longer than deep. Silvery; back darker; an opercular spot; a more or less distinct spot at base of each scale on back and sides; fins pale.

Remarks.—Two specimens, 80 and 85 mm. in length to base of caudal fin (which is incomplete in both). The smaller has several large eggs in the mouth.

***Haplochromis fuscus*, sp. nov.**

Plate 9.

Type.—No. 31524, Museum of Comparative Zoölogy, from Lake Edward; 92 mm. in total length.

Description.—Depth of body $2\frac{4}{5}$ to 3 in length, length of head 3 to $3\frac{1}{3}$. Snout with straight profile, as long as or longer than diameter of eye, which is $3\frac{1}{2}$ to 4 in length of head, greater than preorbital depth, and about equal to depth of cheek; interorbital width 4 in length of head. Mouth little oblique; jaws equal anteriorly; maxillary extending to below anterior $\frac{1}{4}$ of eye; 40 to 60 teeth in outer series of upper jaw, all but the last 2 or 3 on each side bicuspoid, followed by 4 or 5 series of minute tricuspid teeth. Scales on cheek in 3 series. Gill-rakers, 8 on lower part of anterior arch. Pharyngeal teeth small. Scales in a longitudinal series, 31 or 32; from origin of dorsal to lateral line, 6 or 7; between pectoral and pelvic fins, 8. Dorsal XV to XVI, 8 to 9; last

spine about $\frac{2}{5}$ length of head. Anal III, 8 to 9; third spine a little shorter than last dorsal. Pectoral $\frac{3}{4}$ length of head, not reaching anal. Caudal rounded. Caudal peduncle longer than deep. Grayish or blackish; males with ocelli on anal fin.

Remarks.—Three specimens, 80 to 95 mm. in total length. A U-shaped, slightly raised ridge on the chest, reddish in color, is well defined in two of the specimens, but is less evident in the third. I have ascertained that the reddish color is that of the muscles showing through the thin skin, and after comparison with other species I have come to the conclusion that there is no essential structural difference from them.

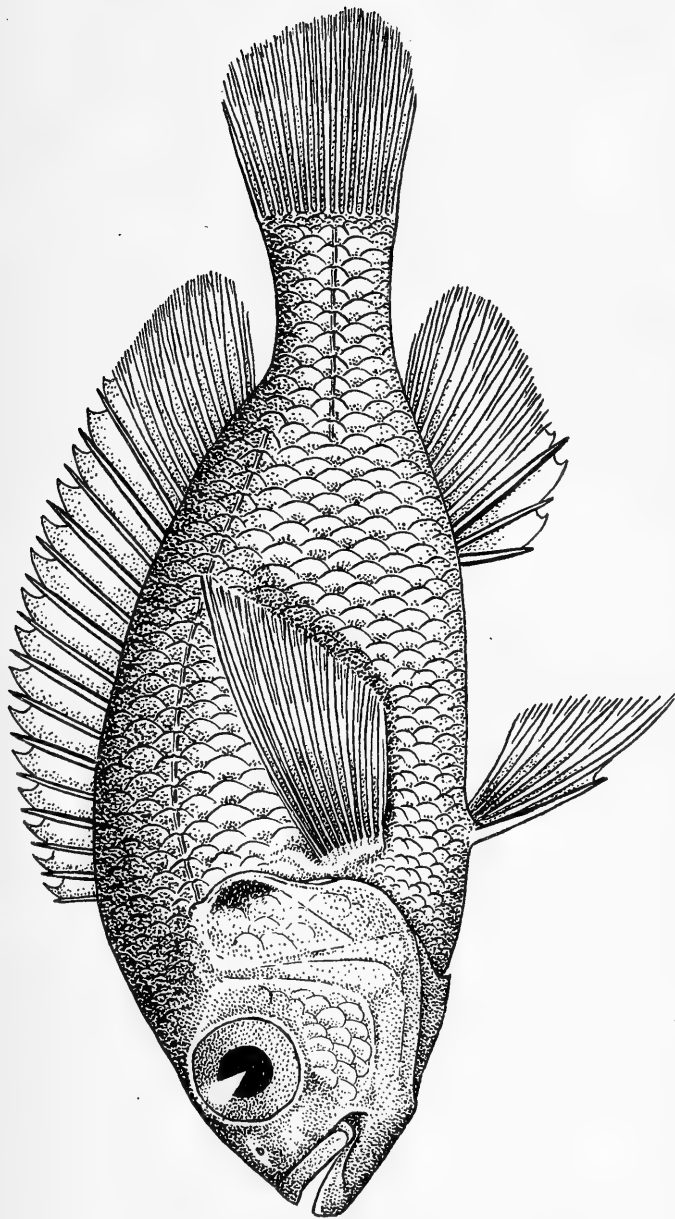
Haplochromis mentatus, sp. nov.

Plate 10.

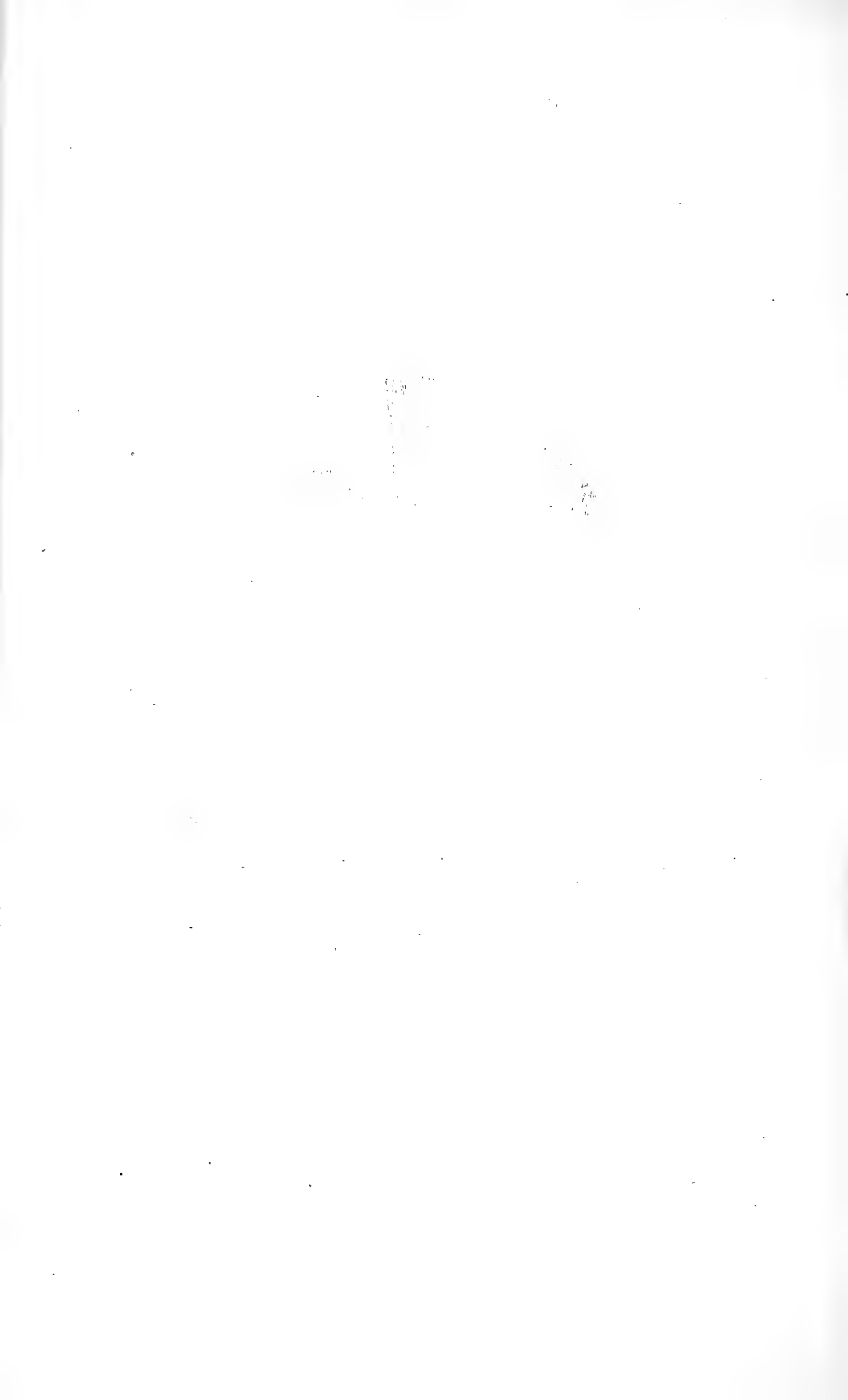
Type.—No. 31523, Museum of Comparative Zoölogy, from Lake Edward; 115 mm. in total length.

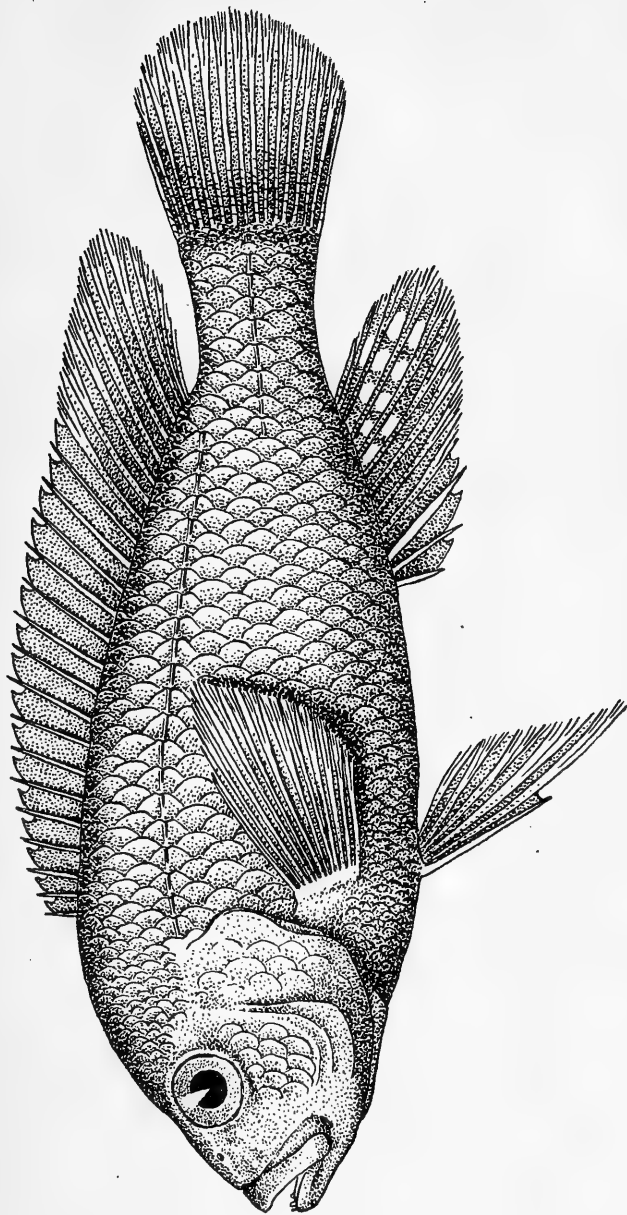
Description.—Depth of body $3\frac{1}{4}$ in length, length of head $2\frac{4}{5}$. Snout $1\frac{1}{2}$ diameter of eye, which is 4 in length of head, equal to interorbital width or depth of cheek. Mouth moderately oblique; lower jaw projecting; maxillary just reaching vertical from anterior edge of eye; teeth conical, triserial, outer rather strong and set well apart, 46 in upper jaw, inner minute. Scales on cheek in 4 series. Gill-rakers, 9 on lower part of anterior arch. Pharyngeal teeth small. Scales in a longitudinal series, 33; from origin of dorsal to lateral line, 6; between pectoral and pelvic fins, 5. Dorsal XV, 10; last spine $\frac{1}{3}$ length of head. Anal III, 9; third spine as long as last dorsal. Pectoral $\frac{3}{4}$ length of head, reaching origin of anal. Caudal subtruncate. Caudal peduncle $1\frac{1}{2}$ times as long as deep. Silvery; back darker; an indistinct lateral stripe posteriorly; dorsal and caudal grayish, with small pale spots; lower fins pale.

Remarks.—One specimen, differing from examples of *H. vittatus* from Lake Kivu especially in the broader interorbital region, $\frac{1}{4}$ instead of $\frac{1}{5}$ length of head.

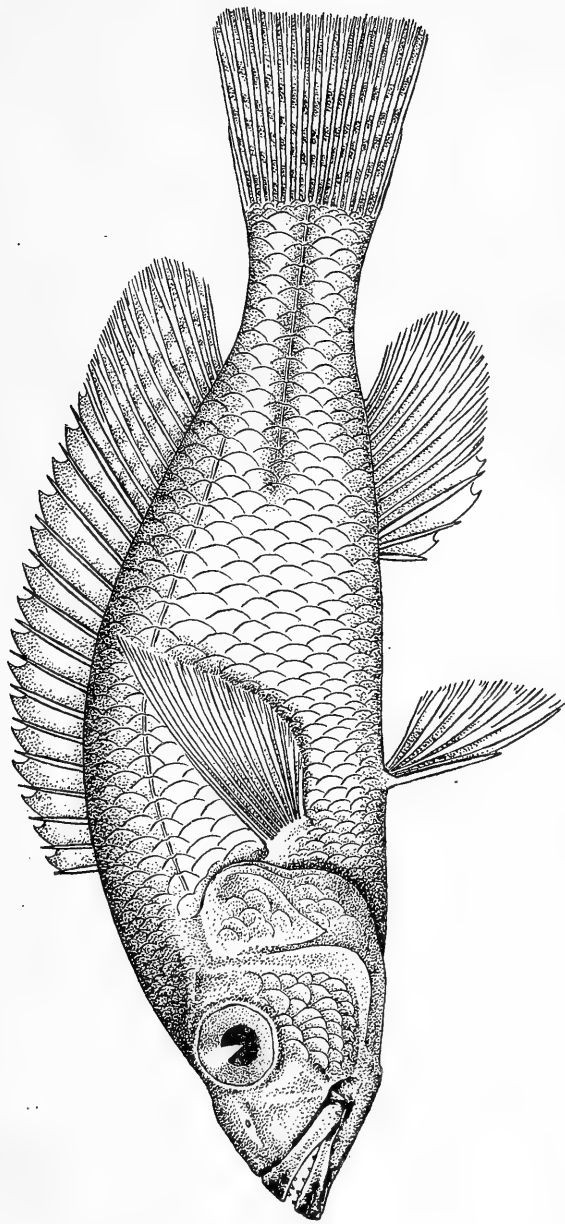


HAPLOCHROMIS SERRIDENS, sp. nov. $\times 1.7$.

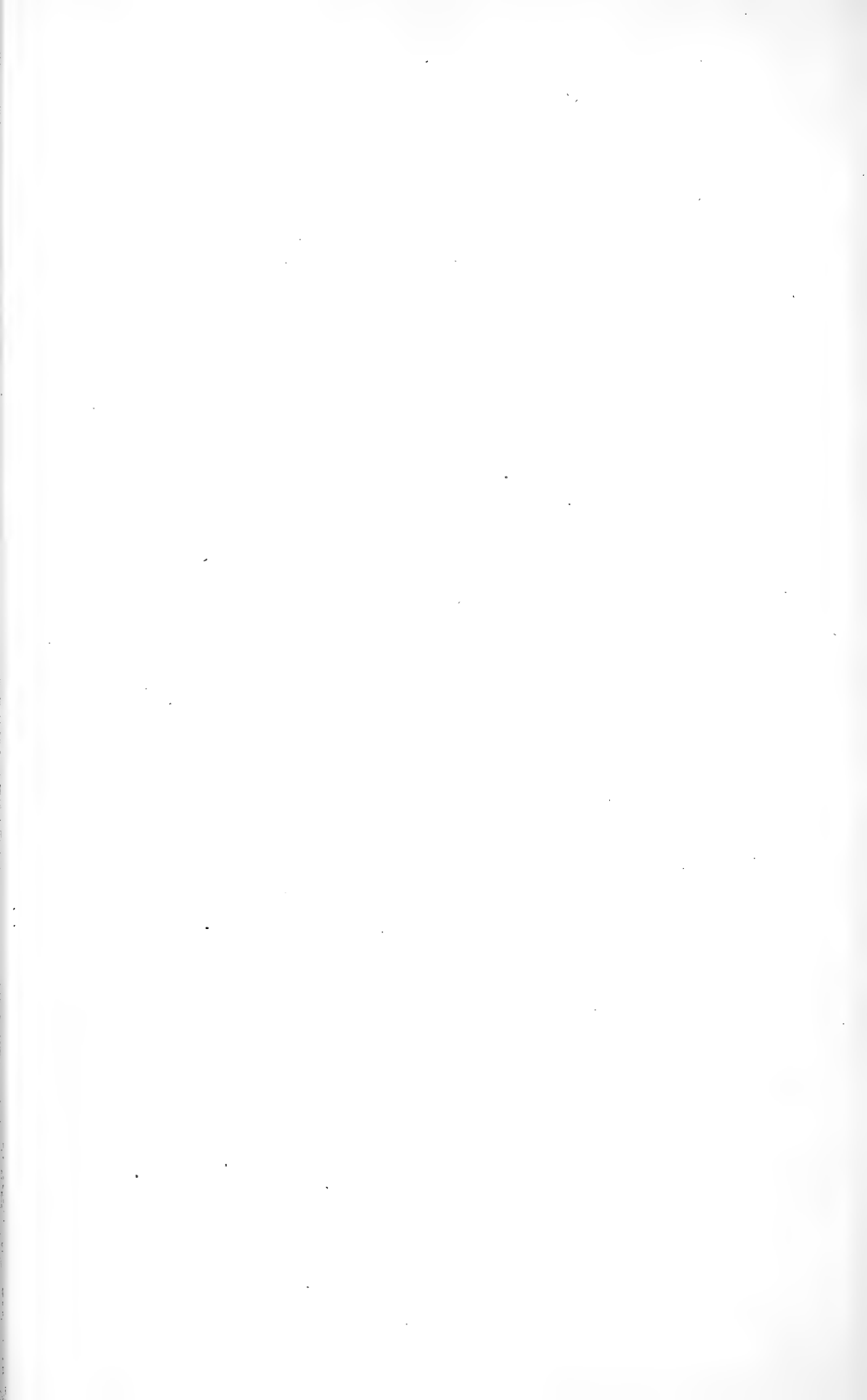




HAPLOCHROMIS FUSCUS, SP. NOV. $\times 1.7$.



HAPLOCHROMIS MENTATUS, sp. nov. Type. X14.



Occasional Papers
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A NEW SILUROID FISH OF THE GENUS CLARIAS FROM
SOUTHWESTERN UGANDA.

BY J. R. NORMAN.

THE collection of fishes made by Dr. John C. Phillips in 1924 includes an example of *Barbus fergussonii* Boulenger and four examples of *Barbus altianalis* Boulenger from Lake Edward. The latter proves to be identical with *B. radcliffii* Boulenger from Lake Victoria. There are also five examples of a new species of *Clarias* which is described below.

***Clarias phillipsi*, sp. nov.**

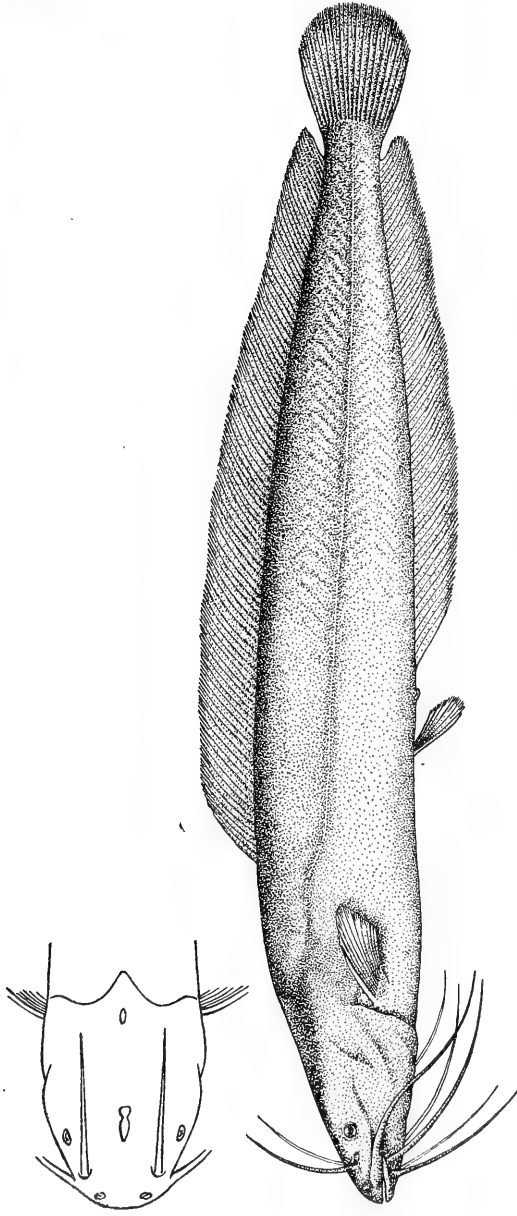
Plate 11.

Type.—No. 31519, Museum of Comparative Zoölogy, from Lake Chahafi; 230 mm. in total length.

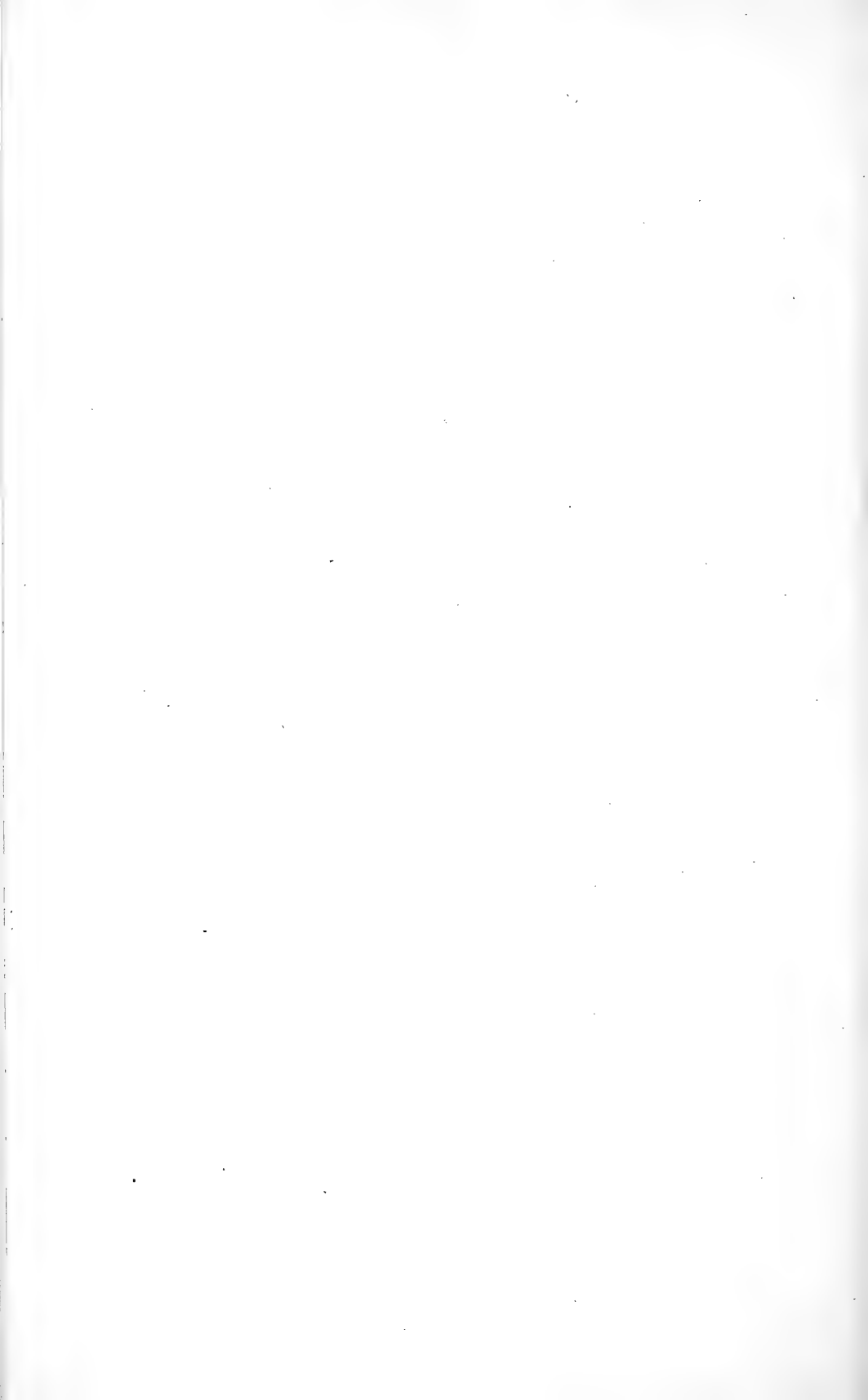
Description.—Depth of body $5\frac{1}{3}$ to $7\frac{1}{2}$ in the length, length of head $4\frac{1}{3}$ to $4\frac{3}{4}$. Head about $1\frac{1}{3}$ times as long as broad, smooth; occipital process broader than long, pointed; frontal fontanelle more than twice as long as broad; occipital fontanelle smaller; eye very small, 4 to 5 times in length of snout, $6\frac{3}{4}$ to $8\frac{1}{2}$ in interorbital width, which is a little less than $\frac{1}{2}$ length of head; band of premaxillary teeth $3\frac{1}{2}$ to $3\frac{3}{4}$ times as long as broad; vomerine teeth granular, forming a curved band which is nearly as broad as the premaxillary band; nasal barbel $\frac{3}{5}$ to nearly $\frac{2}{3}$ length of head; maxillary barbel about as long as head without occipital process, reaching well beyond gill-opening; outer mandibular barbel $1\frac{1}{3}$ to $1\frac{1}{2}$ times length of inner, which is more than $\frac{1}{2}$ length of head. Gill-rakers few, 8 to 11 on anterior arch. Clavicles hidden under the skin. Dorsal 74 to 78; its distance from occipital process $1\frac{2}{3}$ to $1\frac{3}{4}$ in length of head. Anal 55 to 58. Dorsal and anal separated from caudal by a space which is equal to or a little greater than diameter of eye. Pectoral about $2\frac{2}{5}$ to $2\frac{2}{3}$ in length of head, the spine short, serrated on outer side. Pelvics $1\frac{2}{5}$ to $1\frac{1}{2}$ times as far from caudal as from end of snout. Caudal about $\frac{1}{2}$ length of head. Grayish, lighter below.

Remarks.—Five specimens, 180 to 230 mm. in total length,

from Lake Chahafi and Lake Mutanda, Kigezi district, southwestern Uganda. Close to *C. carsonii* Boulenger and *C. liocephalus* Boulenger, differing from the former chiefly in the longer maxillary barbel, and from the latter in the shorter maxillary barbel and fewer gill-rakers.



CLARIAS PHILLIPSI, SP. NOV.



Occasional Papers
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NEW AMPHIBIA.

BY THOMAS BARBOUR.

MANY collections of Neotropical Amphibia have been received during recent years by the Museum of Comparative Zoölogy, and in these the following new species have appeared.

Gymnophis clarkii, sp. nov.

Type.—No. 11047, Museum of Comparative Zoölogy, from Tela, Honduras. Collected in June, 1925, by Dr. Herbert Clark.

Diagnosis.—The shortest and thickest species known. Only about seven anterior and five posterior rings without traces of secondary folds.

Description.—Diameter, 9 mm.; length, 145 mm.; ratio, 16. Complete rings, 105; the 5th ring shows a tendency to a dorsal cleft, and after an interval of the next few rings, well-developed secondary folds appear. These persist, dividing the primary rings dorsally and sometimes almost completely until about six segments from the posterior end of the animal, where they disappear. The vent is nearly terminal.

Color.—As usual, plumbeous.

Phyllomedusa nicefori, sp. nov.

Plate 12, fig. 1, 2.

Type.—No. 11611, Museum of Comparative Zoölogy, from Villavicencio,¹ Colombia. Collected by the Rev. Brother Nicéforo Maria and named for him.

Diagnosis.—This species belongs with those having the first toe longer than the second; having vomerine teeth; lacking parotoid glands; thus very similar to *P. coelestis*, from which it differs in having shorter legs and far less developed digital dilatations.

Description.—Vomerine teeth in two small but very distinct groups opposite the middle of the choanae; form elongate, size medium; snout longer than diameter of eye, sloping; loreal region likewise declivous; interorbital space broader than upper eyelid; tympanum about one-half diameter of eye; fingers entirely free, long, first slightly shorter than second; fourth nearly as long as third; first toe longer than second; discs of fingers and toes small; scarcely a trace of a metatarsal tubercle; the hind limb being carried forward along the body, the tibio-tarsal articulation reaches the anterior border of the eye; skin smooth above, granular beneath, with several large prominent tubercles on each side of the vent; no parotoid glands.

Color in alcohol.—Exactly similar to that of *P. coelestis*, blue (green in life) above, lower lip white, the white line extending completely around the forearm insertion and terminating as a cluster of white dots along the edge of the chest; several white sternal spots; throat and chest lavender, fading posteriorly to dirty white, which is the color of the lower belly and inside of limbs; a white glandular line separating the blue from the white along the back of the fore limbs, while on the hind limbs the blue fades into the light color, with several light spots along the boundary area. A few scattered white tubercles along

¹ A town on the Rio Meta in the tropical lowlands east of Bogotá; altitude, 452 meters.

the sides more abundant ventrad than dorsad, and the enlarged tubercles about the vent conspicuously white.

Measurements.—Total length, tip of snout to vent, 80 mm.; width of head, 24 mm.; length of fore limb, 50 mm.; length of hind limb, from vent to longest toe, 112 mm.

***Bufo dunnii*, sp. nov.**

Plate 13, fig. 1, 2.

Type.—No. 11076, Museum of Comparative Zoölogy, adult female; paratype, No. 11077, a male; also other paratypes (males and females) from Mina Carlota, near Cumanayagua, south central Cuba. The mine is in the Trinidad Mountains at an altitude of about 1200 feet. Collected in July, 1925, by Professor Emmett R. Dunn.

Diagnosis.—Related to *Bufo longinasus* Stejneger from Pinar del Rio, western Cuba, and to *Bufo ramsdeni* Barbour from near Guantanamo. It differs from the former in having a less sharp snout, in being rougher dorsally and more spotted ventrally; the toes are also less completely webbed. From *B. ramsdeni* it differs in being smoother, less spotted below, and in having a sharper snout. It is like *ramsdeni* in having a concave crown, while *longinasus* has a flat head.

Description.—Female: head and body depressed; head concave and tubercular above; weak bony ridges along canthus; snout conical, pointed, projecting; nostrils very near tip of snout and close together; interorbital width greater than upper eyelid; tympanum invisible in type (distinguishable in the male); first finger shorter than second; tips of fingers and toes very slightly swollen; toes about two-thirds or more webbed (rather more in the male); subarticular tubercles on fingers well developed, not so on toes; small inner and outer metatarsal tubercles; a very faint tarsal fold, really represented by an elongate tarsal tubercle; when the leg is stretched forward, the tibio-tarsal articulation reaches the insertion of the fore limb; skin above with many granular tubercles; parotoids large but indistinct, less developed by far than in *B. longinasus*, more as in *ramsdeni*; throat, belly, and thighs coarsely granulated.

Color.—Greenish dark bars on canthus, between eyes, at elbow, mid-forearm, and wrist, and also on the leg; a whitish spot on crown; a light vertebral line often present in the males.

Measurements.—Total length, tip of snout to vent, 36 mm.; width of head, 12 mm.; length of fore limb, 22.5 mm.; length of hind limb, from vent to longest toe, 43 mm.

Remarks.—Professor Dunn contributes the following field notes:

"I found the toads in or near streams above 1200 feet in the northern part of the Trinidad Mountains, viz. at La Mina and at a place called Los Tres Pilonos, some two hours' riding toward the Sigüanea Valley. They are strictly diurnal. The males call from the water's edge or from rocks in the water—a long *waaa*, long drawn out, faint, but resembling the call of *Bufo fowleri*. The toads were very conspicuous in the daytime. None were seen at night. I heard them most often about 10 o'clock in the morning. The females and young did not frequent the water as much as the males. The tadpoles, of which a number were taken, were strikingly black with two white rings, which, paradoxically enough, made them harder to see than if they were uniformly black. I found no eggs.

"The color in life was largely green, white, and brown, rather gaudy. The species is very similar in both color and markings to young *Bufo peltacephalus*."

Eleutherodactylus persimilis, sp. nov.

Plate 14 (type, upper left-hand figure).

Type.—No. 11598, Museum of Comparative Zoölogy, from Suretka, Costa Rica, near the boundary of Bocas del Toro Province, Panamá. Collected July–August, 1923, by Professor E. R. Dunn and Mr. Chester B. Duryea. There are several paratypes, Nos. 11599–11610.

Diagnosis.—A very small representative of the *rhodopis* group which seems to differ from its many and puzzling allies in proportions and coloration. Body short and fat, limbs short and heavy.

Description.—Tongue round, large, unemarginate behind; vomerine teeth in two small round groups between the choanae, widely separated one from the other; nostrils very near tip of snout; upper eyelid much narrower than interorbital space; tympanum large, round, distinct, about two-thirds diameter of eye, its distance from latter about two-thirds its own diameter; no discs on fingers, very small expansions only of the tips of the toes; first finger shorter than second; first toe short, only reaching subarticular tubercle of the second; subarticular tubercles on fingers and toes very well developed; two well-developed metatarsal tubercles; many small plantar tubercles; a moderately developed tarsal fold; the hind limb being extended along the body, the tibio-tarsal articulation reaches the anterior border of the eye; the hind limbs being flexed vertically to body axis, the heels do not meet; limbs short and stout; skin above finely granular; below coarsely granular, especially the posterior aspect of femur.

Color.—Light or dark gray, with dorsal markings symmetrically arranged (cf. plate); beneath clear white; a sharp dark bar from posterior margin of eye over tympanum always present; heels and posterior aspect of tarsus dark brown, sharply defined; a black dot on each side of vent; also a dark streak along posterior aspect of thigh. Rather uniform in coloration.

Measurements.—Total length, tip of snout to vent, 17.5 mm.; width of head, 6.5 mm.; length of fore limb, 7.5 mm.; length of hind limb, from vent to tip of longest toe, 24 mm.

Having found, in a recent collection from Colombia, a *Cryptobatrachus* that appeared distinct from the Santa Marta Mountain specimens presented to the Museum of Comparative Zoölogy by the Museum of Zoölogy of the University of Michigan, I sent it to my friend Dr. A. G. Ruthven for examination. He and his colleague, Mrs. Gaige, have very kindly compared our example with their fine material from Santa Marta, and agree that this specimen seems to represent a distinct form. They point out, and very correctly, that it would be desirable to examine Peracca's type, which came from Guaca (altitude 1600 meters) in the Cordillera Central of Colombia. It is by no means impossible that it is the Santa Marta material which needs naming. This comparison cannot now be made, and therefore it seems desirable to indicate that there is another form in western Colombia. Dr. G. K. Noble states that *Cryptobatrachus* is a pure synonym of *Hyloscirtus* Peters, but I incline to consider this as unproved, following Dr. Ruthven.

The new form may be called:

Cryptobatrachus incertus, sp. nov.

Type.—No. 11616, Museum of Comparative Zoölogy, from Sonsón (altitude 2545 meters), Dept. of Antioquia, Colombia. From the Rev. Brother Nicéforo Maria, of the College of La Salle, Bogotá.

Diagnosis.—Similar to *C. fuhrmanni*, but with skin above strongly granular, belly and thighs more granular, throat likewise granular, not smooth. The coloration also is different.

Description.—Male, sexually well developed: tongue round, unemarginate; vomerine teeth in a straight row behind choanae, the two series nearly contiguous; nostril much nearer tip of snout than eye; upper eyelids wider than interorbital space; tympanum distinct but small, about one-third diameter of eye; discs of fingers and toes large, grooved about the inferior margin and usually with a groove along the diameter as well; disc of first finger smallest; first finger shorter than second; discs of toes all large; toes fully webbed; subarticular tubercles poorly developed; small inner metatarsal tubercle present; tibio-tarsal articulation reaching far beyond tip of snout when hind limb is extended forward; heels overlapping when legs are folded vertically to body axis; skin above granular; a glandular fold over tympanum, continued dorso-laterally to sacral region; belly, throat, and hinder aspect of thighs coarsely granular.

Color (alcoholic specimen).—Above dark slate color; sides marbled; throat and belly pinkish white, faintly clouded with dusky; thighs (inside) marbled and flecked; a light spot beneath eye on lip; two other faint light spots on lip margin between subocular spot and tip of snout.

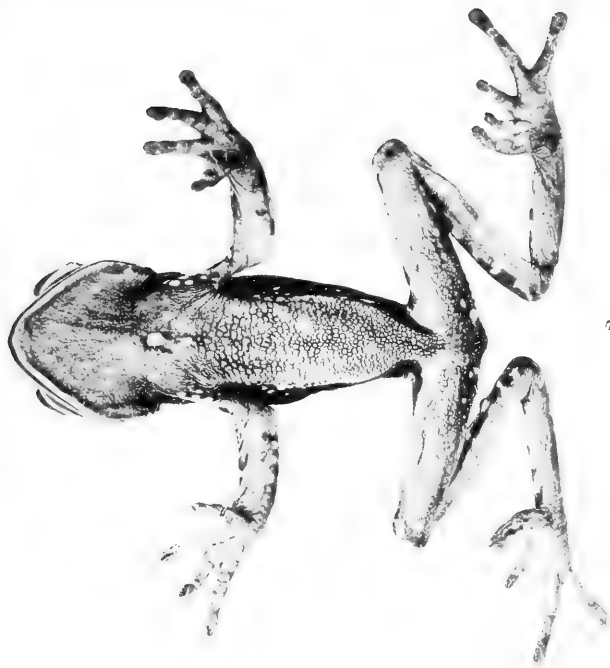
Measurements.—Tip of snout to vent, 47 mm.; width of head, 20.5 mm.; diameter of eye, 7.5 mm.; diameter of tympanum, 2.5 mm.; foreleg from axilla, 35 mm.; hind leg from vent, 86 mm.

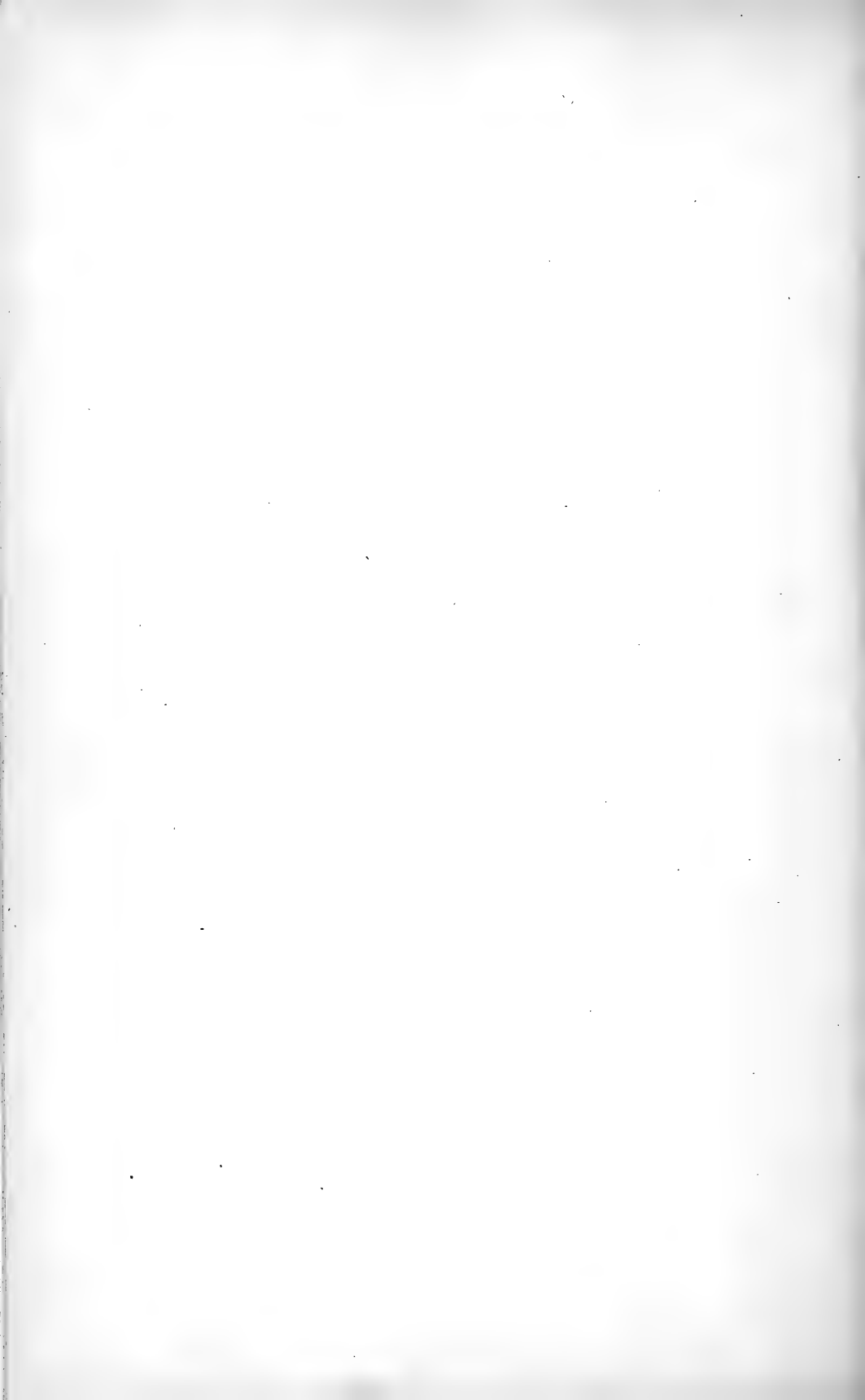
EXPLANATION OF PLATES.

Plate 12. *Phyllomedusa nicefori*, sp. nov., type (No. 11611, M. C. Z.). Fig. 1, dorsal view; fig. 2, ventral view.

Plate 13. *Bufo dunni*, sp. nov. Fig. 1, male, paratype (No. 11077, M. C. Z.); fig. 2, female, type (No. 11076, M. C. Z.).

Plate 14. *Eleutherodactylus persimilis*, sp. nov. Type, upper left-hand figure (No. 11598, M. C. Z.).





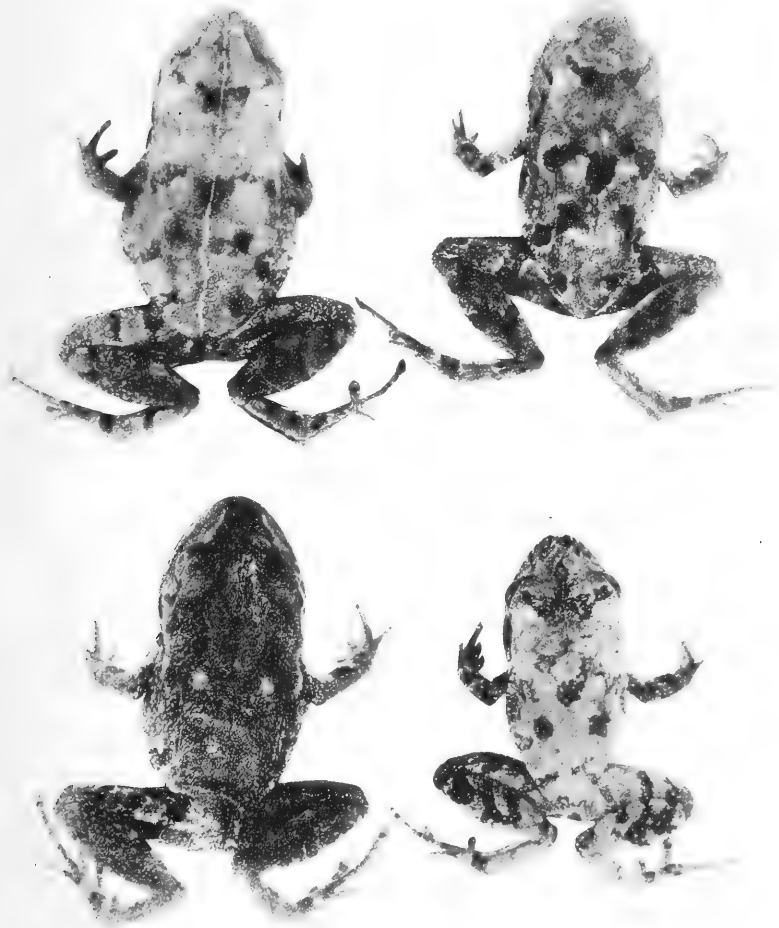


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BARBOUR ON NEW AMPHIBIA.



BARBOUR ON NEW AMPHIBIA.

Occasional Papers
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TWO NEW BIRDS FROM ARGENTINA.

BY JAMES L. PETERS.

IN a collection of birds made in Argentina by J. Mogensen, and recently presented to the Museum of Comparative Zoölogy by Dr. Thomas Barbour, there are specimens representing two new subspecies of birds which are herewith described.

Acknowledgements are due to Mr. W. E. Clyde Todd for the loan of a series of *Piaya cayana* from Bolivia in the Carnegie Museum.

***Ceophloeus erythroptus fulcitus*, subsp. nov.**

Type.—No. 99303, Museum of Comparative Zoölogy, adult male, from Resistencia, Gobernación del Chaco, Argentina. Collected July 19, 1915, by J. Mogensen.

Characters.—Similar to *Ceophloeus erythroptus erythroptus* (Valenciennes)¹ but smaller; black pectoral band extending farther over the lower breast; barred portion of under parts more grayish (less whitish) in appearance, owing to a distinct dusky wash over the pale ground color of the barred feathers; major under tail-coverts black (these same feathers in *C. e. erythroptus* are barred).

MEASUREMENTS.

Ceophloeus erythroptus fulcitus

- 1 ♂ from the Argentine Chaco (type):
Wing, 193; tail, 146; bill from base, 42.25; tarsus, 31.
2 ♀ from the Argentine Chaco:
Wing, 179.5–189; tail, 143–148; bill from base, 38–42;
tarsus, 28.5–30.

Ceophloeus erythroptus erythroptus

- 3 ♂ from northeastern Argentina (Misiones):
Wing, 199–202 (201.33); tail, 135–140 (137.5); bill from base, 45–46.75 (45.75); tarsus, 29.75–31 (30.25).
2 ♀ from northeastern Argentina (Misiones):
Wing, 188–208 (198); tail, 121–139 (130); bill from base, 44–44.5 (44.25); tarsus, 30.5–31 (30.75).
2 ♀ from Brazil:
Wing, 193–195 (194); tail, 118.5–129.5 (124); bill from base, 43–43.25; tarsus, 28–29 (28.5).

Range.—Specimens examined only from Resistencia and Las Palmas, Chaco, Argentina.

***Piaya cayana mogenseni*, subsp. nov.**

Type.—No. 99263, Museum of Comparative Zoölogy, adult male, from Concepción, Province of Tucumán, Argentina. Collected July 12, 1922, by J. Mogensen.

Characters.—Similar to *Piaya cayana macroura* Gambel² but smaller;

¹ Dict. Sci. Nat., 40, 1826, p. 178 ("Brésil").

² Journ. Acad. Nat. Sci. Phila., 1849, p. 215 ("Surinam", in error; substitute type locality, "Süd-Brazilien, Paraguay und Montevideo," Cabanis and Heine, Mus. Hein., IV Theil, Heft 1, 1862, p. 87, footnote).

paler and redder above (between russet and tawny, instead of Rood's brown). Under parts paler; throat pale ochraceous salmon instead of light vinaceous cinnamon; breast pale gull gray instead of light neutral gray.

MEASUREMENTS.

Piaya cayana mogenseni

- 1 ♂ from Tucumán, Argentina (type):
Wing, 156; tail, 349; bill from base, 32.75; tarsus, 39.5.
- 3 ♂³ from Santa Cruz, Bolivia:
Wing, 150-155 (152); tail, 315-345 (328.3); bill from base, 31.5-37 (34.7); tarsus, 37-40 (38.3).
- 1 ♀³ from Santa Cruz, Bolivia:
Wing, 150; tail, 310; bill from base, 31.5; tarsus, 35.5.
- 1 (sex?)³ from Santa Cruz, Bolivia:
Wing, 155; tail, 296 (worn); bill from base, 35; tarsus, 40.5.

Piaya cayana macroura

- 2 ♂ from Misiones, Argentina:
Wing, 155-171 (163); tail, 330-371 (350.5); bill from base, 32.5-33.25 (32.87); tarsus, 40-40.5 (40.25).
- 3 ♀ from Misiones, Argentina:
Wing, 158-169 (161.8); tail, 317-364 (333); bill from base, 31.75-34.5 (33.58); tarsus, 40.5-43.5 (41.58).
- 3 (sex?) from Misiones, Argentina:
Wing, 158-170 (162.7); tail (2 spec.), 341-346 (343.5); bill from base, 32-34.25 (33.3); tarsus, 40.5-42.75 (41.75).

Range.—Not definitely known, but probably extending through the subtropical portions of Tucumán, Salta, and Jujuy, and north into Bolivia, somewhere meeting the range of *boliviana*. Eastward *mogenseni* doubtless intergrades with *macroura*.

Remarks.—This is a strongly marked form resembling *macroura* in size, particularly in the great length of the tail, but in coloration it most nearly approaches *columbiana*, though not quite so pale as that form, and lacking the distinct rufous tone to the under surface of the tail.

³ Coll. Carnegie Museum.

Occasional Papers
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A REVIEW OF THE RACES OF *ELAENIA MARTINICA* (LINNÉ).

BY JAMES L. PETERS.

DURING trips to the West Indies in the interests of the Museum of Comparative Zoölogy in the winters of 1917, 1922, and 1925, I have endeavored to collect as large series of *Elaenia martinica* as possible from the islands visited, with a view to determining the number of forms into which this species divides, and their distribution. This material now totals about 70 skins from St. Thomas, Tortola, Virgin Gorda, Anegada, Anguilla, St. Eustatius, St. Kitts, Nevis, Martinique, St. Lucia, and St. Vincent; and it is supplemented by examples in the Museum from Antigua, Guadeloupe, Dominica, St. Lucia, St. Vincent, Mustique, Barbados, the Caymans, and Old Providence. Material representing the following islands has been borrowed from the Biological Survey and the U. S. National Museum: Vieques, Culebra, Old Providence, Cozumel, and Mujeres. I am under obligations to the authorities of the Field Museum for the loan of necessary material from Aruba, Bonaire, Curaçao, and St. Andrews.

There are several factors to be borne in mind when working with *Elaenias* and particularly with the present species. In the first place, the colors seem to change gradually with the age of the specimen; secondly, some bleaching occurs in life; thirdly, *martinica* has two color phases, one in which gray predominates, and another in which the posterior under parts are strongly washed with yellowish and the upper parts with olive; fourthly, *martinica* exhibits a considerable range of individual variation in size. The occurrence of birds of varying size and color side by side on the same island gives the field impression of two forms occurring together; but museum examination shows that these differences cannot be correlated in any way with age, sex, or locality.

*Elaenia flavogastra*¹ occurs on St. Vincent side by side with *E. martinica*, but the two are very distinct species, differing in certain external structural modifications. *Flavogastra* is readily distinguished from *martinica* by the more triangular shape of the bill and shorter wing tip (the longest primaries exceeding the secondaries by 10 to 14 mm.). The Yellow-bellied *Elaenia* (*E. flavogastra*) of the southern Lesser Antilles has received a variety of treatment at the hands of various authors. Clark (Proc. Boston Soc. Nat. Hist., vol. 32, no. 7, 1905, p. 79-80) and Ridgway (Birds No. and Mid. Am., part 4, 1907, p. 425) both regard it as

¹ *Pipra flavogaster* Thunberg, Mém. Acad. Imp. St. Petersburg, vol. 8, 1822, p. 286 (Brazil).

a race of *martinica*. Von Berlepsch (Proc. Fourth Int. Orn. Congress, 1907, p. 384), however, treated the two forms as specifically distinct on color characters, but overlooked the structural differences which prove that the two birds belong to distinct species.

No work treating with all the forms of *Elaenia martinica* has been published in recent years. Von Berlepsch, in an account of the entire genus in the Proceedings of the Fourth International Ornithological Congress, recognized six races of this species, three of which he described as new. Ridgway (Birds No. and Mid. Am., part 4, 1907) recognized *flavogastra* and *subpagana* in addition to the typical form.

In this review I recognize six forms, admitting one that von Berlepsch synonymized, and rejecting one that the same authority described from discolored specimens.

Elaenia martinica martinica (Linné).

Muscicapa martinica Linné, Syst. Nat., ed. 12, vol. 1, 1766, p. 325 (Martinique; ex Brisson, Ornithologie, vol. 2, 1760, p. 362, pl. 36, fig. 2).

Subspecific characters.—Above olive to deep olive, darker on the head, lighter on the rump; in some individuals the feathers with darker centers. Below very variable, but generally with a grayish band across the breast (this band sometimes with an admixture of olive); throat white or grayish; posterior under parts sometimes white or grayish, sometimes evenly washed with barium yellow, sometimes flammulated yellow and white, or yellow and gray; flanks generally more olivaceous.

Measurements.—Male: wing, 76.5–87; tail, 71–83; bill from base, 13–16; tarsus, 20–22. Female: wing, 72–81; tail, 65–78; bill from base, 13–15; tarsus, 18–21.5.

Range.—I have been unable to find any characters by which specimens from the following islands may be differentiated: St. Eustatius, St. Kitts, Nevis, Guadeloupe, Dominica, Martinique, St. Lucia, St. Vincent, and Mustique. Specimens from Saba, Montserrat, and Marie Galante not seen.

Remarks.—*Elaenias* are common and characteristic species on all the islands just mentioned. They occur in nearly all situations except perhaps on the higher summits, where the clouds hang low most of the time and where the stunted trees reek with moisture.

The species has a variety of notes, the one most frequently heard being the characteristic *whew*, like the sound made by breath sharply indrawn or suddenly expelled. Another note may be written *pewit*, *pewit*, *pewit*, rapidly uttered, and yet another is a sputtering in which the syllables *pewit* are mingled. *Elaenias* give the impression of laziness or at least deliberateness in their actions. They do not choose a conspicuous perch from which they might sally forth after flying insects, but feed upon ripe berries and probably such insects as may be picked off twigs and leaves.

Elaenia martinica barbadensis (Cory).

Elaenia barbadensis Cory, Auk, vol. 5, 1888, p. 47 (Barbados).

Subspecific characters.—Similar to *E. m. martinica*, but with a relatively longer tail, equal to or longer than the wing, and with longer bill and tarsus.

Measurements.—Five males: wing, 79–83.5 (81.5); tail, 79–83 (81.2); bill from base, 15.5–16 (15.7); tarsus, 21.5–22.5 (22). Five females: wing, 76.5–80 (78.7); tail, 77.5–81 (79.3); bill from base, 15–16 (15.4); tarsus, 21–23 (21.7).

Range.—Island of Barbados.

Specimens examined.—5 ♂, 7 ♀, 2 juvenals.

Remarks.—This entire series is composed of badly worn and abraded summer specimens and cannot be relied upon to show the existence of any color characters. However, no authors have remarked any color differences in this race that do not come within the range of individual variation indicated under *E. m. martinica*.

Elaenia martinica riisii (Sclater).

Elaenia riisii Sclater, P. Z. S., 1860, p. 314 (St. Thomas, W. I.).

Subspecific characters.—Smaller than *E. m. martinica*; much grayer and paler above (buffy olive or citrine drab); wing bars wider and whiter (less olive); a well-defined grayish white tip to the tail; below much as in the typical form and equally variable, but very much paler and grayer, particularly when seen in series.

Measurements.—Males: wing, 73.5–80; tail, 66–77; bill from base, 14–16.5; tarsus, 19.5–23. Females: wing, 69–75; tail, 61–73; bill from base, 14–15; tarsus, 18–21.

Range.—Riise's *Elaenia* has a peculiar, rather anomalous distribution. It occurs on Vieques, Culebra, and Culebrita Islands just east of Porto Rico, though not recorded from that island; neither does it seem to be definitely recorded from St. Croix! It is common on the remaining Virgin Islands; examples from Anguilla and Antigua would appear to be referable to this form. I have not examined representatives from St. Barts, St. Martins, or Barbuda. It occurs on some of the islands off the north coast of Venezuela—Aruba, Curaçao, and Bonaire; at least specimens from these islands are indistinguishable from birds from the northeastern Antilles. At the same time I feel confident that here is not a case of discontinuous distribution, but a simple one of parallelism or convergence.

Elaenia martinica caymanensis Berlepsch.

Elaenia martinica caymanensis Berlepsch, Proc. Fourth Int. Orn. Congress, 1907, p. 394 (Grand Cayman).

Elaenia martinica complexa Berlepsch, Proc. Fourth Int. Orn. Congress, 1907, p. 395 (Cayman Brac).

Subspecific characters.—Similar to *E. m. riisii*, but much larger; more uniformly yellow below; wing bars and edging of the inner secondaries much wider.

Measurements.—Males: wing, 82–88; tail, 72–83; bill from base, 14.5–16.25; tarsus, 18–23. Females: wing, 77–81; tail, 69–76; bill from base, 13–16; tarsus, 19.5–21.

Range.—The Cayman Islands (Grand Cayman, Cayman Brac, and Little Cayman).

Remarks.—The specimens on which von Berlepsch based his *E. m. complexa* were badly discolored by reason of the preservative used by the collector in their preparation. Our series from the Caymans, collected by W. W. Brown in 1911, fails to show any differences between the birds from the three islands.

MEASUREMENTS OF RACES OF *ELAENIA MARTINICA*.

Name	Locality	No. and sex of specimens	Wing	Tail	Bill from base	Tarsus
<i>E. m. martinica</i>	St. Eustatius	9 ♂	78-81.5 (80.2)	70.5-80 (74.2)	13-15.5 (14.12)	20-21.5 (20.7)
"	St. Kitts-Nevis	10 ♂	79-83 (81.5)	72-78 (74.9)	13.5-15 (14.35)	20-22 (21.2)
"	Guadeloupe	2 ♂	78.5-84 (81.5)	72-83 (77.5)	14.5-15 (14.75)	19-21.5 (20.25)
"	Dominica	2 " ♂ "	(sexing in doubt).			
"	Martinique	7 ♂	79-87 (82.57)	71-80 (74.6)	14-15.5 (14.7)	20-22 (21.07)
"	St. Lucia	3 ♂	80-84 (82)	71-76.5 (74.5)	14.5-15.5 (14.8)	20-22 (21.17)
"	St. Vincen	8 ♂	76.5-85 (80.5)	72-76 (73.8)	14.5-16 (15.35)	20.5-22 (21.35)
"	St. Eustatius	3 ♀	72-78 (75)	67-77 (72)	13 (1 spec.)	19-20.5 (19.75)
"	St. Kitts-Nevis	5 ♀	72-79 (75.3)	67-74.5 (71.1)	13.5-14.5 (14.2)	19.5-21 (20.02)
"	Guadeloupe	2 ♀	77	71.5-76 (73.8)	14.5-15 (14.75)	19-21.5 (20.25)
"	Dominica	2 " ♀ "	(sexing in doubt).			
"	Martinique	5 ♀	75.5-81 (77.9)	69-78 (72)	14-15 (14.5)	19.5-21.5 (20.6)
"	St. Lucia	3 ♀	75-76.5 (75.8)	68.5-72.5 (70)	13-15 (14)	18-21 (19.8)
"	St. Vincen	4 ♀	73.5-79 (75.25)	65-73 (68.4)	14-15 (14.5)	20-21 (20.4)
"	Mustique	1 ♀	78.5	68	15	21
<i>E. m. rissii</i>	Culebra and Culebrita	5 ♂	74-79 (76.6)	67-76.5 (70.9)	14.5-15.15 (14.7)	20.75-21.5 (21.05)
"	Vieques	4 ♂	73.5-75 (74.56)	67.5-71.5 (69.25)	14-15.25 (14.75)	19.5-21.5 (20.06)
"	St. Thomas	2 ♂	78-78.5 (78.25)	69-70 (69.5)	14.5	20-21 (20.5)
"	Tortola	2 ♂	76	70-71 (70.5)	15-16.5 (15.7)	21
"	Anegada	4 ♂	74-78 (76.25)	66-70 (68.9)	14.5-16 (15)	21-23 (22)
"	Anguilla	3 ♂	77-80 (78.8)	71-77 (73.5)	14.5-15.5 (15)	20-21 (20.67)
"	Antigua	1 ♂	77.5	68.5	14	20.5
"	Aruba	79	79	73	15	20
"	Bonaire	1 ♂	76.5	75	14	19.5

<i>E. m. rissii</i>							
"	1 ♀	70	61.5	14	20.75		
"	2 ♀	73-75 (74)	64-70 (67)	15	20-20.5 (20.25)		
"	1 ♀	73	68	14.5	20.5		
"	2 ♀	71-74 (72.5)	61-66 (63.5)	14-15 (14.5)	20.5-21 (20.75)		
"	5 ♀	70.5-75 (72.4)	65-69.5 (67.3)	14.5-15 (14.6)	20-20.5 (20.1)		
"	2 ♀	69-74 (71.5)	63-66 (64.5)	14-14.5 (14.25)	18-19.5 (18.75)		
"	2 ♀	74.5	71.5-73 (72.25)	14.75-15 (14.87)	19-20 (19.5)		
"	1 ♀	74	70	15	20		
"	1 ♀	73.5	68	15	20		
<i>E. m. caymanensis</i>							
"	5 ♂	82.5-85.5 (84)	74.5-78.5 (76.4)	15-16.25 (15.6)	20-23 (21.3)		
"	4 ♂	82-87 (83.8)	72-79 (75)	14.5-15.5 (15.1)	19-22 (20.9)		
"	5 ♂	82-88 (85)	74-83 (79.1)	15.5-16 (15.9)	18-22 (20.9)		
"	4 ♀	77-81 (78.1)	69-73 (72)	15-16 (15.4)	20-21 (20.4)		
"	2 ♀	78-80 (79)	73-75.5 (73.25)	14.5-15.5 (15)	20-20.5 (20.25)		
"	8 ♀	77-81 (79)	70-76 (73.25)	13-16 (14.9)	19.5-21 (20.47)		
<i>E. m. cinerescens</i>							
"	2 ♂	85-87 (86)	81-82.75 (81.87)	16-16.5 (16.25)	20-22.25 (21.12)		
"	2 ♂	87.5	85-86 (85.5)	16	20-21.25 (20.62)		
"	2 ♀	78-79 (78.5)	73-75.25 (74.12)	14.75-15+	19.5-22.25 (20.87)		
"	3 ♀	79-82 (80.7)	75.5-78 (77)	14.5-15 (14.75)	19.5-20.5 (20)		
<i>E. m. remota</i>							
"	2 ♂	77.75-78.25 (78)	72.5-76 (74.25)	14.5-14.75 (14.67)	20.5-21 (20.75)		
"	2 ♀	74.75-78 (76.37)	68-75.5 (71.7)	13.75-14.25 (14)	19-19.5 (19.25)		
"	3 ♀	72.5-75.5 (74.2)	65-72.75 (69.75)	13.5-15 (14.2)	19.25-21.25 (20.25)		

***Elaenia martinica cinerescens* (Ridgway).**

Elaenia cinerescens Ridgway, Proc. U. S. Nat. Mus., vol. 7, 1884, p. 180 (Old Providence I., Caribbean Sea).

Subspecific characters.—Very close to *E. m. martinica*, but averaging slightly larger.

Measurements.—Male: wing, 85–87.5; tail, 81–86; bill from base, 16–16.5; tarsus, 20–22.25. Female: wing, 78–82; tail, 73–78; bill from base, 14.5–15+; tarsus, 19.5–22.25.

Range.—Islands of Old Providence and St. Andrews, Caribbean Sea.

Remarks.—None of the diagnostic characters given for this race by its describer or by von Berlepsch hold good. The cotypes (a male and a female) on which the name is based are both birds of the gray type of coloration, very ashy in appearance, without trace of yellow below. Two birds in the M. C. Z. collection from Old Providence agree with the statement of von Berlepsch that the “throat and breast are flammulated olive gray and yellow,” but no more so than specimens of *E. m. martinica*. Therefore, to maintain a race which probably is not as closely related to *E. m. martinica* as its appearance would indicate, it is necessary to rely upon its slightly larger size as indicated by the available material.

***Elaenia martinica remota* Berlepsch.**

Elaenia martinica remota Berlepsch, Proc. Fourth Int. Orn. Congress, 1907, p. 396 (Cozumel I.).

Subspecific characters.—Similar to *E. m. martinica* and equally variable in color, but smaller, bill shorter; rump and upper tail-coverts always browner.

Measurements.—Two males: wing, 77.75–78.25; tail, 72.5–76; bill from base, 14.5–14.75; tarsus, 20.5–21. Five females: wing, 72.5–78; tail, 65–75.5; bill from base, 13.5–15; tarsus, 19–21.25.

Range.—Cozumel and Mujeres Islands, off the coast of Yucatan.

Remarks.—Seven unsexed specimens, collected by Gaumer and now in the United States National Museum Collection, have also been examined.

Museum of Comparative Zoölogy,
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NOTES ON GEMMULES AND SPICULES IN *HETEROMEYENIA*
RYDERI POTTS.

BY MILTON F. CROWELL.

Heteromeyenia ryderi Potts is the commonest sponge found in the fresh waters near the University of New Hampshire, Durham, N. H. The writer has collected sponges from this locality, off and on, during the last three and a half years, and from his collections has found one or two things which seemed to him worthy of record.

OCCURRENCE OF GEMMULES.

The formation of gemmules in the Spongillidae has been assumed by many to be a protective habit acquired by the sponge to insure the survival of the species through the cold season of a northern winter, or through periodic dry seasons, as in the tropics. While it seems to be generally true that the gemmules do insure survival through periods of adverse conditions, gemmules are formed, sometimes, in response to other conditions than cold or drouth.

In the writer's collecting he has taken gemmule-bearing specimens of *Heteromeyenia ryderi* Potts on August 10 and on February 1. Both specimens were taken from the Oyster River, about a mile from the administration building of the University of New Hampshire, and they were taken within 100 feet of each other. On February 1 spongillids not bearing gemmules were also taken.

Since the Oyster River never goes dry at this point, and since the gemmule-bearing specimen found on August 10 was taken from a pebble from the bottom of the stream, the gemmules could hardly have been formed for the purpose of carrying the sponge through a dry spell, because no dry spell was coming.

By February 1, 1926, when the specimen bearing gemmules was found, the river had been frozen over for weeks, except in a few open spaces left because of the rapidity of the current.

The sponge was growing on the under side of a pebble picked from the bottom of the river where the water was flowing rapidly. The animal appeared perfectly healthy and vigorous. It was brought to the laboratory, and microscope slides prepared from it for the purpose of identification. Microscopic examination showed that the sponge was in good condition. The skeleton spicules, while largely mature, showed many that were not fully developed, giving evidence that this specimen was still growing at the time of collection.

Gemmule-bearing specimens of *Heteromeyenia ryderi* Potts have

been taken by the writer over a period of seven months from localities in Durham, N. H., as follows:

- August 10, 1923—Oyster River, College Woods.
- October 27, 1922—Oyster River, College Woods.
- October 28, 1922—Longmarsh Brook, first branch.
- October 29, 1922—Reservoir.
- November 14, 1922—Reservoir.
- November 25, 1922—Oyster River, Mill Pond.
- February 1, 1926—Oyster River, College Woods.

The following notes are quoted, with his permission, from memoranda by Prof. H. V. Wilson, of the University of North Carolina.

"Jane Stephens (Proc. Royal Irish Acad., vol. 35, p. 218, 1920) records that gemmules may be found apparently at almost any time of the year in some of the Irish spongillids, in *Heteromeyenia ryderi*, for instance, during June (*loc. cit.*, p. 241).

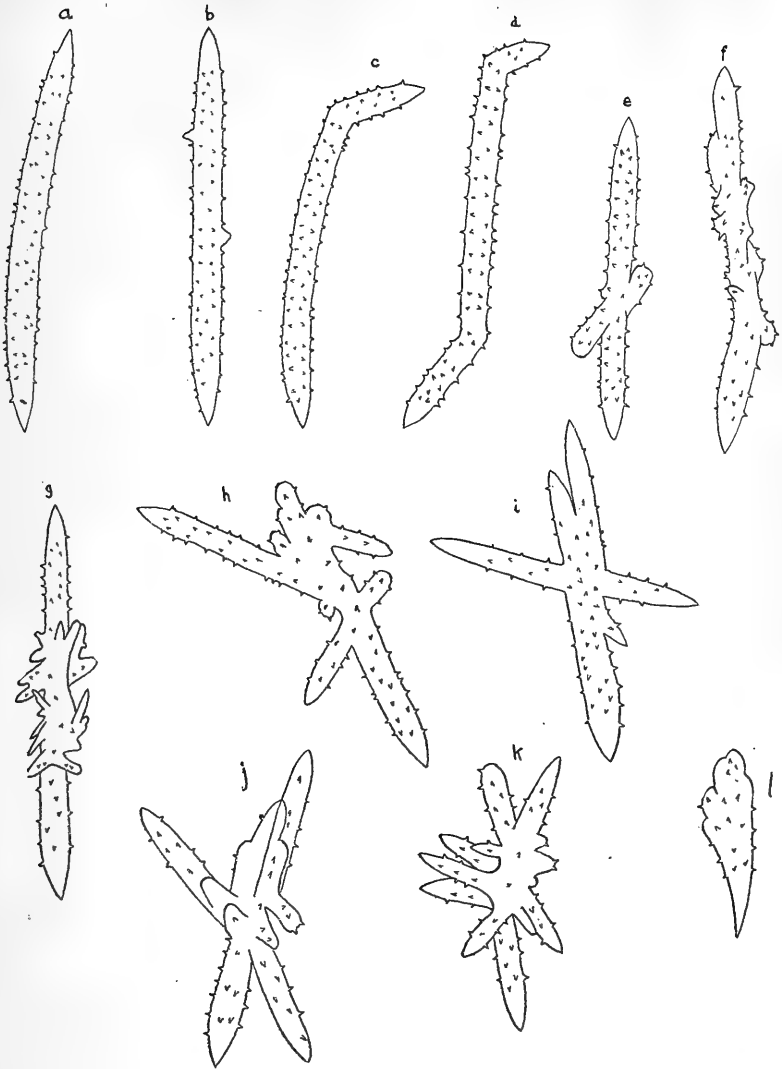
"W. Weltner finds that *Ephydatia fluviatilis* in some places in Germany behaves as do many spongillids in the north temperate zone, that is, toward the end of autumn it forms gemmules and dies. But in other places the same species may persist through the year (perennial condition), forming, at any rate containing, gemmules at all seasons including the summer, so that specimens may be had in the summer containing gemmules and eggs or sperm (W. Weltner, Spongillidenstudien V, p. 275, Archiv f. Naturgesch. 73, 1907). That *Ephydatia fluviatilis* in some places was perennial and could be found with gemmules at all seasons was already known to Lieberkühn and Goette (W. Weltner, Archiv f. Naturgesch. 59, 1893, pp. 225, 271, 272).

"In other spongillids, too (*Ephydatia mülleri* and *Spongilla fragilis*), which ordinarily form gemmules and degenerate toward the end of autumn, W. Weltner has found degenerating specimens with gemmules in June and July. Again, *Euspongilla lacustris* in Tegel Lake has been found by the same observer sometimes to contain gemmules in July along with the egg-larvae.

"It has long been known that perennial spongillids occur. Such perennial species have sometimes lost, it would seem, or practically lost or perhaps in some cases have never acquired, because unnecessary, the protective habit of forming gemmules (W. Weltner, Archiv f. Naturgesch. 59, 1893, p. 272. He gives references to W. Marshall and Edw. Potts). *Heteromeyenia ryderi* and *Ephydatia fluviatilis* do not, however, fit well into this category. The facts for *Ephydatia* are given above. *Heteromeyenia* is perennial, or at least occasionally perennial (waters of Long Island, Nova Scotia, and Newfoundland: Edw. Potts, Fresh Water Sponges, p. 247, Proc. Acad. Nat. Sci. Phila., 1887)."

REMARKABLE SKELETON SPICULES.

On October 27, 1922, the writer took a spongillid from the Oyster River showing a remarkable condition existing in the



TEXT-FIG. 1. Skeleton spicules of *Heteromeyenia ryderi*.

formation of a small percentage of the skeleton spicules. Examination of the gemmule spicules convinced him that this was an unusual specimen of *Heteromeyenia ryderi* Potts rather than a new variety or species.

The typical form of skeleton spicule in this species is a long, slender, slightly bent rod, gradually pointed at both ends, spined entirely, except at the tips (a of text-fig. 1).

The malformations found in this specimen were various, as shown in the text-figure. Some of the spicules seemed to have

two or three extra large spines (*b*). Others were abruptly bent at one, or both ends (*c*, *d*). Some had the form of a simple cross (*e*). Potts (Fresh Water Sponges, Pl. VIII, fig. VI, Proc. Acad. Nat. Sci. Phila., 1887) has figured malformations similar to *c*, *d*, and *e* for *Spongilla aspinosa*; also (Pl. IX, fig. IV) a somewhat similar malformation in *Meyenia fluviatilis*.

But these were the simpler malformations. Other malformations such as *f* and *g* were present, and on up to actual stellate forms, as shown in *j* and *k*. A few were daggerlike, having but one point and a spined, short "handle" (*l*).

The cause of such malformations is not known to the writer. Normal specimens of the same species have been taken within a few feet of the spot where this one was found.

*University of New Hampshire,
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NEW GALL MIDGES FROM NEW ENGLAND.

BY E. P. FELT.

THE studies of the last 30 years in this and other countries have demonstrated the occurrence of a rich and varied gall-midge fauna in different sections of the world, the most striking progress along this line being made in certain of the non-gall-making species, two of which are characterized below. Although many species have been described during the above-mentioned period, there are still many new ones and probably a number of new genera yet to be characterized.

Neocatocha nylanderi, sp. nov.

The extremely interesting midge described below was collected by Olof O. Nylander at Woodland, Me., on December 1, 1917, and submitted for study by C. W. Johnson of the Boston Society of Natural History. Mr. Johnson informs me that the specimen was taken in an effort to get a more northern record for the wingless snow midge, *Chionea valga* Harris, and adds that it was probably picked up on the snow. It is easily distinguished from other species of the genus by the decidedly longer stems of the flagellate antennal segments.

Female.—Length 1.2 mm. Antennae extending to the base of the abdomen, rather thickly haired, light brown, ten segments, the fifth with a stem three-fourths the length of the subcylindrical basal enlargement, which latter has a length one-half greater than its diameter; a sparse, subbasal whorl of long, stout setae and a rather thick subapical band of similar setae; terminal segment reduced, irregularly subconical; palpi, first segment short, second with a length over twice its diameter, the third as long as the second, the fourth one-half longer than the third, strongly flattened and somewhat broad; mesonotum shining black; scutellum reddish brown; postscutellum darker; abdomen mostly pale yellowish; wings hyaline; subcosta uniting with the margin at the basal half, the third vein somewhat curved, joining the anterior margin at the distal fifth, the thickened costa extending to the apex of the wing, the fifth vein uniting with the posterior margin at the distal fourth, the sixth strongly curved at the basal third, joining the posterior margin near the basal half; halteres yellowish; coxae and legs pale yellowish; claws long, rather heavy, strongly divergent, simple; the pulvilli rudimentary; ovipositor short, triarticulate, the first segment irregularly triangular, the second short, subquadrate, the third broadly oval, with a length about one-half greater than its width.

Type.—Cecid. A 1813, N. Y. State Museum.

Porricondyla sylvestris, sp. nov.

The male characterized below was labelled Bar Harbor, Me., August 12, 1920. It was collected by C. W. Johnson of the Boston Society of Natural History, who kindly forwarded the specimen for study. The species is related to *P. pini* Felt, *P.*

dilatata Felt, and *P. johnsoni* Felt, especially the last, from which it is most easily separated by the less dilated, somewhat fusiform terminal clasp segment and by the heavily chitinized, bifurcate harpes.

Male.—Length 1.5 mm. Antennae twice the length of the body, sparsely haired, fuscous yellowish, the stems whitish, transparent, presumably 16 antennal segments, the fifth with a stem twice the length of the subcylindrical basal enlargement, which latter has a length nearly twice its diameter; terminal segments missing; palpi, first segment subquadrate, the second a little longer, rather broad, the third apparently short, with a length less than one-half greater than its width, the fourth about three times the length of the third, somewhat dilated; mesonotum dark brown; scutellum and postscutellum fuscous yellowish; abdomen somewhat darker; halteres yellowish transparent; coxae and femora pale straw, the remainder of the legs dark straw; claws slender, unidentate; the pulvilli about half the length of the claws; basal clasp segment rather short, broad, terminal clasp segment dilated, roundly triangular; harpes heavily chitinized and with strongly divergent, curved processes apically.

Type.—Cecid. 1821, N. Y. State Museum.

***Hormomyia fulva*, sp. nov.**

This species approaches rather closely *H. caudata* Felt, from which it is easily distinguished by the distinctly longer, more constricted, flagellate antennal segments and by the shorter ovipositor with wider lobes. The specimen was labelled Sherborn, Mass., August 25, 1912, E. J. Smith, and was received from C. W. Johnson of Boston.

Female.—Length 6 mm. Antennae about one-half the length of the body, rather thickly haired, pale yellowish, probably 14 segments, the fifth with a distinct subbasal stem with a length about one-half greater than its diameter, and an apical stem with a length a little greater than its diameter; basal enlargement subglobose, with a length nearly one-half greater than its diameter; the distal enlargement cylindrical, with a length nearly twice its diameter; moderately low circumfili occur on the basal enlargement, and basally and apically on the distal enlargement; terminal segments missing; palpi, first segment probably short, subquadrate, the second cylindrical with a length about twice its diameter, the third long, slender, with a length fully seven times its diameter; mesonotum greatly produced over the head, fuscous yellowish; scutellum yellowish; postscutellum brownish yellow; abdomen yellowish brown; halteres pale yellowish; coxae and femora mostly pale straw; tibiae and tarsi dark straw; claws moderately long, stout; the pulvilli apparently about half the length of the claws; ovipositor short, with a length approximately one-sixth that of the abdomen, the lobes narrowly oval, with a length about four times the width.

Type.—Cecid. 1824, N. Y. State Museum.

State Museum,
Albany, N. Y.

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ADDITIONAL FROGS FROM CUBA.¹

BY E. R. DUNN.

A second summer at the Harvard Biological Station at Soledad near Cienfuegos has enabled me to add materially to the remarks I made in 1925 (Occ. Papers, Boston Soc. Nat. Hist., Vol. 5, p. 163-166), and to offer diagnoses of four more species of *Eleutherodactylus* from Santa Clara Province, bringing the total number of species of that genus from Santa Clara up to eleven.

Thanks are due to Dr. Thomas Barbour, to the officials of Central Soledad and of its various Colonias, and to Mr. Caspari of Mina Carlota.

At Soledad I succeeded in getting the long-lost *Eleutherodactylus varians*, and in the Trinidad Mountains, at Mina Carlota, I took large series of three forms of which I had taken only a few the previous summer, and one which I had not taken before.

I have also examined the Cuban frogs in the United States National Museum, the American Museum of Natural History, and the Museum of Comparative Zoölogy, with the result that I shall describe another species from western Cuba, and give a tentative arrangement and key to the Cuban species of this troublesome genus.

As far as the Province of Santa Clara itself is concerned, there is no difficulty in discriminating between species, except in the cases of *ricordii* and *casparii* (which do not occur together), and of *ricordii* and *cuneatus* (which do occur together but whose resemblances are superficial). Some difficulty may be expected in distinguishing individuals of *auriculatus* from *eileenae*, or *greyi* from *pinarensis* and *brevipalmatus*, for these are vicarious forms confined to different provinces, and may even be found to intergrade.

E. gundlachi from Oriente and *E. casparii* from Santa Clara may be vicarious forms, but are well differentiated.

Other forms, such as *atkinsi* and *dimidiatus*, show slight geographical differences, not enough to warrant distinction; while *cuneatus* and *ricordii* and *sonans* range over the entire island without perceptible change; *ricordii*, however, does not occur in

¹Contribution from the Smith College Department of Zoölogy, No. 139. No. 2, Studies from the Biological Laboratory (Atkins Foundation) of the Harvard Institute for Tropical Biology and Medicine.

the higher mountains. We may reasonably expect a form like *gundlachi* eventually to turn up in Pinar del Rio.

The status of *sierra-maestrae* is in some doubt. It is very close to *brevipalmatus* and may turn out to be the same.

There are four groups of *Eleutherodactylus* in the island of Cuba, and the same four are also found in Hispaniola.

The *auriculatus* group is represented by *auriculatus* in Oriente, and is replaced by *eileenae* in the mountains of Santa Clara and Pinar del Rio. This seems to be a mountain-loving group of forms. The tiny *sonans* is found all over the island and is easily distinguished by its size and by its much smaller digital disks and tympanum. The peculiar *varians* is known definitely only from Soledad. It is an arboreal type and lives in the tallest trees in the old lowland forest, now so largely cleared away. These four species form a group which as a whole is characterized by enlarged digital disks, rugose belly, and short vomerine teeth.

The *dimidiatus* group is characterized by smooth skin above and below, by long vomerine series, very feebly developed disks, black cheek patch, and gray or tan color. Members of this series are largely restricted to the mountains, *dimidiatus* occurring throughout the island, and *emiliae*, which is quite distinct, being known only from Santa Clara.

The little *varleyi*, which has short vomerine series, rugose belly, feebly developed disks, a dorso-lateral glandular fold, and a pectoral vocal sac, seems rather isolated from the rest and forms a group by itself.

The majority of the forms, however, are allied to *ricordii* and agree with it in having rugose dorsum, long vomerine series, belly smooth or feebly rugose, and digital disks feebly developed or restricted to the two outer fingers.

In Santa Clara the small, short-legged *ricordii* is found near water in the low country, and in the mountains it is replaced by the longer-legged and differently marked *casparii*. Always associated with water is the web-footed *cuneatus*, which is found both in lowland and in mountains. Occupying a similar habitat to that of *ricordii* and *casparii* is the large, uniformly shagreened *greyi*, rather rare in the lowlands and more common in the mountains. In the dry forest and common in the lowland and rare in the mountains, is the beautifully colored *atkinsi*, with its markings of scarlet and black.

In Pinar del Rio *pinarensis* (the *varians* of Barbour, Stejneger, and Schmidt) replaces *greyi*, differing from it in rugose belly and slightly different color. *Cuneatus*, *ricordii*, and *atkinsi* are also found in this province.

In Oriente *brevipalmatus* replaces *greyi*, differing in its webbed toes. *Gundlachi*, with red legs and long warts, may replace *casparii*. *Cuneatus*, *ricordii*, and *atkinsi* are also found. The insufficiently known *sierra-maestrae* is allied to *brevipalmatus* and to *ricordii*, distinguished from the former by absence of webs and

by the more irregular warts, and from the latter by the larger size and in the more developed digital disks. It may turn out not to be distinct.

From the Isle of Pines I have seen *cuneatus* and *pinarensis*.

The species found in the neighborhood of the Harvard Biological Station at Soledad are *varians*, *sonans*, *varleyi*, *cuneatus*, *ricordii*, *greyi*, and *atkinsi*. Of these, *cuneatus* and *ricordii* are common and often met with; *atkinsi* is common in the dry woods at Guabairo but rare elsewhere; *greyi* is quite common; *varleyi* is common but small and seldom seen; *sonans* is common in bushes; and *varians* is uncommon and only in tall trees.

At Mina Carlota in the Trinidad Mountains, *atkinsi* and *ricordii* reached the mine itself at 1200 feet altitude, but did not extend farther into the mountains, being there replaced by *emiliae* and *dimidiatus*, and by *casparii*, respectively. *Varians* and *varleyi* did not seem to occur. *Eileenae*, the "Kolin" (not *dimidiatus*, as I erroneously suggested in 1925), was found at the mine and higher up, while *greyi*, *cuneatus*, and *sonans* were at all altitudes.

At Hoyo Colorado, in the San Blas division of the Trinidad Mountains, *atkinsi* was found in company with *dimidiatus* and *casparii*.

Key to the Cuban Species of Eleutherodactylus.

- A. Belly coarsely granulated; vomerine series short; disks of fingers and toes well developed; a gular vocal sac.
 - B. Tympanum one-half eye; disk of finger smaller than tympanum.
 - C. Larger, male to 38 mm.; back smoother; Oriente. *auriculatus*.
 - CC. Smaller, male to 26 mm.; small warts on back; Santa Clara and Pinar del Rio. *eileenae*, sp. nov. (p. 212).
 - BB. Tympanum one-third eye; disk of finger equal to tympanum.
 - C. Smaller, under 20 mm.; color rather uniform; finely granulated above. *sonans*.
 - CC. Larger, male 25 mm.; irregular coarse marbling; scattered coarse warts above. *varians*.
- AA. Belly granulated; vomerine series short; disks of digits not developed; a dorso-lateral line of warts; vocal sac extending onto chest; male 14 mm., female 17 mm. *varleyi*.
- AAA. Belly smooth; vomerine series long; disks of digits not developed; smooth above save for dorso-lateral fold; a black cheek patch.
 - B. Legs longer; heel reaching eye; snout longer; no red in groin; larger, female 45 mm. *dimidiatus*.
 - BB. Legs shorter; heel not reaching tympanum; snout shorter; red in groin; smaller, female 27 mm. *emiliae*, sp. nov. (p. 213).
- AAAA. Belly smooth or feebly granulated; back granulated or warty; vomerine series long; no black cheek patch.
 - B. Feet webbed at base.
 - C. Digital disks not developed; a W-shaped scapular fold. . . . *cuneatus*.
 - CC. Disks of fingers III and IV larger; uniformly shagreened above. *brevipalmatus*.
 - BB. Feet not webbed.
 - C. Uniformly shagreened above.
 - D. Belly not granulated; color uniform. . . . *greyi*, sp. nov. (p. 213).
 - DD. Belly feebly granulated; indications of crossbars or dorso-lateral light lines *pinarensis*, sp. nov. (p. 213).

- CC. Not uniformly stragreened above.
 D. Warts of dorsum well developed, no dorso-lateral line.
 E. Warts of dorsum not elongated; groin not red.
 F. Legs short, heels not overlapping, heel reaching eye; no V mark or wart on scapular region; no oblique bars on sides; disks of two outer fingers developed; maximum length 30 mm.
ricordii.
 FF. Legs long, heels overlapping, heel reaching snout.
 G. Disks not developed; an inverted V on scapular region in both color and glandular fold; three oblique black bars on sides; small, maximum length 21 mm.
casparii, sp. nov. (p. 215).
 GG. Disks developed; larger, 38 mm. *sierra-maestrae*.
 EE. Warts of dorsum elongated; groin red; legs long. *gundlachi*.
 DD. Warts of dorsum feebly developed, save in dorso-lateral line; disks not developed; reddish brown; groin red. *atkinsi*.

***Eleutherodactylus auriculatus* (Cope).**

This species seems to be confined to Oriente. I have seen three specimens: two from "Eastern Cuba", collected by Charles Wright (probably in Yateras) and hence probably topotypes (U. S. N. M. Nos. 26640, 29776); and one from Monte Libano near Guantanamo (M. C. Z. No. 3117).

***Eleutherodactylus eileenae*, sp. nov.**

Type.—No. 11128, Museum of Comparative Zoölogy, from Mina Carlota. Collected in July, 1925, by E. R. Dunn.

Diagnosis.—This species differs from its close ally *auriculatus* in its smaller size (male 26 mm.) and more rugose dorsum. From *sonans* it differs in having the tympanum much larger than the digital disks, in being much larger, and in being more rugose above.

I have seen 71 specimens, all from Pinar del Rio and Santa Clara, in which provinces it is locally famous as the "Kolin" and is the only species of the genus that has a distinctive popular name. It is known from Luis Lazo (M. C. Z. No. 4175); Guane (M. C. Z. No. 3726); San Diego de los Baños (U. S. N. M. No. 27862); Hoyo Colorado (M. C. Z. Nos. 10615-18); Mina Carlota (M. C. Z. Nos. 11128, 11444-60).

***Eleutherodactylus sonans* Dunn.**

This occurs in all parts of the island and in Santa Clara at all altitudes. I have seen 20 specimens, as follows: Rangel (U. S. N. M. Nos. 54400, 54403); Soledad (M. C. Z. Nos. 10605-13, 11512-17); Mina Carlota (M. C. Z. No. 11511); Baracoa (U. S. N. M. Nos. 29829, 29831).

***Eleutherodactylus varians* (Gundlach and Peters).**

This has been seen from Soledad (M. C. Z. No. 11131); and I have also seen one of Gundlach and Peter's cotypes (M. C. Z. No. 11621), which has no other data than "Cuba."

***Eleutherodactylus varleyi* Dunn.**

This has been seen from all parts of the island, as follows: Havana (U. S. N. M. No. 57861); La Modesta (U. S. N. M. No.

36860); Matanzas (M. C. Z. No. 5001); Soledad (M. C. Z. Nos. 2841, 10599-604, 11536-48); Santiago (M. C. Z. No. 2414); in all, 33 specimens.

Eleutherodactylus dimidiatus (Cope).

This species has been recorded from Rangel in Pinar del Rio by Gundlach, but I have only seen specimens from Santa Clara and from Oriente: Hoyo Colorado (M. C. Z. Nos. 10226-31); Mina Carlota (M. C. Z. Nos. 11176-200); Guantanamo (U. S. N. M. Nos. 29767, 63234-5); Monte Libano (M. C. Z. No. 3050); Jiguani (M. C. Z. No. 3045); Cayo del Rey (M. C. Z. No. 3883); Pan de Azucar (M. C. Z. No. 3046).

Eleutherodactylus emiliae, sp. nov.

Type.—No. 11129, Museum of Comparative Zoölogy, from Mina Carlota. Collected in July, 1925, by E. R. Dunn.

Diagnosis.—This differs from *dimidiatus* as follows: legs shorter, heel not reaching to tympanum; snout short; concealed surfaces of thighs red; a black spot at groin, but no yellow one; much smaller (maximum length of female 27 mm., as against 45 mm. in *dimidiatus*).

I collected 26 specimens (M. C. Z. Nos. 11129, 11461-85).

Eleutherodactylus pinarensis, sp. nov.

Type.—No. 3814, Museum of Comparative Zoölogy, from Isle of Pines.

Diagnosis.—A large species uniformly shagreened above; belly feebly rugose; disks of fingers III and IV developed; tympanum nearly as large as eye; color marbled dark and light; young crossbarred dark and light.

This species, confined to western Cuba and the Isle of Pines, is the *varians* of authors (not of Gundlach and Peters). I have seen 44 specimens, as follows: Isle of Pines (M. C. Z. No. 3814); San Diego de los Baños (M. C. Z. No. 3948; U. S. N. M. Nos. 26741, 27651-2, 27860-1, 59329-35, 59348); Luis Lazo (M. C. Z. Nos. 3721, 4176-94); El Guamá (U. S. N. M. Nos. 27417-8); Guanajay (U. S. N. M. Nos. 27635-7); Rangel (U. S. N. M. No. 54399); Havana (U. S. N. M. Nos. 57862-3).

Eleutherodactylus greyi, sp. nov.

Type.—No. 11131, Museum of Comparative Zoölogy, from Soledad. Collected July 20, 1925, by E. R. Dunn.

Diagnosis.—This differs from *pinarensis* in being uniform in color or finely marbled above; young similar to adults and never with crossbars; belly smooth. This seems to be the largest Cuban species, the type measuring 65 mm.

I have seen 50 specimens, all collected by myself, as follows: Soledad (M. C. Z. Nos. 11131, 11527-34); Mina Carlota (M. C. Z. Nos. 11486-510); and from three localities in the San Blas division of the Trinidad Mountains (M. C. Z. Nos. 10614, 11065-8).

Named for Mr. Robert M. Grey, Superintendent for nearly thirty years of the Harvard Botanical Garden at Soledad.

Eleutherodactylus brevipalmatus Schmidt.

This form from Oriente differs from the two preceding in having webs at the base of the toes. It agrees with *greyi* in color and in

having a smooth belly. I have seen the two types from the Sierra Maestra (A. M. N. H. Nos. 6448-9), and four others from Pan de Azucar (M. C. Z. Nos. 3052-3), Monte Libano (M. C. Z. No. 3812), and La Patana (M. C. Z. No. 3054).

Eleutherodactylus sierra-maestrae Schmidt.

This differs from *brevipalmatus* in absence of webs, and from *greyi* and *pinarensis* in the dorsal warts being few and irregular. In the latter respect it is like *ricordii*, from which it differs in size, color, and greater development of the disks of the outer fingers. I have seen the type from the Sierra Maestra (A. M. N. H. No. 6450), and one specimen from Pan de Azucar (M. C. Z. No. 3047).

Eleutherodactylus ricordii (Duméril and Bibron).

Of this common small species, which has a larger tympanum and better developed disks on the outer fingers than any of the species of the group save the preceding larger forms, I have seen numerous specimens, as follows: Pinar del Rio (U. S. N. M. No. 27415); El Guamá (U. S. N. M. No. 27414); San Diego de los Baños (M. C. Z. Nos. 3714-9); Havana (U. S. N. M. Nos. 36605-9, 48795, 57638-9; M. C. Z. No. 2837); Matanzas (M. C. Z. No. 1457); La Modesta (U. S. N. M. Nos. 36850-6, 36858-9); Santiago de las Vegas (U. S. N. M. No. 36861); Soledad (M. C. Z. Nos. 2841, 10679-89, 11535); Mina Carlota (M. C. Z. Nos. 11201-11); San Blas (M. C. Z. Nos. 10676-8); Bayate, Guantánamo (A. M. N. H. No. 13129); Baracoa (U. S. N. M. Nos. 29821-8); Rio Tana, near Manzanillo (M. C. Z. No. 3051).

Eleutherodactylus cuneatus (Cope).

This form, which can immediately be recognized by its W-shaped scapular fold, webbed toes, and lack of digital disks, has been seen from the following localities: Isle of Pines (M. C. Z. Nos. 3791-6, 3813); Luis Lazo (M. C. Z. Nos. 4111-4); San Diego de los Baños (M. C. Z. No. 2838, 7; U. S. N. M. Nos. 26653-62, 27857-9, 59328, 59349-50); Rangel (M. C. Z. No. 5008; U. S. N. M. Nos. 54401-2); Pinar del Rio (U. S. N. M. No. 59325); El Guamá (M. C. Z. No. 2842; U. S. N. M. Nos. 27400-13, 27416); San Cristobal (U. S. N. M. No. 36849); Soledad (M. C. Z. Nos. 2839, 10690-700); San Blas (M. C. Z. Nos. 10701-12); Mina Carlota (M. C. Z. Nos. 11151-75); Oriente (U. S. N. M. No. 63236-7); Monteverde (U. S. N. M. No. 5702, type).

Eleutherodactylus gundlachi Schmidt.

This form is amply distinct from the rest of the group on account of its red thighs, lack of disks, and elongate dorsal warts. I have seen it from Monte Libano near Guantánamo (M. C. Z. Nos. 3056, type, and 3119); and from the Sierra Maestra (A. M. N. H. Nos. 6445-7). This is *Eleutherodactylus plicatus* Barbour 1919, Mem. Mus. Comp. Zoölogy, vol. 47, p. 107 (not *Hylodes plicatus* Günther, 1900, Biol. Cent.-Amer., p. 228). It was also

renamed by Nieden (1923, *Das Tierreich*, Lief. 46, Anura I, p. 416) as *E. barbouri*, but Schmidt's new name has priority.

***Eleutherodactylus casparii*, sp. nov.**

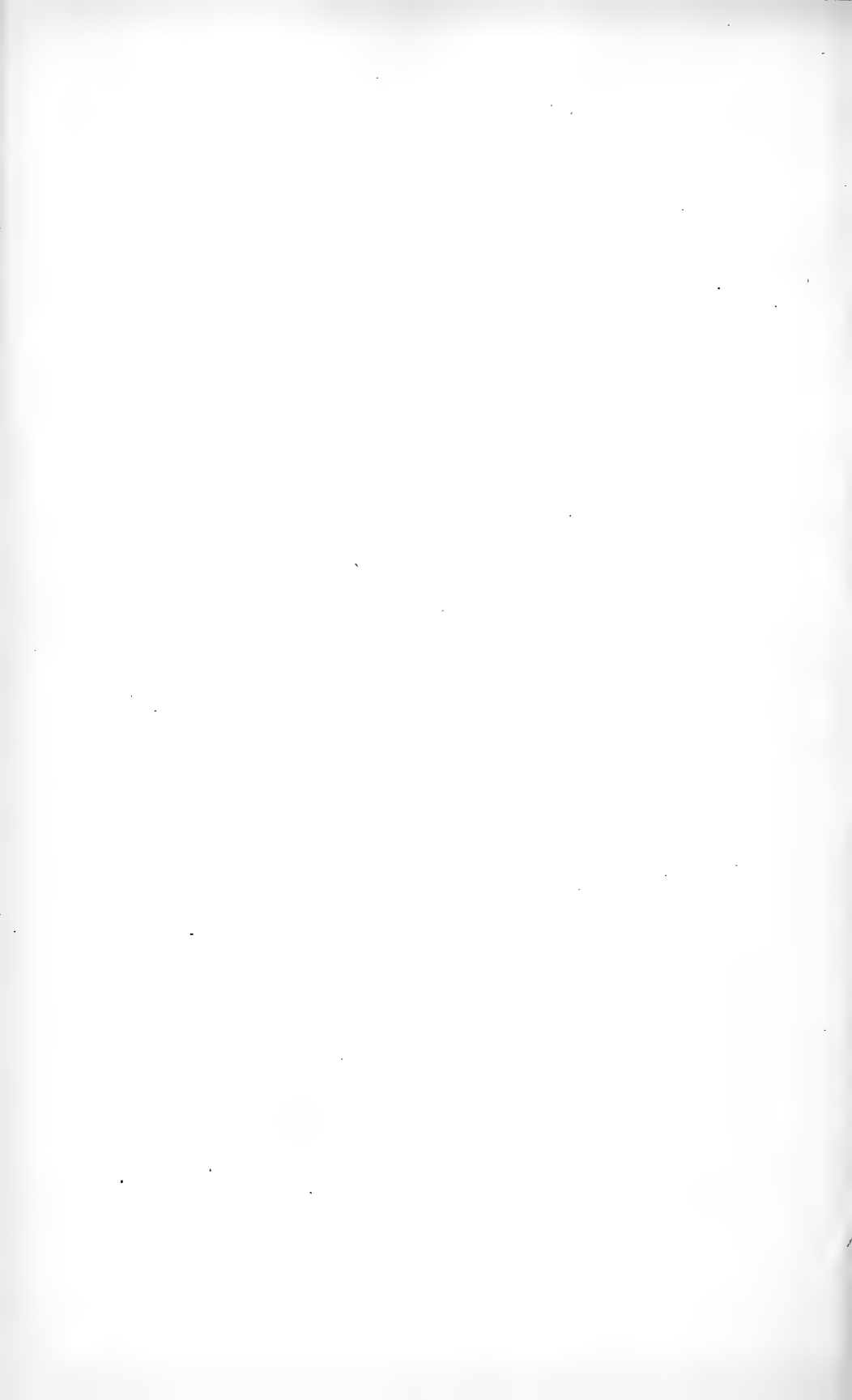
Type.—No. 11130, Museum of Comparative Zoölogy, from Mina Carlota. Collected in July, 1925, by E. R. Dunn.

Diagnosis.—A species of small size (21 mm.); without developed disks; belly smooth; back irregularly warty; legs long, heel reaching to snout; three oblique black bars on sides; no dorso-lateral light streak; usually an inverted V on scapular region; this usually accompanied by a fold of similar shape; no red on legs; legs crossbarred.

This species is closely related to *ricordii*, having the same habits and habitat, and seems to replace it in the higher altitudes of the Trinidad Mountains. Its long legs and its coloration are sufficiently distinctive. I collected 28 specimens, as follows: Electric Plant at San Blas (M. C. Z. Nos. 10626–30); Hoyo Colorado at San Blas (M. C. Z. Nos. 10619–23); Mina Carlota (M. C. Z. Nos. 11130, 11430–43).

***Eleutherodactylus atkinsi* Dunn.**

Of this very distinct and beautifully colored frog, I have seen the following series: Guane (M. C. Z. No. 3722); Soledad (M. C. Z. Nos. 2840, 10586–98, 11518–26); Hoyo Colorado (M. C. Z. Nos. 10624–5); Mina Carlota (M. C. Z. Nos. 11120–1); Bayate (M. C. Z. No. 3704); Guantanamo (U. S. N. M. No. 63238); Baracoa (M. C. Z. No. 3882); Siboney (M. C. Z. No. 10166); Santiago (M. C. Z. No. 2414); Cape Maisí (M. C. Z. No. 4073); El Guamá (U. S. N. M. No. 29757). This is the *E. cuneatus* of most recent authors.



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THREE NEW AFRICAN BIRDS.

BY HERBERT FRIEDMANN.

While working on the birds I collected in Africa during 1924 and 1925, I found it advisable to recognize two new subspecies and one new species, which are described below.

Parus albiventris curtus, subsp. nov.

Type.—No. 232685, Museum of Comparative Zoölogy, female, from Taveta, Kenya Colony. Collected April 13, 1925, by H. Friedmann.

Subspecific characters.—Similar to *Parus albiventris albiventris* but smaller, with shorter wings.

Description of type.—Head, neck, scapulars, interscapulars, back, rump, and upper tail-coverts dark blackish brown; median wing-coverts white; greater wing-coverts and the remiges edged with white on the outer webs, the white edges of the inner primaries and outer secondaries shaded with ashy; sides of head, chin, and throat dusky brownish; breast and flanks ashy black, mixed with brown on the breast and fading to dark bluish gray on the lower flanks; abdomen and under tail-coverts whitish; tail black, the outermost pair of rectrices with the outer webs white except at the base, where they are blackish; bill black; feet dark slate color.

Measurements of type.—Wing, 75; tail, 53; culmen from base, 10; tarsus, 15.3.

Range.—The coast districts of Kenya Colony inland to Taveta. Specimens known from Sagala and Samburu (Van Someren) and Taveta.

Remarks.—Dr. van Someren (*Novitates Zoologicae*, vol. 29, p. 205, 1922) noticed that birds from the coastal region are smaller than specimens from the uplands of Kenya Colony, and expressed the opinion that, with more material, the coastal birds would prove to be a smaller race. He gives the following wing measurements: coastal males, 75-77; upcountry males, 83-86; upcountry females, 80-82. My Taveta bird (a female) has a wing of 75 mm., while a male from Morijo has a wing of 84 mm. Taveta is in the low thorn-bush plain about 120 miles inland, while Morijo is in the high inland plateau of East Africa. The discrepancy in size in my specimens, corresponding with that reported by Van Someren, justifies the recognition of the coastal bird as a distinct form. *Parus albiventris* was originally described by Shelley from Ugogo, in the inland plateau of Tanganyika Territory, and the type speci-

men, a female, has a wing of 80 mm. Therefore the inland bird with longer wings is the typical form.

Amadina fasciata candida, subsp. nov.

Type.—No. 232923, Museum of Comparative Zoölogy, adult male, from Taveta, Kenya Colony. Collected April 4, 1925, by H. Friedmann.

Subspecific characters.—Male: similar to *Amadina fasciata alexanderi* but browner above and below; the mantle less streaked, more uniform; and the bill slightly shorter. Female: similar to *alexanderi* but browner above and below, and bill slightly smaller.

Description of type.—Head avellaneous, changing gradually into wood brown on the occiput and hind neck, all the feathers with subterminal black bars; scapulars and interscapulars walnut brown, the anterior interscapulars with subterminal bars, the others with only faint indications of such bars; back and rump pecan brown, merging anteriorly into walnut brown, the feathers faintly barred subterminally with black; upper tail-coverts light ochraceous-buff with black subterminal bars; tail fuscous-black, the middle pair of rectrices washed with grayish for the basal three-quarters, narrowly edged with light grayish and narrowly tipped with pale ochraceous-buff; the rest of the rectrices broadly tipped with pale ochraceous-buff on their inner webs and narrowly tipped with the same color on their outer webs, the outermost pair of rectrices with the entire outer web pale ochraceous-buff; lesser wing-coverts pecan brown with black subterminal spots; the middle coverts pale fuscous-black with brownish buff shaft streaks, ochraceous-buff tips, and V-shaped black subterminal bars; the greater coverts pale fuscous-black with wide ochraceous-buff tips, the black subterminal marks restricted to the outer webs; remiges fuscous-black, externally margined and tipped with ochraceous-buff, the tips narrow on the primaries and outer secondaries and broad on the inner secondaries; black subterminal bands present on the inner secondaries only; sides of head and chin whitish, with a broad band of crimson extending from the auriculars across the cheeks and upper throat; lores dusky brownish; lower throat, breast, flanks, abdomen, and under tail-coverts pale fawn color, darkest on the breast, flanks, and thighs, and fading to light buff on the lower abdomen; center of abdomen pale Mars brown; bill dark brown; feet reddish brown; iris brown.

Measurements.—Adult male (type): wing, 65; tail, 41; tarsus, 13; culmen from base, 9.5. Adult female: wing, 63; tail, 38; tarsus, 13; culmen from base, 9.5. (In three males of *alexanderi*, culmen from base measures 10–10.5 (10.3); in one female, 10.)

Range.—The lowlands of Kenya Colony (and probably of Tanganyika Territory).

Remarks.—Judging by Van Someren's statement (*Novitates Zoologicae*, vol. 29, p. 146, 1922) that his birds seemed to have browner mantles than specimens from Abyssinia and South Ethiopia; it seems that his series is all *candida*. His birds were collected at Taveta, Simba, Tsavo, Magadi, and Kisumu.

In Kenya Colony *Amadina fasciata alexanderi* ranges at least as far south as the Mweru River (between Mount Kenya and the

Guaso Nyiro). This form was described by Neumann (Bull. B. O. C., vol. 23, p. 43, 1909) from Waram, Hawash River, Shoa, Abyssinia, and therefore this name applies to the paler northern birds of Kenya Colony with which I have compared my specimens of *candida*. My *alexanderi* material consists of three males and one female from the Mweru River.

Parisoma pulpum, sp. nov.

Type.—No. 94842, Museum of Comparative Zoölogy, male in worn plumage, from Gunnal, Portugese Guinea. Collected May 28, 1909, by W. J. Ansorge.

Specific characters.—Similar to *Parisoma plumbeum* but with a much larger, more swollen bill; less white on the wing-coverts and remiges; and the feet pale olive-green as opposed to dark brown in *P. plumbeum*.

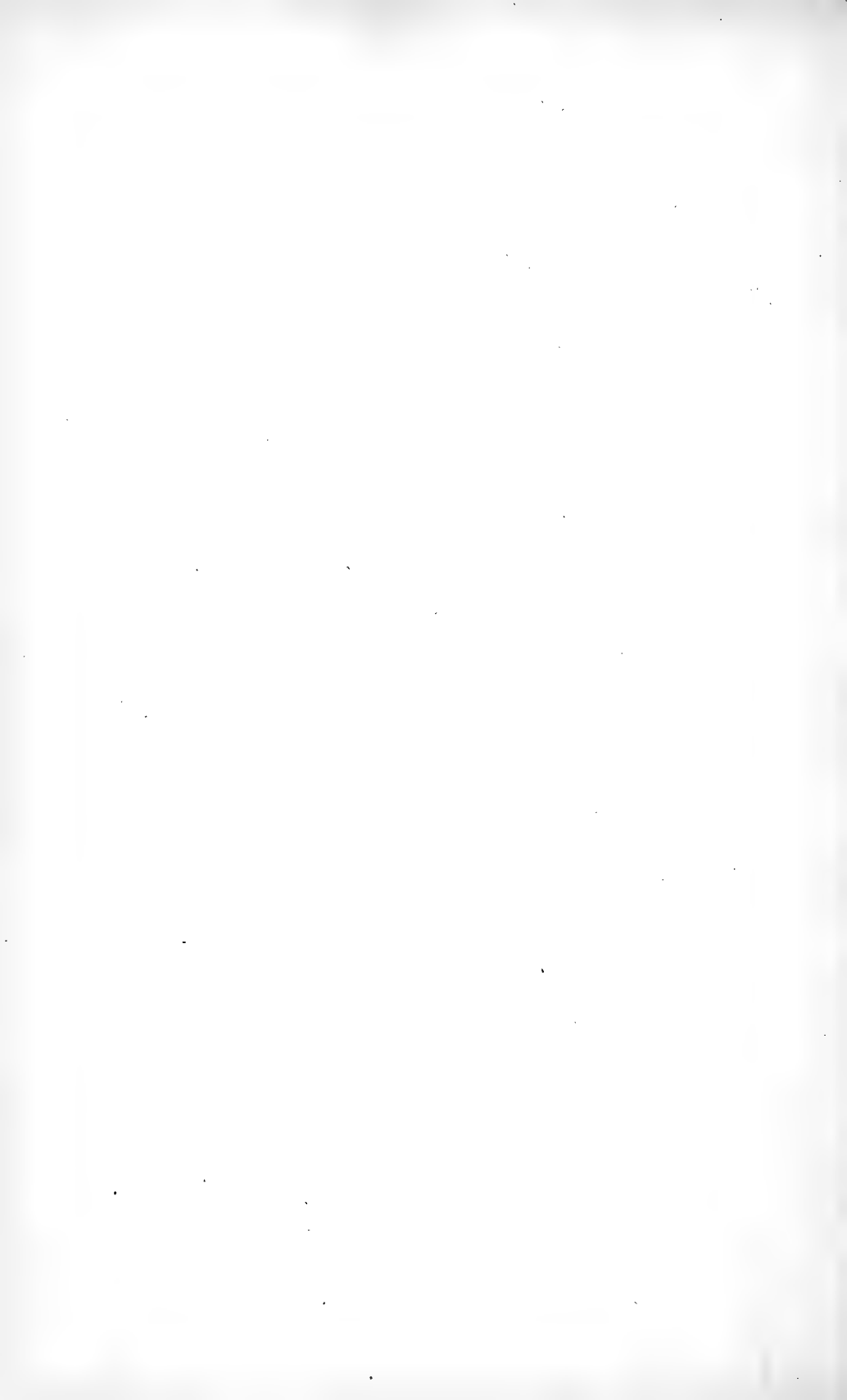
Description of type.—Head, neck, scapulars, interscapulars, back, rump, and upper tail-coverts light neutral gray washed with cinereous, the interscapulars with a brownish tinge; lesser coverts like the scapulars; the middle and greater coverts and the remiges fuscous, the coverts and two outermost primaries externally edged with grayish buff, the rest of the remiges externally edged with whitish; the inner webs of all the remiges broadly margined with white; under wing-coverts whitish; tail dark fuscous, the outermost pair of rectrices white except basally; the second pair very broadly tipped with white, the outer web being white for its distal two-thirds; the next two pairs tipped with white; the middle two pairs without white tips (but the specimen is badly worn); sides of head light neutral gray; lores blackish, margined above and below with whitish, the whitish extending around the eye; chin whitish, streaked with pale neutral gray; throat, breast, and flanks pale neutral gray; belly and under tail-coverts whitish, tinged with light buff; bill greenish gray, the upper mandible darker than the lower; feet pale olive-green; iris dark brown. The colors of the bill, feet, and iris are taken from the collector's notes on the original label and are not distinguishable in the dried skin, but even in the skin the bill and feet are much lighter than in skins of *Parisoma plumbeum*.

Measurements of type.—Wing, 68.5; tail, 66; culmen from base, 15.5; tarsus, 18.

Range.—Known only from the type locality.

Remarks.—This new tit-babbler closely resembles *Parisoma plumbeum*, and the specimen in the Museum of Comparative Zoölogy was labeled as such. The differences in bill and feet are very marked and cannot be considered as pathological in the bird described above. *P. plumbeum* is said to range from the Cape Colony to Portugese Guinea, but I have seen no specimens from anywhere near the latter country. It may be that specimens from that district will all prove to be *pulpum*.

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A NEW MARSH WREN FROM ALBERTA.

BY FRANCIS HARPER.

In June and July, 1920, a series of *Telmatodytes palustris* was collected on the Athabaska Delta by Hamilton M. Laing, J. Alden Loring, and myself, while carrying on field work in behalf of the U. S. Biological Survey and Dr. John C. Phillips. These specimens appear to represent a distinct new subspecies, which may be known as

Telmatodytes palustris laingi,¹ subsp. nov.

ALBERTA MARSH WREN.

Type locality.—Athabaska Delta, Main Branch (9 miles above mouth), Alberta, Canada.

Type specimen.—No. 231790, Museum of Comparative Zoölogy; adult male; collected June 3, 1920, by Francis Harper and J. Alden Loring; orig. no. 142.

Subspecific characters.—Nearest to *T. p. iliacus*, but paler on scapulars, rump, upper tail-coverts, and flanks; median area on forehead and crown more distinct. (*T. p. plesius* is a much browner and duller bird than *laingi*.)

Geographic range.—In summer, Alberta and western Saskatchewan.

Description of type.—Pileum dull black, with a fairly well-defined median area of Dresden brown on forehead and crown; interscapulars black, streaked with white; scapulars buffy brown; rump and upper tail-coverts cinnamon-brown; rectrices buffy brown, the middle pair faintly barred with dusky, the others broadly barred with dull black; wing-coverts buffy brown, the greater faintly barred with dusky; outer webs of tertials dull black, serrated exteriorly with buffy brown; remiges otherwise Chaetura drab, edged with light drab; a narrow superciliary stripe of white, streaked with blackish above and in front of orbit; under parts dull white, passing on sides and flanks into pale buffy brown; breast tinged with light buff; under tail-coverts indistinctly barred with cinnamon-buff.

Measurements.—Type: length (skin), 114; wing, 53; tail, 41; exposed culmen, 13.5; tarsus, 20. Extreme and average measurements of four adult males (including type) from Athabaska Delta: length (skin), 100-114 (106.5); wing, 50.5-54.5 (52.6); tail, 35.5-41.5 (39.8); exposed culmen, 13.5-14 (13.9); tarsus, 19-20 (19.6).

Specimens examined.—ALBERTA: Athabaska Delta, Main Branch (9 miles above mouth), 6;² Athabaska Delta, Egg Lake (15 mi. NW. of Chipewyan),

¹ Named for Hamilton M. Laing, in appreciation of his writings on the bird life of western Canada.

² Biol. Surv., 4; Mus. Comp. Zoöl., 2.

2:¹ Peace River Landing, 1;² Lake Majua, Belvedere, 6;² Edmonton, 4.² SASKATCHEWAN: Last Mountain Lake, 2.²

Remarks.—Specimens from central Alberta have hitherto been referred to *plesius* (Oberholser, Auk, vol. 14, p. 192, 1897) and to *iliacus* (Ridgway, Bull. 50, U. S. Nat. Mus., pt. 3, p. 493, 1904; Preble, N. A. Fauna No. 27, p. 484, 1908; Macoun and Macoun, Cat. Can. Birds, p. 708, 1909).

Intergradation with *iliacus* seems to take place in south central Saskatchewan. Specimens from Last Mountain Lake and Kutawagan Lake are apparently intermediate, two from the first-mentioned locality being nearer to *laingi*, and three from Kutawagan Lake perhaps nearer to *iliacus*. The area of intergradation may coincide with the approximate boundary between the prairies on the east and the plains on the west.

May, June, and July specimens of *laingi* exhibit a much more abraded condition of plumage than do specimens of other subspecies taken during the same months.

So far as known, the Athabaska Delta is the northernmost locality at which any Marsh Wrens breed. In Alberta none have been recorded previously from a more northerly point than Peace River Landing.

I am under obligations to Dr. Jonathan Dwight, to Mr. Outram Bangs, of the Museum of Comparative Zoölogy, and to Mr. P. A. Taverner, of the Victoria Memorial Museum, for the privilege of examining comparative material in the collections under their charge.

Boston Society of Natural History.

¹ Mus. Comp. Zoöl.

² Victoria Mem. Mus.

Occasional Papers
OF THE
Boston Society of Natural History.

**THE CRANE-FLIES (TIPULIDAE) OF NEW ENGLAND:
SECOND SUPPLEMENTARY LIST.**

BY CHARLES P. ALEXANDER.

MR. JOHNSON'S "Diptera of New England" (Occas. Papers Boston Soc. Nat. Hist., vol. 7, no. 15, p. 1-326, 1925) furnished the basic list of Tipulidae for the New England States with 264 species. My first supplement (Occas. Papers Boston Soc. Nat. Hist., vol. 5, p. 169-174, 1925) added 13 species to this list. As a result of further detailed collecting during 1926, it is now possible to add 13 more species to this list, bringing the known total to 290. In the present paper I wish to discuss these additions; to briefly outline the late summer Tipulidae of Mount Desert (New England Area 8); and to describe the two novelties that are discussed in the list of additions.

ADDITIONS TO THE TIPULIDAE OF NEW ENGLAND.

278. *Dicranomyia lacroixi* Alex. (Ent. News, vol. 37, p. 46, 1926).

Rochester, Plymouth Co., Mass., on cranberry bog, July 9, 1924 (*D. S. Lacroix*).

279. *D. cramptoni* Alex. (Ent. News, vol. 37, p. 47, 1926).

Fish hatchery, near Sunderland, Franklin Co., Mass., altitude 200 feet, October 15-16, 1924 (*G. C. Crampton and C. P. Alexander*).

280. *D. spinifera*, sp. nov.

Abundant specimens from New York and New England, as indicated under the type description (p. 229). This species had been confused with *D. halterata* O. S., but a study of the types of the latter shows the present species to be very distinct.

The only authentic specimens of *halterata* from New England seem to be those I recorded in the first supplementary list (Lake May, Mass., June 12-30, 1925).

281. *Limonia macateei* (Alex.) (Can. Ent., vol. 48, p. 42, 1916).

One female, Charlemont, Franklin Co., Mass., August 12, 1925. I follow Mr. Edwards, the late Dr. Bergroth, and others, in placing in *Limonia* those species of the genus *Dicranomyia* with the long subcostal vein.

282. *Dicranoptycha septemtrionis* Alex. (Psyche, vol. 33, p. 56, 1926).

Greenfield Mt., Franklin Co., Mass., August 23–September 6, 1925. One additional specimen was taken on the Holyoke Range, south of Amherst, Mass., October 3, 1926, where it was associated with a characteristic autumnal tipulid fauna: *Dicranomyia immodesta* O. S., *Dicranomyia spinifera*, sp. nov., *Limonia indigena* (O. S.), *Rhipidia maculata* Meig., *Discobola argus* (Say), *Ormosia deviata* Dietz, *O. nigripila* (O. S.), *Cladura flavoferruginea* O. S., *Tipula unifasciata* (Lw.) (the commonest species, especially the females, which were noted ovipositing in the thick leaf mold along the trail), *T. unimaculata* (Lw.), *T. algonquin* Alex., *T. fragilis* Lw., and *T. ultima* Alex. All of the above frequented the high, relatively dry mountain ridge, with no streams and but little water.

283. *Limnophila* (*Ephelia*) *solstitialis* Alex. (Bull. Brooklyn Ent. Soc., vol. 21, p. 109, 1926).

The New England records in Johnson's List have been indicated in the original description. The fly occurred in small numbers at Orient Springs, near Amherst, Mass., July 17, 1926, and on the following day on the slopes of Mt. Toby, Franklin Co., Mass.

284. *Limnophila* (*Phylidorea*) *auripennis* Alex. (Bull. Brooklyn Ent. Soc., vol. 21, p. 113, 1926).

A paratype was from Mt. Kineo, Maine, August 17, 1913 (*C. P. Alexander*). Other New England specimens are in the Boston Society Collection.

285. *L. (P.) fratria* O. S.

Bar Harbor, Mount Desert, Maine, June 3, 1919 (*C. W. Johnson*).

286. *L. (P.) platyphallus* Alex. (Bull. Brooklyn Ent. Soc., vol. 21, p. 111, 1926).

Lake May, Berkshire Co., Mass., in sphagnum bog, altitude 1500 feet, July 1, 1925 (*C. P. Alexander*); holotype. Orono, Penobscot Co., Maine, June 6, 1913 (*C. P. Alexander*); paratype.

287. **Ormosia megacera** Alex. (*Can. Ent.*, vol. 49, p. 26, 1917).

Canada Brook, Echo Lake, Mount Desert, September 1, 1926 (*C. P. Alexander*). The conditions under which this fly was taken are discussed in the second part of this paper.

288. **Erioptera (Erioptera) furcifer** Alex. (*Bull. Brooklyn Ent. Soc.*, vol. 14, p. 108, 1919).

Amherst, Mass., July 26, 1926 (*Kenneth Salman*). Two other species of the *chlorophylla* group (*chlorophylloides* Alex. and *subchlorophylla* Alex.) may be expected in New England, though not yet recorded.

289. **Tipula concava** Alex. (*Ent. News*, vol. 37, p. 294, 1926).

Paratype, ♂, Winnipauk, Conn., June 16, 1909 (*C. W. Johnson*).

290. **T. tennesa** Alex. (*Can. Ent.*, vol. 52, p. 226, 1920).

Cohasset, Mass., October 20 (*Owen Bryant*); Faneuil, Mass., 1904 (*A. P. Morse*).

(58). **Molophilus soror**, sp. nov.

This species was erroneously determined by myself (Cornell Univ., Agr. Exper. Sta., Mem. 25, p. 906, 1919) as being *M. comatus* (Doane), and was so recorded by Mr. Johnson in his New England list. The species is discussed on p. 231 of the present paper.

MOUNT DESERT, MAINE, AUGUST 26–SEPTEMBER 12, 1926.

Through the great kindness of Dr. and Mrs. H. T. Fernald, Mrs. Alexander and I were able to spend three weeks at the Fernald home, near Southwest Harbor. The collections of crane-flies made on the western half of Mount Desert during this period are very rich and representative of the late summer and early autumnal fauna of the island. Approximately a score of species were added to the island list.

Collections were made in favorable situations at and near Southwest Harbor, and on all of the mountains west of Somes Sound. Special attention was devoted to the arborvitae swamps which are so characteristic of the low-lying portions of the island. The extensive swamp along Canada Brook, the southern inlet of Echo Lake, may be briefly discussed as being typical of numerous

similar areas throughout the region. The dominant tree is arborvitae, with much balsam, yew, red maple, and yellow and white birches at slightly higher levels. Among the shrubs, alder is dominant. The hollows are densely carpeted with sphagnum, and the stream flowing through the swamp is partly choked in places with *Chrysosplenium*. On the slightly elevated hummocks occur the numerous remnants of characteristic spring flowers, notably twinflower, goldthread, star flower, bunchberry, and sarsaparilla. The crane-flies were swept in great numbers from the rank growth of yew, balsam, and herbage. Species in the accompanying list that were taken in the above swamp are indicated by "Swamp."

In places there are very old bogs, where a dense growth of larch, balsam, and spruce forms the bulk of the vegetation. There is much sphagnum in the hollows. Species from situations such as this are indicated by the word "Bog."

Along the Beech Hill Road, on the eastern foot of Beech Mountain, is a broad rocky gorge that produced certain crane-flies that were not found elsewhere. The forest cover of the gorge is almost entirely yellow birch, with smaller balsams and much yew. A small stream flows through the gorge, and most of the crane-flies taken were swept from the vegetation along this stream or from the rocky cliffs nearby. Species from this locality are indicated by the word "Gorge."

A small swale lying between Norwood Cove and the village center of Southwest Harbor yielded a few species that were found nowhere else. A small sluggish stream flows through the swampy area, with a few alders and dense growths of *Impatiens biflora*, *Polygonum sagittatum*, *Scirpus* sp., *Carex* sp., etc. Species from this situation are indicated by the word "Swale."

Rhipidia (Rhipidia) maculata Meig. Generally distributed along the trails, in swamps and bogs, and on the slopes of Western Mountain to 970 feet, August 26–September 8.

Discobola argus (Say). Very common and widely distributed throughout the coniferous belt, ascending to the wooded summit of Western Mountain, August 26–September 12.

Geranomyia (Geranomyia) canadensis (Westw.). One, shores of Echo Lake, September 4.

Dicranomyia immodesta O. S. Common in the swamps and in wet places along the trails, September 1–8.

D. stulta O. S. Along a small stream near Fernald Cove, August 26 (M. M. Alexander); Gorge, September 12. Two specimens only, very much darker in color than the summer specimens, the mesonotal praescutum being almost uniformly shiny black. At first I thought these represented an undescribed species, but from the hypopygial characters they must be referred to *stulta*.

D. profunda Alex. A fully colored individual at Echo Lake, August 29; teneral specimens at Long Pond, September 8. The uncolored specimens are light green, with the femoral tips only slightly darkened. The species is characteristic of higher and drier situations than are some of the allied forms.

D. spinifera, sp. nov. Not uncommon in the swamps and along wet places, August 31–September 8; Gorge, September 10–12.

Limonia globithorax (O. S.). Swamp, September 1.

L. parietina (O. S.). Gorge, September 10.

L. immatura (O. S.). One ♂, flew from a cranny of the cliffs in the gorge, September 12. It is very small, but I cannot find any other tangible differences between it and *immatura*. It is very possible, moreover, that *immatura* is not specifically distinct from *cinctipes* (Say).

L. solitaria (O. S.). Swamp, September 1.

L. triocellata (O. S.). Swamp, September 1.

L. tristigma (O. S.). Swamp, September 1–10, common.

L. indigena (O. S.). Along trails, September 1.

Ula paupera O. S. Evergreen woods, September 11.

Pseudolimnophila contempta (O. S.). Swamp, August 29.

P. noveboracensis (Alex.). Common in swamps, September 1–4.

Limnophila brevifurca O. S. Swamp, 1 ♀ only, September 4.

L. lenta O. S. Swamp, August 26–September 11; Gorge, September 10–12.

L. (Ephelia) solstitialis Alex. Swamp, September 1.

L. (Dicranophragma) fuscovaria O. S. Swamp, August 29–September 1; very small but apparently conspecific.

L. (Prionolabis) munda O. S. Gorge, September 10–12.

Adelphomyia americana Alex. Swale, September 1–10; Swale, September 11; Gorge, September 12.

A. cayuga Alex. Swale, August 30–September 11.

Pedicia albivitta Walk. Trail, August 30; Swamp, September 1.

Tricyphona inconstans (O. S.). Swamp, August 29–September 10.

T. autumnalis Alex. Swamps, very common, August 29–September 10.

Amalopina flaveola (O. S.). Very common in the swamps and bogs, August 26–September 10.

Rhaphidolabis (*Rhaphidolabis*) *tenuipes* O. S. Swamp, August 26–September 10.

R. (R.) rubescens Alex. Swamps, September 8–10; Gorge, September 10–12.

R. (R.) cayuga Alex. Swale, August 30–September 11.

Cladura (*Neocladura*) *delicatula* Alex. The commonest species in the gorge, September 10–12.

Gonomyia (*Gonomyia*) *bidentata* Alex. One of the commonest and most characteristic species in the swamps, August 29–September 10; Bogs; Gorge, September 10–12.

Erioptera (*Empeda*) *stigmatica* (O. S.). Swamp, August 29.

Molophilus pubipennis (O. S.). Swamps, August 26–September 10; Swale, September 11. Some of the males are unusually dark in color.

M. soror, sp. nov. The occurrence of this species is discussed under the specific diagnosis (p. 231); Swale, September 11.

Ormosia nubila (O. S.). Lake shores, September 4; on Western Mountain to 600 feet, September 8.

O. luteola Dietz. Swamps, September 1–4; Bogs, August 28–September 8.

O. pygmaea (Alex.). Bogs, September 4–10; Swamp, September 1.

O. deviata Dietz. Swamp, September 1; Bogs, September 4; Swale, September 11.

O. rubella (O. S.). Swamp, August 29–September 10; margins of bogs and along trails, September 4–10.

O. nimbipennis Alex. The commonest *Ormosia* on the island at this season, occurring in swamps, bogs, and along trails, August 25–September 12; found in small dancing swarms beneath the evergreens; ascends Western Mountain to 600 feet.

O. monticola (O. S.). Swamps and bogs, August 26–September 10.

O. megacera Alex. Swamp, one ♂, September 1.

Oropeza sp. One ♀ not specifically determined; trail, August 31.

Nephrotoma brevioricornis (Doane). One ♂, in bog, September 5.

Tipula umbrosa Lw. Common in the swamps and along wet places near trails, August 28–September 10.

T. mainensis Alex. On higher land, along trails and on lower slopes of mountains, August 28–September 10.

T. fragilis Lw. One small ♂ of what appears to be this species; Western Mountain, on wet cliffs, 850 feet, September 8.

T. hermannia Alex. Along trails, August 27–September 8; among the boulders in Valley Cove at low tide, September 3; in spider's web, Swamp, September 1.

T. trivittata Say. Females only, Gorge, September 12.

T. ultima Alex. In numbers along the trails, the first of the season on September 8, very common on the 12th.

T. (Cinctotipula) algonquin Alex. Common and very characteristic of the lower slopes of the mountains, flying about among the *Juniperus*; Flying Mountain, August 27; Western Mountain up to 700 feet, September 8.

Besides the Tipulidae mentioned, *Bittacomorpha clavipes* (Fabr.) and *Ptychoptera rufocincta* O. S. (Ptychopteridae) occurred in the swamps, September 1–4.

DESCRIPTIONS OF NEW SPECIES.

Dicranomyia spinifera, sp. nov.

Allied to *D. halterata* O. S.; head gray; mesonotal praescutum brownish yellow with three confluent dark brown stripes, the surface sparsely pruinose; pleura pruinose, the sternopleurite darkened; halteres and abdomen elongate; wings with Sc_1 longer than $m-cu$; caudal margin of the ninth tergite of the male hypopygium with a deep V-shaped notch; a single spine on rostrum of ventral dististyle; anal tube with a conspicuous group of seven or eight spinous setae.

Male.—Length 7.5–8 mm.; wing 7.8–8 mm.

Female.—Length 8.5 mm.; wing 8.5 mm.

Rostrum and palpi brownish black, the former pruinose. Antennae black throughout; flagellar segments oval, the verticils slightly longer than the segments. Head light gray.

Pronotum dark brown, gray pruinose. Mesonotal praescutum brownish yellow with three confluent darker brown stripes, the scutal lobes similarly colored; median area of scutum and the scutellum paler; postnotum pruinose. Pleura pale, sparsely pruinose, the postnotal pleurotergite and the anterior sternopleurite dark brown, pruinose. Halteres elongate, pale, the knobs dark brown. Legs with the coxae yellow, very sparsely pruinose; trochanters pale; femora brownish yellow, darkening outwardly; tibiae and tarsi gradually passing into dark brown. Wings with a pale brown tinge, the stigma a trifle darker; veins dark brown. Venation: Sc_1 ending opposite the origin of Rs , Sc_2

removed from the tip of Sc_1 , the latter longer than $m-cu$; R_s in alignment with R_{2+3} , about one-half longer than the basal deflection of R_{4+5} ; cell 1st M_2 relatively small; $m-cu$ variable in position, usually before the fork of M .

Abdominal tergites dark brown, the sternites more yellowish, especially the basal segments; hypopygium reddish brown. Male hypopygium with the caudal margin of the ninth tergite with a deep V-shaped notch, the lateral lobes conical, darkened, setiferous. Basistyle with the ventro-mesal lobe large, appressed to the mesal face. Ventral dististyle relatively small, the rostrum stout, bearing a single spine. Dorsal dististyle slender, strongly curved, the tip acute. Mesal lobe of each gonapophysis slender, gently curved, the tip blackened. Anal tube with a conspicuous group of about seven or eight strong spinous setae.

Range.—Northeastern North America.

Holotype, male, Whately Glen, Franklin Co., Mass., altitude 250 feet, October 4, 1925 (*Alexander*). *Allotype*, female, Mt. Toby, Mass. September 15, 1925 (*Alexander*). *Paratopotypes*, numerous alcoholic specimens (*Crampton*); *paratypes*, Orient Springs, Hampshire Co., Mass., altitude 375 feet, September 18, 1925; Holyoke Range, Hampshire Co., Mass., altitude 700 feet, October 3, 1926; Halifax Gorge, Vermont, September 6, 1925; Mount Desert, Maine, August 31–September 8, 1926; Gloversville, New York, altitude 900 feet, August 31–September 1, 1925 (*Alexander*).

Dicranomyia spinifera has been confused in collections with *D. halterata* O. S., and it is probable that all late summer and autumnal records for the latter in northeastern North America really pertain to the present species. The fly is very common in shaded places and may be swept in numbers from the ferns and other rank herbage late in the season.

Molophilus soror, sp. nov.

General coloration brownish gray; wings whitish, the costal margin conspicuously yellowish; a brown seam along vein Cu_1 and a cloud on $m-cu$ and the basal section of M_{3+4} .

Female.—Length 4–5 mm.; wing 5–6 mm.

Rostrum dark gray, the palpi black. Antennae short, brownish black, the first segment pruinose; basal flagellar segments subcylindrical, passing into elongate oval, the outer segments smaller. Head yellowish gray.

Pronotum dark. Lateral pretergites narrowly whitish. Mesonotal praescutum brownish gray, paler laterally; humeral triangles usually a little brightened; interspaces between the three usual stripes appearing as narrow darker brown vittae; pseudosutural foveae elongate, transverse, black; scutum grayish brown, the centers of the lobes somewhat darker; scutellum obscure fulvous; postnotum grayish brown. Pleura dark gray. Halteres pale. Legs with the coxae dark, pruinose, especially the fore coxae, the posterior coxae more reddish brown; trochanters reddish brown; femora brownish yellow, the tips narrowly darker brown; tibiae pale brown, the tips narrowly infuscated; tarsi dark brown. Wings whitish, the costal margin and wing-base strongly yellowish; a brown seam along vein Cu_1 ; a brown cloud on $m-cu$ and the basal section of M_{3+4} .

veins dark brown, *C*, *Sc*, and *R* yellowish; macrotrichiae of veins dark brown. Venation: *Sc*₁ ending just beyond *r*; *Sc*₂ far from the tip of *Sc*₁ and only a short distance beyond the origin of *Rs*; inner end of cell *R*₃ lying proximad of cells *R*₄ and *R*₅; vein 2nd *A* relatively long, the outer third gently sinuous, deflected toward vein 1st *A* so that cell 1st *A* is narrowed shortly before its outer end.

Abdominal tergites dark brown, with a relatively sparse vestiture of yellow setae; sternites more grayish brown, the extreme caudal margins of the individual segments narrowly pale. Ovipositor with the valves horn-colored, the tergal valves gently upcurved.

Range.—Maine.

Holotype, female, Southwest Harbor, Mount Desert, September 11, 1926 (*Alexander*). *Paratopotypes*, 50 females; *paratypes*, 4 females, Houlton, Aroostook Co., August 24, 1913 (*Alexander*).

This very interesting species was taken in large numbers in a small swale (described on p. 226) near Southwest Harbor. I at once recognized the fly as being identical with a species I had taken in northern Maine in 1913 and which had earlier (Cornell Univ., Agr. Exper. Sta., Mem. 25, p. 781, 906–907, 967, 1919) been tentatively identified as being *Molophilus comatus* (Doane). In 1913 only a few specimens were secured and these all proved to be females. With this knowledge available, a special and very detailed effort was made to locate the male sex, but despite these efforts all of the more than one hundred specimens seen proved once more to be females. The very great abundance of the species over a restricted area renders it improbable that the males had appeared earlier and that their flight period was over. Working on the possibility that there might be here a case of subapterism in the male sex, I made a critical search on the moist earth of the swale but without results. The condition of fully winged females and subapterous males is very rare in the Diptera, as, indeed, throughout the insect world. There remains the possibility that the species is parthenogenetic, but such a condition could not be proven without breeding the species.

All records for *Molophilus comatus* (Doane) from New England should be deleted and the present species added in its place. The fly is readily told from all other eastern species of the genus by the spotted wings.

The holotypes of the two new species described at this time are in my collection, and paratypes are in the collection of the Boston Society of Natural History.

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Occasional Papers
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NOTES ON *THECAMOEBA VERRUCOSA* EHRENBERG.

BY MILTON F. CROWELL.

ON December 4, 1923, the writer noticed a small patch of moss growing on the interior sill of the insectary of the Department of Entomology of the University of New Hampshire, at Durham, N. H. This building is a small glass house, built like a greenhouse. The foundation is of concrete, on top of which the sill, a wooden "two by four," is laid, and the frame of the house is built on the sill. The walls are window frames resting on the sill, and fastened to the frame by bolts. The moss was growing on the sill, inside of the house.

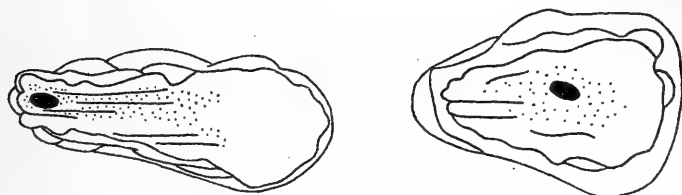


FIG. 1.—*Thecamoeba verrucosa* Ehrenberg, from Durham, N. H. Two views of the same specimen, greatly enlarged.

This moss was taken to the laboratory and moistened with distilled water. A slide was prepared for microscopic examination from moisture squeezed from the wet moss.

The only form observed, of which the writer has a record, was *Thecamoeba verrucosa* Ehrenberg.

F. L. Landacre (1908, p. 427) records this species as occurring on aquatic plants from logs in the Basket Factory Cove, Sandusky Bay, Ohio. In this cove a great deal of timber was floating. According to Leidy (1879, p. 54-55), *Thecamoeba verrucosa* is "very common, found almost everywhere with moisture and algae." He "found it in the ooze of ponds, ditches, and river shores, in the mud of marshes, in wet sphagnum, among the confervae of fountains and dripping rocks, and in company with Rotifers, about the roots of mosses, in the yard attached to my house." He records it from Pennsylvania, New Jersey, Rhode Island, Con-

necticut, Maine, Nova Scotia, Colorado, Wyoming, and Utah. H. W. Conn (1905, p. 14, and pl. 1, fig. 5-6) records and figures this species from Connecticut, but does not give the habitat in which he found it. C. H. Edmondson (1918, p. 220) states that its habitat is sphagnum swamps. A. A. Schaeffer (1923, p. 179) records it from an old abandoned cistern in Key West, Florida.

From these records, it would appear that *Thecamoeba verrucosa* Ehrenberg is a widely distributed rhizopod, and one having considerable range of habitat. The writer believes that his discovery of the species in what was an apparently unusual location, namely inside of a building, may be of interest.

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*Bureau of Plant Industry,
North East, Pa.*

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BIRDS FROM MARATUA ISLAND, OFF
THE EAST COAST OF BORNEO.

BY OUTRAM BANGS AND JAMES L. PETERS.

DR. ERIC MJÖBERG, the well-known Swedish naturalist, recently undertook an expedition to Borneo to engage in general collecting. Through the generosity of Dr. Thomas Barbour, certain of the major groups of vertebrates, including the birds, were secured for the Museum of Comparative Zoölogy.

From February 27 to March 23, 1926, Dr. Mjöberg was on Maratua Island, where he secured 112 birds belonging to 16 species, 7 of which we describe as new. Although Dr. Mjöberg neglected to note the date of capture on the labels of his specimens, nevertheless we have been able to deduce the approximate date by tracing the sequence of the original numbers.

So far as we have been able to ascertain, no birds have been collected previously on Maratua.

There is practically no information to be had concerning Maratua, which lies a short distance off the east coast of Borneo. Dr. Mjöberg writes that it is a horseshoe-shaped coral island, heavily forested, and that the surface is covered with sharp limestone blocks alternating with depressions in the ground. Near by is a small island, Kakaban, where no specimens were secured.

The collection, which is rich in novelties, furnishes an interesting field for speculation. Several of the species that we record or describe are identical with, or closely allied to, birds from the Sulu Islands, while others that have no representatives at all in the Sulus are clearly related to Bornean species, but differ so trenchantly that we describe them as specifically distinct.

Megapodius cumingii tolutilis, subsp. nov.

One adult female.

Type.—No. 235861, Museum of Comparative Zoölogy, adult female, from Maratua Island. Collected March, 1926, by E. Mjöberg.

Characters.—Similar to *M. c. cumingii* Dillwyn, but darker; much more brownish, less olive above; under parts much darker gray.

Measurements.—Wing, 230; tail, 76; tarsus, 64; bill from base to forehead, 28.

Remarks.—We fully agree with Riley (Proc. U. S. Nat. Mus., vol. 64, 1924, art. 16, p. 6) that *Megapodius cumingii* is badly in need of revision. Our available material is wholly inadequate, but scanty as it is, it indicates the existence of more than one island form in the Philippines. Riley (op. cit.) has already recognized *M. gilbertii* Gray for the Celebesian form of *cumingii*, and some years ago Sharpe (P. Z. S. 1875, p. 111) pointed out that the plate of *M. cumingii* (P. Z. S. 1851, pl. 39) was drawn from the bird from Labuan Island, which he named *lowi*, restricting *cumingii* to the Philippines.

Caloenas nicobarica (Linné).

One male; two females.

The male is peculiar in having extensive white bases to the primaries; on the third this color extends along the outer web to about the point reached by the primary coverts. A female from Lighthouse Island, Apo Reef, P. I., in the M. C. Z. collection exhibits this peculiarity to a lesser extent.

Numenius phaeopus variegatus (Scopoli).

Three males; one female.

Actitis hypoleucos (Linné).

Two males; two females.

Demiegretta sacra (Gmelin).

Two females; one in normal, the other in white plumage.

These specimens do not differ from examples from Java and the Philippines. There is a possibility that one or more races of the Reef Heron may be recognized on a basis of size, but considerable material will be required to determine this and to allocate the numerous synonyms correctly.

Tanygnathus lucionensis horrisonus, subsp. nov.

Thirteen specimens, both sexes.

Type.—No. 235875, Museum of Comparative Zoölogy, adult male, from Maratua Island. Collected February–March, 1926, by E. Mjöberg.

Characters.—Similar to *T. l. lucionensis* (Linné) but much larger; females with more blue on the head and with the shoulders blacker, thus less differentiated from the males than is the case in true *lucionensis*. Similar also to, and of the same size as, *T. l. talautensis* Meyer & Wigelsw., but sides of head green instead of blue; back and under parts greener and less yellowish.

MEASUREMENTS.

No.	Sex	Wing	Tail	Tarsus	Bill from cere
235875	Male	202	134	21	34
235876	"	192	125	22	31
235877	"	198	131	21	32
235878	"	196	125	19	32
235879	"	197	120	21	33
235887	"	193	133	22	33
235880	Female	191	122	20	28
235881	"	190	123	19	29
235882	"	190	123	20	30
235883	"	188	122	20	29
235884	"	189	128	21	30
235885	"	190	131	21	30
235886	"	185	118	20	29

Remarks.—*Tanygnathus salvadorii* Ogilvie-Grant (Ibis, 1896, p. 562, Mantanani I., northwestern Borneo) is smaller than *lucionensis* and lacks the black shoulders, but is best regarded as a form of the latter. *Tanygnathus heterurus* Salvadori (Ann. Mus. Civ. Genova, vol. 45, 1912, p. 328, origin not definitely known) remains unique and differs from all other known species of the genus in having the under surface of the tail "olivaceo-rufescente" instead of yellowish green.

Muscitrea grisola grisola (Blyth).

Nine specimens: adults of both sexes, and one immature.

Compared with a series from Java, the Maratua Island birds are quite the same in color and size. The bill averages a trifle larger but this difference is altogether too slight to be of any real significance.

Hypothymis aeria, sp. nov.

Ten specimens: adults of both sexes, and one immature male.

Type.—No. 235918, Museum of Comparative Zoölogy, adult male, from Maratua Island. Collected March, 1926, by E. Mjöberg.

Characters.—A distinct species; the male without a black occipital patch and with all the feathers of the crown normal; no black chin spot; a narrow black jugular collar; in color bright blue, with a white belly.

Color.—Adult male. A narrow black frontal band; remainder of upper parts Helvetia blue; throat, chest, and upper breast Helvetia blue, a narrow black crescent between throat and chest; under tail-coverts and belly bluish white, gradually merging into color of chest on lower breast; wings and tail dusky, edged with blue slightly deeper in tone than the blue of the back; bend of wing blue; under wing-coverts white; bill and feet black.

Adult female. Similar to the male but somewhat duller and grayer blue, and lacking the black jugular collar.

MEASUREMENTS.

No.	Sex	Wing	Tail	Tarsus	Bill to base of forehead
235918	Male	75	72	17	15
235919	"	77	73	17	16
235920	"	76	73	18	15
235922	"	73	70	18	15
235923	"	76	75	18	16
235924	"	76	74	18	15
235925	Female	72	70	17	14.5
235927	"	71	69	17	15

Remarks.—The male of the Maratua Island species differs at once from the male of any of the races of *azurea* in not having a black occipital patch, in all the feathers of the crown being normal, and in the black jugular crescent being narrower and less velvety. The female differs from females of *azurea* in having a blue, not a brownish back. From species that in the male lack the black occipital patch, such as *abbotti*, *rowleyi*, and *puella*, the new species differs in having the belly white.

Lalage nigra mitifica Bangs.

One immature male. Wing, 21; tail, 67; bill to base of forehead, 18.

This one specimen, in plumage not unlike an adult female, is large and has a gray back, in both respects agreeing with Philippine birds.

Microtarsus hodiernus, sp. nov.

Seven adults, both sexes.

Type.—No. 235902, Museum of Comparative Zoölogy, adult male, from Maratua Island. Collected February–March, 1926, by E. Mjöberg.

Description.—Head all round and throat shining black, with greenish reflections on crown and purplish on throat; upper parts, wing-coverts, and outer webs of secondaries slate color; rump and upper tail-coverts slate gray, the long feathers of rump with black bases, which show through as black mottling when the feathers are disturbed; chest and breast slate color; belly and under tail-coverts pale slate gray; primaries and their coverts wholly black; under wing-coverts slate gray; tail slate gray at base and at tip, black in the middle; under side of three outer rectrices slate color.

Size large, larger than in *M. atriceps atriceps* (Temm.) of India and the Sunda Islands. (The wing in birds from India and Borneo measured by us, varies from 76 to 78 mm.).

MEASUREMENTS.

No.	Sex	Wing	Tail	Tarsus	Bill to base of forehead
235902	Male	82	70	16	17
235903	"	81	70	17	16
235904	"	85	68	17	16
235905	"	84	67	17	16
235906	Female	83	73	17	16
235907	"	83	71	17	17
235908	"	85	76	17	16

Remarks.—At first sight the form of Maratua Island appears so different in color from *Microtarsus atriceps atriceps* (Temm.) as to need no comparison with that bird, but it must be borne in mind that *atriceps*, in a part of its Indian range only, shows a color variant—*M. cinereoventris* (Blyth)—in which gray replaces the yellowish of breast, upper abdomen, hind neck, and sometimes the upper back; however, the rump, the upper and under tail-coverts, under wing-coverts, tail, and wings remain with the yellowish of the normal plumage. Possibly, therefore, the species *atriceps* carries a latent tendency to vary toward gray, and our wholly black and gray island form, with no yellow whatsoever anywhere in its plumage, is not so fundamentally different as it appears.

The new form differs from *M. chalconcephalus* (Temm.), of Java, in larger size and much darker colors, and in having the tail tipped with gray instead of white.

***Kittacincla barbouri*, sp. nov.**

Thirteen specimens: adults of both sexes, and one immature female.

Type.—No. 235959, Museum of Comparative Zoölogy, adult male, from Maratua Island. Collected March, 1926, by E. Mjöberg.

Characters.—Similar to *K. stricklandi* (Motl. and Dillw.) of northern Borneo, and with a white crown as in that species, but much larger, with much longer tarsus and bigger foot, and with the tail *wholly black*. The female is similar to the male but smaller, and the black portions of the plumage are duller, less glossy black.

MEASUREMENTS.

No.	Sex	Wing	Tail	Tarsus	Bill to base of forehead
235959	Male	108	149	32	23
235961	"	106	144	31	22
235962	"	105	150	32	23
235964	"	112	142	31	21
235966	"	105	143	31	22
235967	Female	98	114	29	21
235968	"	96	115	30	21
235969	"	94	114	29	19
235970	"	96	112	29	20
235971	"	100	112	30	21

Remarks.—The shama of Maratua Island, besides being much larger than *stricklandi*, differs from it conspicuously in having the three outer pairs of rectrices black instead of white. The one immature female (M. C. Z. No. 235972), however, has some slight grayish-white freckling on the three pairs of outer rectrices, and one adult male (M. C. Z. No. 235966) has similar freckling on all three outer feathers on one side of the tail and on one feather on the other side. This condition of the tail in two examples cer-

tainly suggests reversion to a white-tailed ancestor and indicates that the black tail of the island form is a recently acquired character.

It gives us much pleasure to name this fine shama for our colleague, Dr. Thomas Barbour, to whose generosity and foresight the Museum of Comparative Zoölogy is indebted for the collection from Maratua Island.

Artamus leucorhynchos leucorhynchos (Linné).

Three adults—one male and two females.

Cinnyris sperata (Linné).

One adult male; two adult females.

Comparison with a series of ten adult males from the Philippines reveals no characters on which we can base a separation. In the absence of Philippine females suitable for comparison, we are unable to comment on the two adults of that sex sent in by Mjöberg from Maratua Island.

Cinnyris hasselti (Temm.) of Borneo is a very different species and requires no comparison.

Anthreptes malacensis mjobergi, subsp. nov.

Twenty-eight specimens: adults and immatures, both sexes.

Type.—No. 235952, Museum of Comparative Zoölogy, adult male, from Maratua Island. Collected March, 1926, by E. Mjöberg.

Characters.—Adult male: similar to that of *A. m. borneensis* Riley, of northern Borneo, but much larger; cheeks and postocular region without a trace of olivaceous but nearly concolor with throat; maroon on wing-coverts and scapulars deeper and more extended; yellow of under parts more intense. Similar also to *A. m. wigelsworthi* Hartert, of the Sulu Islands, but slightly larger; much brighter yellow below; and lacking the broad olive edges of the secondaries. Adult female: similar to the female of *borneensis*, but larger, and with the median under parts more brilliantly yellow.

MEASUREMENTS.

No.	Sex	Wing	Tail	Tarsus	Bill to base of forehead
235930	Male	75	49	18	22
235935	"	70	50	19	21
235943	"	71	51	19	21
235947	"	73	53	19	22
235948	"	71	52	19	21
235950	"	72	51	20	23
235951	"	71	53	20	21
235952 (type)	"	74	52	19.5	21
235953	"	70	53	19	20
235955	"	71	51	18.5	21
235929	Female	66	48	19	20
235934	"	66	46	19	19.5
235946	"	66	45	18	20

Remarks.—One male taken by Mjöberg on Pulu Derawan, an island situated between Maratua and the main island of Borneo, is smaller than birds from Maratua, and agrees wholly in color with Bornean examples.

In six males of *borneensis* from northern Borneo, the wing varies from 64 to 67; and in one female it is 61.

Aplonis panayensis suggrandis, subsp. nov.

Seven specimens, both sexes, all adult.

Type.—No. 235888, Museum of Comparative Zoölogy, adult male, from Maratua Island. Collected March, 1926, by E. Mjöberg.

Characters.—Similar in color to *A. p. strigatus* (Horsf.), of Tenasserim, Java, Sumatra, and Borneo, but much larger with a much heavier bill. Similar also to *A. p. panayensis* (Scopoli), of the Philippines, but larger.

MEASUREMENTS.

No.	Sex	Wing	Tail	Tarsus	Bill to base of forehead
235888	Male	113	78	23	25
235889	"	114	77	24	25
235890	"	111	76	25	24
235891	"	113	75	24	25
235892	Female	109	73	24	25
235893	"	115	81	24	25
235894	"	111	74	24	25

Remarks.—*Aplonis panayensis* is a species of wide distribution in India, Burma, Malay Peninsula, Sumatra, Java, Borneo, the Philippines, and many of the smaller islands. It has a marked tendency to break up into island races whose main criteria are size, color characters being noticeable in only two or three races. The form here described is one of the larger ones. It is larger than *affinis* (*Calornis affinis* A. Hay, Journ. As. Soc. Bengal, vol. 15, 1846, p. 36, Tipperah), whose wing measurement, according to Stresemann (Nov. Zool., vol. 20, 1913, p. 375–377), ranges from 103 to 109 (average 105.9), but it is smaller than *leptorrhynchus* (*Aplonis panayensis leptorrhynchus* Stresemann, loc. cit., p. 375) from Pini Island, whose wing measurement varies from 111 to 116. To neither of these, of course, can it bear any close genetic relationship.

Mjöberg took one female on Pulu Derawan Island. This specimen, with a wing of 107, while smaller than examples from Maratua Island, is so much larger in all particulars than birds from Borneo that we refer it to our new form.

Chibia bracteata suluensis (Hartert).

Three adult males.

This drongo, of which Mjöberg sent three males from Maratua

Island, is quite different from *C. b. borneensis* (Sharpe), and appears very close to, if not identical with, *suluensis* Hartert (Nov. Zool., vol. 9, 1902, p. 441) of the Sulu Islands, which differs from *borneensis* in having longer bill and tail and slightly longer wing.

Our three skins afford the following measurements:

<i>No.</i>	<i>Sex</i>	<i>Wing</i>	<i>Tail</i>	<i>Bill to base of forehead</i>
235895	Male	157	137	38
235896	"	149	126	39.5
235897	"	151	136	38

These figures do not exactly agree with the measurements given by Hartert (*supra*), but the difference is so slight that it might easily be due to the personal equation.

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THE VALIDITY OF *MOLGULA ROBUSTA* (VAN NAME) AS A SPECIES DISTINCT FROM *MOLGULA MANHATTENSIS* (DE KAY).

BY ALFRED M. LUCAS.

THE validity of *Molgula robusta* (Van Name) as a species distinct from *M. manhattensis* (De Kay) is questioned by Hartmeyer (1923). He maintains the former is only a variety of *M. manhattensis*. The purpose of this paper is to record observations that establish *M. robusta* as a valid species.

During the summer of 1925, while I was working at Woods Hole, Mass., a number of simple ascidians dredged from Vineyard Sound were brought into the laboratory. One of these was identified as *M. robusta* (Van Name). A study of its embryology revealed the following facts.

The eggs of *M. robusta* are usually shed at night, probably toward morning. With the eggs and surrounding them is a mucous mass, very viscous, which tends to hold them together in strings. When these strings of eggs and mucus are stirred in the sea water, considerable time is required for the mass to settle to the bottom, a condition not true for the eggs when free from the mucus. It may be that in nature the current, carrying the strings of mucus, is a means of disseminating the eggs. Eggs isolated from the mucus are not adhesive.

The eggs in their development during the first two days show very few obvious changes for the reason that the deep reddish-purple pigment renders them opaque. In two and a half days the epidermal tubes, five in number, push out from the body, but as yet they do not cause an evagination of the tunic. A day later, one of these tubes projects beyond the tunic, and by means of this epidermal tube the embryo becomes attached to the object upon which it is resting, provided attachment has not already been effected by the mucus. The embryos were observed from day to day in their development, and at no time was either a free-swimming larval stage or a statolith or similiar organ noted.

The development of *M. robusta* was compared with that of *M.*

manhattensis. Accounts of the embryology of the latter have been published. Tellkamp (1871), working with this species, observed that the eggs were liberated from the cloacal chamber, and he described their transformation into mammariae, each mammaria subsequently giving rise to a single tadpole larva. Kingsley (1882), working as he supposed with the same species, denies the existence of mammariae and states that the embryos develop in an "ovarian pouch" until the tadpole stage. Van Name (1912, p. 466) has helped to clear the situation by identifying a number of Tellkamp's specimens as *M. manhattensis*. Tellkamp is correct in his first observation that the adult liberates eggs from the cloacal chamber, but development from this point has apparently been confused with other forms. Several points of difference are found between Kingsley's account and recent observations of *M. manhattensis*, but these discrepancies have been satisfactorily cleared by the suggestion of Grave (1926) that the species with which Kingsley worked is *M. citrina*. In addition, Grave gives measurements for the egg and larva and pictures the free-swimming tadpole form of *M. manhattensis*.

At least one statolith is always present in the tadpole of *M. manhattensis*, and this large, black, spherical body persists long after the animal becomes attached. This organ was found still evident in numerous embryos developing in Syracuse watch glasses until 15 days old. In those animals in which the statolith persisted, the siphons were still widely apart, while in animals in which the statolith had disappeared the siphons had moved into the same relative position as that characteristic of the adult.

Thus it is shown that *M. manhattensis* has a free-swimming larval period and a statolith, while *M. robusta* has neither.

Beside the specific differences found in their development, other minor differences distinguish the adult forms of the two species.

M. manhattensis, as pointed out by Van Name (1912), is found most plentifully in shallow water, always attached, and usually to eelgrass, piling, or rocks near the surface. *M. robusta*, on the other hand, is found on sandy or muddy bottoms, unattached, and in deeper water, that is, at depths varying from 60 to 80 feet.

Moreover, *M. manhattensis* is symmetrical, while *M. robusta* is asymmetrical. The asymmetry in the latter is probably brought about during its development and is caused by the movement of the siphons to one side. In this position the siphons are

directed upward since the animal lies upon the side opposite the siphons. In 17 out of 19 cases the animal was found to lie upon its left side.

Another difference between *M. manhattensis* and *M. robusta* is shown by the color of the eggs and ovaries. In the former species they are colorless, while in the latter they are reddish purple. After the eggs of *M. robusta* are shed, the ovaries lose much of their color.

Still another difference is evident in the character of the tunic, that of *M. robusta* being relatively thick as well as entirely opaque, and when viewed from the inside it has a purple color. The tunic of *M. manhattensis* is slightly translucent and is colorless.

According to the observations here presented, *M. robusta* differs sufficiently from *M. manhattensis* in embryology, morphology, and ecology, to justify the classification of the two forms as distinct species.

The classification of animals in the past has usually been based upon adult structures, but that such a basis is inadequate is evidenced by the uncertainty in the classification of these two species of *Molgula*. It is necessary, therefore, that beside the adult form, the complete life history also be considered, and particularly is this true in the ascidians. Here we often find that the factors of evolution have caused a great diversity in the embryology of different species, though the adults may be very similar.

SUMMARY.

1. *M. manhattensis* has a larva with a free-swimming period, while *M. robusta* has not. A statolith is present during this period in the former and absent in the latter.
2. *M. manhattensis* is found attached, while *M. robusta* is unattached.
3. *M. manhattensis* is symmetrical, while *M. robusta* is asymmetrical and tends to lie upon its left side.
4. The eggs and ovaries of *M. manhattensis* are colorless, while those of *M. robusta* are reddish purple.
5. *M. manhattensis* has a relatively thin, translucent tunic, while that of *M. robusta* is relatively thick and opaque.

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A NEW SUBSPECIES OF THE RED SALAMANDER
FROM LOUISIANA.

BY SHERMAN C. BISHOP.

MR. PERCY VIOSCA, JR., of New Orleans, has collected a number of Red Salamanders which are sufficiently distinct from the described forms to deserve subspecific recognition. The specimens were all taken in the vicinity of Bogalusa, La., an area from which *Pseudotriton ruber* has not been recorded. *Pseudotriton montanus flavissimus*, the dwarfed, Coastal Plain derivative of *P. montanus*, has been recorded by Dunn¹ from near Bogalusa, but unlike this subspecies, the salamander here described attains a size scarcely less than that of the typical form. This subspecies is named in honor of the collector:

***Pseudotriton ruber vioscai*, subsp. nov.**

Type.—No. 75057, U. S. National Museum; adult female; collected April 10, 1926. (Pl. 15, fig. 3.)

Type locality.—A spring run 10 miles west of Bogalusa, La.

Description.—The body is stout; the tail comparatively short, comprising only 35 per cent of the total length. There are fifteen costal grooves, excluding an imperfectly developed axial. The ground color of the dorsal surface in the preserved specimen is dull yellowish brown; the lower sides and venter dull yellow, lighter. The entire dorsal surface of the trunk and the tail is marked with large, well-separated black blotches which are irregular in shape but tend to form a fairly regular herringbone pattern in some individuals. On the venter and lower sides, the dark spots are smaller and closer together. There are six and one-half intercostal spaces between the appressed toes in the type. The teeth do not differ materially from those of typical *ruber*.

Measurements of four adult specimens are as follows:

<i>Total length</i>	<i>Head</i>	<i>Tail</i>	<i>Ratio of tail to total length</i>
148 mm. (type)	23 mm.	53 mm.	35
132 mm.	20 mm.	50 mm.	37.8
132 mm.	20 mm.	48 mm.	Tip regenerated
118 mm.	18 mm.	40 mm.	33.9

¹ The salamanders of the family Plethodontidae, p. 293, 1926.

In living specimens the ground color approaches brownish red above, fading on the lower sides and venter to salmon pink. The large dark blotches are very dark brown or black. The head between the eyes, the snout, the throat, the legs, and the sides of head and trunk are flecked with many small whitish spots, which are soon lost in preservatives.

Remarks.—This race is obviously more closely related to typical *ruber* than to the other described subspecies, *nitidus* and *schencki*; the chief distinguishing characteristics being found in color and pattern. In old adults of *P. ruber ruber* the dark pigmented spots are considerably enlarged but tend to fuse, often, in fact, to such an extent that a mottled or marbled pattern is developed (fig. 6). In *P. ruber vioscai* the adults of all sizes are marked above with large dark spots well separated. There is no tendency toward fusion of the spots, and the ground color is sufficiently light to set them off in strong contrast (figs. 1, 3). A single living larva (fig. 2) exhibits the same pattern, which is strikingly different from that found in the larvae of *P. ruber ruber*. Typical *ruber* larvae are marked above with very small black spots closely set on a dull brown ground color (fig. 5). Whether or not the large spots are always present in the larvae of *vioscai* can only be determined by the collection of additional specimens. A single preserved larva in the collection, taken with some adult specimens, is sparsely spotted with small flecks, but may belong to *P. montanus flavissimus*.

This new subspecies differs from the mountain races, *nitidus* and *schencki*, in being considerably larger and in having much larger black spots which extend to the tip of the tail. The ground color also is darker and duller, and white flecks are present on the head, trunk, and legs, as noted above.

A few specimens which may properly be regarded as intergrades between *ruber* and *vioscai* have been noticed. Thus No. 57391, U. S. National Museum, from Mobile County, Ala., is a large spotted individual which seems to be of intermediate character. In fact, in individuals from the Coastal Plain region of both the Gulf and the South Atlantic States, there is a tendency to retain the large pigment spots separately, but never to the extent found in the specimens from Louisiana.

Mr. Viosca has furnished the following field notes.

This Red Salamander has been found only in the longleaf pine region between Bogalusa and Franklinton. It occurs in or adjacent to the val-

leys of small spring-fed streams which dissect this country. The few adults known were taken either by springs under logs or on near-by hillsides. The larvae can be found in spring pools throughout this region and are more noticeable during the late afternoon or during the night when the flashlight is used. During dry weather the adults are difficult to find, but in rainy weather they come to the surface of the ground where they can be found under logs along with such species as *Eurycea gutto-lineata* (Holbrook) and *Plethodon glutinosus* (Green).

Specimens have been taken at the type locality (10 miles west of Bogalusa) as follows: April 10, 1926, 4 adults, 1 larva; February 13, 1928, 2 adults, 1 larva.

New York State Museum,
Albany, N. Y.

EXPLANATION OF PLATE 15.

FIG. 1.—*Pseudotriton ruber vioscai*, subsp. nov. A young adult, actual length 118 mm., photographed from life. From Bogalusa, La., February 13, 1928. Note the light flecks on the head, legs, and sides of body.

FIG. 2.—Same. Larva, actual length 75 mm., photographed from life. From Bogalusa, La., February 13, 1928. The tip of the tail is in the process of regeneration.

FIG. 3.—Same. Old adult, the type, posed and photographed after having been in preservative. Actual length 148 mm. From Bogalusa, La., April 10, 1926.

FIG. 4.—*Pseudotriton ruber ruber* (Sonnini). Young adult in which the dark spots are still fairly conspicuous on a bright red ground color. Actual length 123 mm.; photographed from life. From Voorheesville, N. Y., November 4, 1922.

FIG. 5.—Same. Larva, actual length 88 mm., photographed from life. From Voorheesville, N. Y., April 5, 1924.

FIG. 6.—Same. Old adult, actual length 150 mm., photographed from life. In this the dark spots have largely fused and the ground color has become much darker. From Voorheesville, N. Y., April 27, 1923.

(All photographs by Mr. E. J. Stein.)



BISHOP ON A NEW RED SALAMANDER.

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THE FORMS OF THE ORANGE-BREASTED BUSH-
SHRIKE, *CHLOROPHONEUS SULFUREO-*
OPECTUS (LESSON).

BY HERBERT FRIEDMANN.¹

The Orange-breasted Bush-Shrike is a common, wide-ranging bird of the semi-open forests (*i. e.*, not the true forests) of Africa, and, because of its bright plumage, has been collected in good numbers by many ornithologists. It is a very variable species, both the color and the size characters exhibiting quite a range of diversity. The geographic races are thereby rendered somewhat obscure by the relatively great individual, non-geographic variation, but, on the whole, five forms appear to be valid. In each case, the characters are average ones, and it is therefore not surprising that several investigators have decided against them and recognize no subspecific groups. For example, Gyldenstolpe, Kungl. Sv. Vet. Akad. Handlingr., (3), vol. 1, no. 3, p. 115-116, 1924, and Sclater and Mackworth-Praed, *Ibis*, (10); vol. 6, no. 4, p. 632, 1918, are among those who conclude that the individual is greater than the geographic variation in this bird.

According to Neumann (*Journ. f. Ornith.* (5), vol. 6, no. 2, p. 395, 1899), the type locality of Lesson's *Lanius sulfureopectus* is to be restricted to Senegal, in which case the races are as follows:

Chlorophoneus sulfureopectus sulfureopectus (Lesson).

Range.—Senegal to the Gold Coast and Togoland, east to the Bahr el Ghazal, Upper White Nile districts of the Sudan, the Uelle district of the Congo, and Uganda.

Remarks.—This form has the orange pectoral patch fairly well developed, and differs from all the others in having black auriculars. It may eventually be found to be divisible into a typical western group, and a paler-breasted Ugandan aggregate.

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Chlorophoneus sulfureopectus similis (Smith).

Range.—South Africa from the eastern part of the Cape Province northwards through Pondoland and Natal to the Transvaal and Zululand to Gazaland, Swaziland, and Amatongaland, southern Mozambique.

Remarks.—Auriculars grayish, the orange color on the breast more extensive and more intense than in the nominate form; the forehead and the inner margins of the rectrices orange-yellow.

Chlorophoneus sulfureopectus modestus (Bocage).

Range.—Northern Angola east through the Katanga to the Marungu Plateau.

Remarks.—Like *similis* but with the breast much less suffused with orange; the forehead and the inner margins of the rectrices yellow, not orange-yellow; no black beneath the eyes; auriculars grayish, paler than in any of the other races.

Chlorophoneus sulfureopectus suahelicus (Neumann).

Range.—Eastern Africa from central Mozambique north through Tanganyika Territory to the coastal belt of Kenya Colony (inland to southern Ukamba and, occasionally to Kakamega), north to southern Italian Somaliland.

Remarks.—This race is similar to *similis*, but has the forehead and inner margin of the rectrices as in *modestus*, and averages smaller than the former; wings 83–92 as against 89–99 mm. in *similis*. In this form the greenish wash on the forehead is restricted to the area in front of a line drawn across from the anterior end of the eyes, and usually to a rather narrow band immediately adjacent to the yellow forehead stripe.

Chlorophoneus sulfureopectus fricki, subsp. nov.²

Type.—No. 245461, U. S. Nat. Mus., adult male, from Sadi Malka, Ethiopia. Collected December 21, 1911, by Edgar A. Mearns.

Subspecific Characters.—Similar to *suahelicus* but with the green color on the top of the head much more extensive; in adult males always reaching beyond the middle of eye, and not infrequently as far as the occiput; the pectoral band slightly darker; the yellow frontal stripe wider, brighter and lighter.

²Named in honor of Mr. Childs Frick, the leader of the expedition on which the type and series of this new bird were obtained.

Range.—Southern Ethiopia (Shoa, Arussi-Gallaland, etc.) to northern Kenya Colony, south approximately to the equator.

Remarks.—The birds of the interior of southern Kenya Colony east of the Rift Valley are very variable and are intermediates between this form and *suahelicus*.

Gyldenstolpe (*loc. cit.*) has claimed that the extent of the green color on the forehead and crown is variable and hence not a reliable character. In answer to this I may say that a series of 25 birds from Ethiopia all have this color extending farther back (except in non-adult birds) than in any of a series of *suahelicus* from Mozambique, Tanganyika Territory, and southeastern Kenya Colony.

Key to the Subspecies. (Adult Males Only.)

- A. Auriculars solid blackish.....*sulfureopectus*.
- AA. Auriculars grayish black or grayish.
 - B. Breast with only a slight orange tinge; auriculars gray....*modestus*.
 - BB. Breast with a well-developed orange patch; the auriculars grayish black.
 - C. Frontal stripe and inner margin of rectrices with an orange tinge.
 - similis*.
 - CC. Frontal stripe and inner margin of rectrices pure yellow without orange tinge.
 - D. Green color restricted to the forehead, *i. e.*, not extending beyond the anterior margin of the eyes.....*suahelicus*.
 - DD. Green color extending on to the crown, and occasionally to the occiput.....*fricki*.

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THE TYPE SPECIES OF THE AVIAN GENUS
HARPIPRION.

BY JAMES L. PETERS.

When Wagler erected his genus *Harpiprion* (*Isis*, 1832, p. 1232) he assigned two species to it, *H. cajennensis* [= *Tantalus cayennensis* Gmel.] and *H. plumbeus* [= *Ibis caerulescens* Vieill.]. No type was designated at the time and neither of the included species have a tautonymic name in their synonymy, so the determination of a type species for the genus *Harpiprion* Wagler must be by subsequent designation. This was done eight years later by Gray (*List of Genera of Birds*, 1840, p. 67) who designated as the type '*H. plumbeus* (Temm.)' [= *Ibis plumbea* Temm. = *I. caerulescens* Vieill.] so this species must stand as the type.

The complication in the situation arose the following year when Gray in the second edition of his *List of Genera of Birds* gave (p. 87) '*H. cajennensis* (Gm.) Wagl.,' the other included species, as the type. This second designation appears to have been the one generally accepted since that time. Thus when Reichenbach (*Av. Syst. Nat.*, 1852 (1853) p. XIV) came to subdivide *Harpiprion* he created the genus *Molybdophanes* to receive *Ibis caerulescens* Vieill., keeping *cayennensis* in *Harpiprion*, a proceeding that has been followed ever since. Gray's action in 1840 cannot, however, be superceded, even by his reversing himself in 1841, as he himself had already irrevocably fixed *plumbeus* [= *caerulescens*] as the type of *Harpiprion* the year previous. *Harpiprion* of Wagler, 1832, therefore replaces *Molybdophanes* of Reichenbach, 1853, being of earlier date and with the same type. The only species will therefore stand as

***Harpiprion caerulescens* (Vieillot).**

By reason of this transposition *Tantalus cayennensis* Gmelin is left without a generic name, which, in the absence of any available synonym, may be named

Mesembrinibis, gen. nov.

The type, and only species, is *Tantalus cayennensis* Gmelin which therefore becomes

Mesembrinibis cayennensis (Gmelin).

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A LARK NEW TO SCIENCE FROM SOUTHERN
ETHIOPIA.

BY HERBERT FRIEDMANN.¹

Among the birds collected by the Childs Frick Expedition to Ethiopia and Kenya Colony is a specimen of a lark of the genus *Mirafra* which is so different from any known form that it appears worthy of description as a specific entity. It may be known as

***Mirafra pulpa*, sp. nov.**

Type.—U. S. Nat. Mus. no. 246241; adult male, collected at the Sagon River (north side), southern Shoa, Ethiopia, on May 19, 1912, by Edgar A. Mearns.

Specific Characters.—Nearest to *Mirafra passerina* of South Africa, but much darker, more rufous, less tawny above, and with a shorter, wider, more heavily conical bill, and a shorter, more deeply curved claw on the hind toe than *passerina*. Of the northeast African larks, *M. cantillans* seems to be its closest ally, but *pulpa* has a larger, heavier and longer bill, and is darker above.

Description of Type.—Feathers of the forehead, crown, occiput, and interscapular region fuscous brown margined with Brussels brown; feathers of upper back argus brown with a median fuscous brown streak and with edges of Brussels brown; lower back and upper tail coverts fairly uniform Brussels brown; upper wing coverts bright argus brown with fuscous shaft streaks and pale, light tawny gray margins; primaries dark earth brown, externally margined with bright rufous hazel, narrowly tipped with whitish, internally edged with pale tawny buff, the edgings in neither web reaching the shaft even basally; outer secondaries like the primaries; inner ones more rufescent brown and completely narrowly margined with buffy white; the two innermost remiges argus brown with fuscous shaft streaks which expand basally, and margined more broadly with buffy white; central pair of rectrices dark brown edged with hazel; the outermost pair white except for a basal earth brown smear on the inner webs extending distally along the outer edge of the inner web for about half the length of the feather, the shaft white; the next pair with the outer web almost wholly white, becoming brown next to the shaft, which, like the inner web, is earth brown; rest of tail feathers dark fuscous brown; lores and postocular stripe pale tawny, indistinctly marked off from the cheeks and auriculars which are similarly pale tawny in color but which are finely streaked

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with argus brown; chin and upper throat white; lower throat and breast slightly suffused with tawny and flecked with elongated tear-shaped spots of dark Brussels brown; rest of underparts whitish, lightly washed with pale buff; under wing coverts pale buffy; bill and feet apparently pinkish brown in life; the maxilla darker reddish along the culmen and basally.

Measurements.

Wing	84 mm.
Tail	60.5 mm.
Culmen from the base	14 mm.
Tarsus	22 mm.
Hind toe without claw	7 mm.
Claw	6 mm.

Range.—Known only from the type locality.

Remarks.—The discovery in northeastern Africa of a lark so closely related to a South African species is of zoogeographic interest, especially inasmuch as it is not the only case of its kind. Larks are among the most sedentary of African birds, and consequently are reliable indices of faunal relationships. The similarity between the avifauna of the northeastern and the southern parts of the African continent, as expressed by the larks, may be summarized as follows:

1. *Mirafra passerina* of South Africa has as its nearest relative *M. pulpa* of Ethiopia.

2. *Heteromirafra ruddi* of South Africa is represented in British Somaliland by *H. archeri*, and the genus is unknown elsewhere.

3. The genus *Certhilauda* is represented in South Africa by two species, *curvirostris* and *albofasciata*; in Somaliland by one, *somalica*, and does not occur elsewhere.

4. The genus *Ammomanes* is likewise found only in northern (west to the French Sahara and the Cape Verde Islands) and in southern Africa, being represented in the former region by the species *cinctura* and *deserti*, and in the latter by *grayi*. It is true that *A. cinctura* occurs west to the Cape Verde Islands, but the center of distribution of the genus is in northeastern Africa.

5. *Eremopteryx verticalis* of South Africa finds its nearest relative in *E. signata* of British Somaliland, southern Ethiopia, and adjacent parts of northern Kenya Colony.

6. The genus *Spizocorys* occurs only in South Africa and in Somaliland. In the former region it is represented by three species,—*conirostris*, *starki*, and *sclateri*, and in the latter by one,

obbiensis. It has been suggested that *obbiensis* may be generically distinct from *Spizocorys*, but even so, it would be most closely allied to the latter genus.

I am indebted to Mr. Outram Bangs of the Museum of Comparative Zoölogy for the loan of a specimen of *Mirafra passerina*.

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TWO UNDESCRIBED RACES OF *PHAËTHON*
ÆTHEREUS.

BY JAMES L. PETERS.

COMPARISON of the series of Red-billed Tropic Birds in the Museum of Comparative Zoölogy with a series of six topotypical examples from Bosun Bird Islet, Ascension Island, reveals the presence of two hitherto undescribed subspecies of this bird. It gives me great pleasure to express my thanks to the authorities of the Cleveland Museum of Natural History for the loan of the series from Ascension Island.

Phaëthon æthereus mesonauta, subsp. nov.

Type.—Museum of Comparative Zoölogy no. 238017; adult female, collected at Swan Key, Almirante Bay, Panama, June 3, 1927, by H. Wedel (orig. no. 51).

Subspecific Characters.—Similar to *Phaëthon æthereus æthereus* Linné¹ of Ascension Island, but the greater primary coverts deep black, sometimes tipped, but never edged with white. In the typical form the greater primary coverts present a more frosted appearance and are always broadly edged with white.

Phaëthon æthereus limatus, subsp. nov.

Type.—Museum of Comparative Zoölogy no. 65699; adult male, collected at Tower Island, Galapagos Islands, September 3, 1891, by George Baur.

Subspecific Characters.—Similar to *P. a. mesonauta* but differing from that form as well as from typical *æthereus* in having a longer and more slender bill (67-68 against 60-64 mm.) which in dried skins is yellowish horn color, orange red only on the distal third of the culmen.

Remarks.—I am convinced that the color of the bill in the Tower Island Tropic Bird is of taxonomic value, and is not to be attributed to age, season, or post-mortem change. In a series of twenty-nine specimens of *Phaëthon æthereus* the only two that do not have red bills are two males from Tower Island, which have that organ more slender than any other examples examined. The longest central tail feather of the type of *limatus* exceeds the

¹*Phaëthon æthereus* Linné, *Syst. Nat.*, 1758, 10th ed., 1, p. 134.

longest normal tail feather by 570 mm.; the nearest approach to this record is a length of 510 mm. found in a specimen of *mesonauta* (M. C. Z. 32400) collected on St. Lucia, Lesser Antilles, by John Semper about 1875. Two Tropic Birds taken by Beck on Daphne Island, Galapagos, March 6, 1901, are indistinguishable from birds collected in Caribbean waters and are referable to *mesonauta*.

Material examined.—*Phaëthon æthereus æthereus*, from Ascension Island (4♂, 2♀) and St. Helena Island (2). *Phaëthon æthereus mesonauta*, from Panama: Swan Key (4♂, 3♀); from the Lesser Antilles: Anguilla (2♂), St. Lucia (5); from the Cape Verde Islands: Brava (1♂, 1♀); from the Galapagos Islands: Daphne Island (1♂, 1♀); from the west coast of Mexico: Isabella Island (1♀). *Phaëthon æthereus limatus*, from the Galapagos Islands: Tower Island (2♂).

I have not seen *Phaëthon æthereus indicus* (Hume),² but comparison with this very distinct subspecies is not required. *Indicus* is said to have the black band on the sides of the head nearly obsolete behind the eye, and the bill orange red with the tip and cutting edges of the mandibles blackish.

² *Phaëton indicus* Hume, *Str. Feath.* 4, p. 481, 1876 (Mekran Coast).

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NOTES ON GEOGRAPHIC VARIATIONS IN THE GENUS
MACRONYX WITH DESCRIPTION OF TWO NEW
RACES.

BY HERBERT FRIEDMANN.¹

THE purely African genus of pipits forming the subject of the present note is peculiar in that it contains four species, each of which has a restricted range (*capensis*, *sharpei*, *flavicollis*, and *aurantigula*), one with two spatially distant races (*ameliae* and *wintoni*), and only one form with a very wide, discontinuous distribution. That one, *M. croceus*, is the bird under immediate consideration. While studying the series of this Yellow-throated Long-claw in the Frick, Roosevelt, and Loveridge collections I became aware of the fact that the birds of southeastern Africa were different from those to the north and northwest. This difference was a dimensional one with regard to the bill, the large-billed form being the one found in Natal and adjacent regions of southeastern Africa. No name appears to be available for it, and I therefore propose to call it

Macronyx croceus vulturinus, subsp. nov.

Type.—U. S. Nat. Mus. no. 109591; adult male, collected in Natal, South Africa, by E. H. Richards.

Subspecific characters.—Similar to *M. croceus croceus*, but with the bill noticeably longer, the culmen (in the males) measuring from 17.5 to 21.0 mm. as against 15.0 to 17.5 mm. in the nominate form.

Range.—Natal and adjacent regions of southeastern Africa.

Remarks.—Gyldenstolpe (1924, p. 81) writes that in the Royal Natural History Museum in Stockholm, ‘. . . there are a few specimens of *M. croceus* collected at Port Natal. These agree in color with East and Central African birds but have longer bills, measuring 17–19 mm.’

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Although the birds of East, Central, and West Africa vary greatly among themselves, I do not see how any races can be maintained other than *fülleborni* of northern Nyasaland, Katanga, and Northern Rhodesia, west to Benguella. Thus, Gyldenstolpe (*loc. cit.*) finds that specimens of *croceus* from ' . . . the Central African Lakes District, Uganda, east to Elgon and Kavirondo, are, however, somewhat larger than those from Kenya Colony and Tanganyika Territory . . . ', but he finds that his Congo birds are referable to typical *croceus*, of which he had seen two Senegalese specimens. On the other hand, van Someren (1922, p. 179) writes that ' . . . eastern birds are larger than typical ones . . . examined. More material required.' I have examined a series of some 28 birds from Gaboon, Uganda, Ruanda, Kenya Colony, and Tanganyika Territory, besides *vulturinus* of Natal, and do not find any constant size differences that are correlated with geography.

The races of the Yellow-throated Long-claw may be summarized as follows:

***M. croceus croceus* (Vieillot)**

Senegal, Nigeria, Gold Coast, and Bahr el Ghazal district of the Sudan, south through Cameroon to Gaboon, through the Belgian Congo to the northern part of the Katanga, and through Uganda and Kenya Colony to Ruanda, Tanganyika Territory (except the southwestern part), and Mozambique. Just how far south this race extends is not yet definitely known, but it probably intergrades with *vulturinus* in southern Mozambique and Gazaland.

M. croceus vulturinus

Natal and adjacent parts of the Transvaal, Pondoland, the eastern Cape Province (where, however, it is rare), Zululand, probably Swaziland, and Amatongaland in southern Mozambique, whence, however, I have seen no material.

***M. croceus fülleborni* Reichow**

From the Unika highlands north of Lake Nyasa, and adjacent parts of southwestern Tanganyika Territory, west through the Katanga and Northern Rhodesia to Benguella in Angola. Selater (1930, p. 348) writes that this may be a distinct species

as it is said to occur together with the typical form in the Katanga. This is a point that I cannot decide as I have no material from that region, but a specimen from Nyanza, Belgian Congo (west side of Lake Tanganyika) is somewhat intermediate in nature between *croceus* and *fülleborni*.

Gyldenstolpe (*loc. cit.*) notes that two specimens from Mossamedes differ from all the rest of his series of *M. c. croceus* in lacking the stripes on the sides of the body and the sides of the breast. They are slightly darker on the upperparts than *croceus* and differ from *fülleborni* in having pure yellow underparts. If these characters be found to be constant, the Mossamedes birds will be worth naming as a fourth race. However, it may be noted that I have seen specimens from Ruanda and Uganda that also lacked these stripes, but were pure yellow below. I have assumed them to be slightly intermediate in character between *croceus* and *fülleborni*, but nearer the former. As far as I know there are no *Macronyx croceus* south of Mossamedes (in Damaraland or Namaqualand, or in Bechuanaland to the east) so that on geographic grounds it would be difficult to account for intermediacy in Mossamedes.

Of all the species of the genus *Macronyx* perhaps the least well known is *M. aurantiigula*. This form is of interest in that it serves to connect two such diverse types as *M. croceus* and *M. flavicollis*. Hitherto *M. aurantiigula* has been recorded only from the coastal districts of East Africa from the Pangani River in northern Tanganyika Territory north to Malindi in Kenya Colony, and inland to Lake Manyara and the plains east of Mount Kilimanjaro in Tanganyika Territory and to the Athi River in Kenya Colony. Consequently it was interesting to find that the Childs Frick Expedition procured a specimen in the Tharaka district north of the Tana River, and east of Mount Kenia, an extension of range of some 150 miles. Furthermore, Donaldson Smith collected another many years before on the Tana River, but this record has apparently remained unpublished. His specimen is now in the collections of the Academy of Natural Sciences of Philadelphia, to which institution I am indebted for the privilege of examining it. I have carefully compared these two northern birds with a series of five from

southern Kenya Colony and northern Tanganyika Territory, and find them to be sufficiently different to be worthy of nomenclatural recognition. The northern race may be known as

***Macronyx aurantiigula subocularis*, subsp. nov.**

Type.—U. S. Nat. Mus. no. 246154; adult female, collected in the Tharaka district, Kenya Colony, on August 12, 1912, by Edgar A. Mearns.

Subspecific Characters.—Similar to the typical form, but with the posterior half of the superciliary stripes white instead of yellow and with a band of white running from the bill under the eye just dorsal to the black margin of the yellow throat patch. In the nominate form this area is yellow. In size the two forms are alike.

Range.—Known from the Tharaka district and the Tana River.

Material examined.—*M. a. aurantiigula*, 5 adults; *M. a. subocularis*, 2 adults.

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THE CRANE-FLIES (TIPULIDAE) OF NEW ENGLAND:
THIRD SUPPLEMENTARY LIST.

BY CHARLES P. ALEXANDER.

THE basic list of Tipulidae for New England, as given in Mr. Johnson's 'Diptera of New England' (Occas. Papers Boston Soc. Nat. Hist. 7, no. 15: 1-326, 1925) recorded 264 species of these flies from the New England states. In two supplementary lists (Occas. Papers Boston Soc. Nat. Hist. 5: 169-174, 1925, and *ibid.* 5: 223-231, 1927) I have added 26 species to this total, bringing the list to 290 species. In recent years further collecting has produced a considerable number of additional records which are given at this time and bring the list of Tipulidae to a total of 318. In the present paper, I wish to record these additional forms, to discuss in some detail the crane-fly fauna of Mount Mansfield, highest of the Green Mountains, Vermont, and to describe three novelties included in the list of additions to the list for New England.

ADDITIONS TO THE TIPULIDAE OF NEW ENGLAND.

291. *Tipula hinei* Alex. (Ohio Journ. Sci. 20: 200, 1920).
Mt. Mansfield, Vermont, 2100 feet, June 16, 1927 (*C. P. Alexander*).
292. *Tipula maritima*, sp. nov.
Nantucket Is., Mass., October 1-8, 1925 (*W. S. Brooks*).
293. *Tipula vicina* Dietz. (Ent. News 28: 148-149, 1917).
West branch of the Waterbury R., near Stowe, Vermont, along stream, June 14, 1927 (*C. P. Alexander*).
294. *Cylindrotoma tarsalis* Johnson. (Psyche 19: 2, 1912).
Woodcrest Farm, foot of Mt. Mansfield, Vermont, altitude 1000 feet, June 14, 1927; Bingham Falls, Vermont, June 18, 1927 (*C. P. Alexander*). Norfolk, Conn., September 11-12, 1928 (*G. C. Crampton and C. P. Alexander*).

295. *Limonia (Limonia) novae-angliae* Alex. (Ent. News 40: 44-45, 1929).
Orient Springs, Hampshire Co., Mass., altitude 375 feet, July 20, 1929 (*C. P. Alexander*); Chesterfield Gorge, Mass., August 2, 1928 (*C. P. Alexander*); Manitic Lake, Conn., August 6, 1929 (*C. P. Alexander*).
296. *Limonia (Dicranomyia) gibsoni* Alex. (Can. Ent. 61: 17-18, 1929).
Nantucket Is., Mass., in salt marsh, August 21, 1926 (*C. W. Johnson*).
297. *Limonia (Dicranomyia) iowensis* (Rogers). (Florida Ent. 9: 150-152, 1926).
Amherst, Mass., at trap lantern, October 3-17, 1928 (*C. F. Clagg*); Manitic Lake, Conn., June 8-9, 1929; West Granby, Conn., June 8, 1929 (*C. P. Alexander*).
298. *Limonia (Dicranomyia) uliginosa* Alex. (Bull. Brooklyn Ent. Soc. 24: 27-28, 1929).
Foot of Mt. Mansfield, near Stowe, Vermont, in sphagnum bog, altitude 1000 feet, June 22-24, 1927 (*C. P. Alexander*); Manitic Lake, Conn., in bog, June 8-9, 1929 (*C. P. Alexander*).
299. *Pedicia margarita* Alex. (Bull. Brooklyn Ent. Soc. 24: 300-302, 1929).
Orient Springs, Hampshire Co., Mass., Aug. 9, 1928 (*Alexander, Edwards and Rogers*), July 29, 1929 (*C. P. Alexander*); Bashbish Falls, Berkshire Co., Mass., altitude 900 feet, August 20, 1929 (*M. M. Alexander*).
300. *Tricyphona johnsoni*, sp. nov.
Nantucket Is., Mass., June 25, 1926, June 7-22, 1927 (*C. W. Johnson*).
301. *Tricyphona paludicola* Alex. (Proc. Acad. Nat. Sci. Philadelphia for 1916: 538-540, 1916).
Smugglers Notch, Mt. Mansfield, Vermont, altitude 2100 feet, in sphagnum bog, June 16, 1927 (*C. P. Alexander*).
302. *Rhaphidolabis avis* Alex. (Ent. News, 37: 50-51, 1926).
Becket, Mass., in gorge, July 18, 1928 (*G. C. Crampton*).
303. *Dactylolabis supernumeraria* Alex. (Ent. News, 40: 46, 1929).

Bingham Falls, Vermont, June 18, 1927 (*C. P. Alexander*); Smugglers Notch, Mt. Mansfield, Vermont, altitude 2100 feet, June 15–20, 1927 (*C. P. Alexander*).

304. *Limnophila (Phylidorea) adustoides* Alex. (Bull. Brooklyn Ent. Soc. 22: 63–64, 1927).

Amherst, Mass., at trap-lantern, July 18–19, 1928 (*C. F. Clagg*). Wings slightly darker than in the type.

305. *Limnophila (Phylidorea) luteola* Alex. (Bull. Brooklyn Ent. Soc. 22: 113–114, 1927).

Woodcrest Farm, near foot of Mt. Mansfield, Vermont, altitude 1000 feet, in boggy areas, June 17–20, 1927 (*C. P. Alexander*); Mt. Desert Island, Maine, June 20, 1928 (*K. A. Salman*).

306. *Limnophila (Ephelia) sabrina* Alex. (Bull. Brooklyn Ent. Soc. 24: 189–190, 1929).

West branch of the Waterbury R., near Stowe, Vermont, June 14–29, 1927 (*C. P. Alexander*); Amherst, Mass., June 5, 1924 (*C. P. Alexander*); waterfall, near Winsted, Conn., June 9, 1929 (*C. P. Alexander*).

307. *Limnophila (Dicranophragma) angustula* Alex. (Bull. Brooklyn Ent. Soc. 24: 190–191, 1929).

Orono, Maine, July 8, 1913 (*C. P. Alexander*); Mt. Desert Island, Maine, August 29–September 1, 1926 (*C. P. Alexander*); Amherst, Mass., altitude 275 feet, July 15–25, 1928 (*C. P. Alexander*).

308. *Pilaria vermontana* Alex. (Ent. News 40: 47–48, 1929).

Woodcrest Farm, near Stowe, Vermont, altitude 1000 feet, in boggy areas, June 22–24, 1927 (*C. P. Alexander*); Manitic Lake, Conn., in bog, June 8–9, 1929 (*C. P. Alexander*).

309. *Eriocera gibbosa* Doane. (Journ. N. Y. Ent. Soc. 8: 193, 1900).

Avon Old Farms, Avon, Conn., June 15, 1929 (*C. H. Curran*).

310. *Gonomyia (Gonomyia) currani* Alex. (Can. Ent. 58: 239, 1926).

Becket, Mass., in gorge, July 18, 1928 (*G. C. Crampton*).

311. *Gonomyia (Lipophleps) alexanderi* (Johnson). Psyche 19: 3, 1912).

Near Middlebury, Vermont, June 17, 1927 (*C. L. Farrar*).

312. **Gonomyia (Lipophleps) sacandaga** Alex. (Proc. Acad. Nat. Sci. Philadelphia for 1914: 587-588, 1914).
Near Middlebury, Vermont, June 17, 1927 (*C. L. Farrar*).
313. **Ormosia mesocera** Alex. (Can. Ent. 49: 25, 1917).
Mt. Mansfield, Vermont, altitude 3500 feet, June 16-24, 1927 (*C. P. Alexander*).
314. **Erioptera (Ilisia) laevis** Alex. (Bull. Brooklyn Ent. Soc. 25: 1930, in press).
Amherst, Mass., July 18, 1928 (*C. F. Clagg*); Chesterfield Gorge, altitude 850 feet, August 2, 1928 (*C. P. Alexander*).
315. **Erioptera (Erioptera) ebenina** Alex. (Can. Ent. 58: 237-238, 1926).
Manitic Lake, Conn., in cranberry bog, June 8-9, 1929 (*C. P. Alexander and G. C. Crampton*).
316. **Erioptera (Erioptera) uliginosa**, sp. nov.
Manitic Lake, Conn., in cranberry bog, June 8-9, 1929 (*C. P. Alexander and G. C. Crampton*).
317. **Erioptera (Erioptera) viridula** Alex. (Can. Ent. 61: 20, 1929).
Woodcrest Farm, near foot of Mt. Mansfield, Vermont, in boggy areas, altitude 1000 feet, June 20-27, 1927 (*C. P. Alexander*).
318. **Molophilus paludicola** Alex. (Journ. N. Y. Ent. Soc. 37: 57-58, 1929).
Boggy meadows, near Amherst, Mass., altitude 275 feet, July 15-25, 1928 (*C. P. Alexander*).

CRANE-FLIES OF MOUNT MANSFIELD, VERMONT, AND VICINITY.

In June, 1927, Mrs. Alexander and I spent two weeks at Woodcrest Farm, at the foot of Mount Mansfield, highest of the Green Mountains. Crane-flies were exceedingly abundant and the complete list, as given at this time, adds no fewer than 72 species to those previously known from the State. Official altitudes of stations mentioned are as follows: Woodcrest Farm, A. J. Houston, proprietor, 900 feet; Stowe Fork, 962 feet; Toll House, 1300 feet; Bingham Falls, 1400 feet; Barnes Camp, 1550 feet; Big Spring, 1803 feet; Smugglers Notch, 2162 feet; Lake of the Clouds, 3900 feet; Summit of Mansfield, Nose, 4000 feet, Chin,

4393 feet; Taft Lodge, 3700 feet; Half-way House, 2250 feet; Moss Glen Falls, 1000 feet.

Tanyptera frontalis (O. S.). Smugglers Notch, June 16.

T. fumipennis (O. S.). Bingham Falls, June 18.

Tipula abdominalis (Say). Smugglers Notch, June 18.

T. angulata Lw. Woodcrest Farm, June 17; Bingham Falls, June 18-21.

T. bicornis Forbes. Stream, Waterbury R., west branch, June 14.

T. cayuga Alex. Woodcrest Farm, June 15; Bingham Falls, June 18-21.

T. hermannia Alex. Woodcrest Farm, June 22.

T. hinei Alex. Mount Mansfield, at 2100 feet, June 16.

T. iroquois Alex. Smugglers Notch, June 16; Mansfield, at 2500 feet, June 16.

T. latipennis Lw. Woodcrest Farm, June 15; Bingham Falls, June 21.

T. longiventris Lw. Woodcrest Farm, June 15.

T. monticola Alex. Woodcrest Farm, June 18; Mansfield, Chin, June 16.

T. nobilis Lw. Bingham Falls, June 16-18.

T. noveboracensis Alex. Woodcrest Farm, resting on boulders in Waterbury R., June 20.

T. parshleyi Alex. Woodcrest Farm, along Waterbury R., June 17.

T. senega Alex. Woodcrest Farm, June 15; Bingham Falls, June 18-21; Mansfield, 2000-2500 feet, June 24.

T. sarta Lw. Woodcrest Farm, June 15; Bingham Falls, June 18.

T. strepens Lw. Woodcrest Farm, June 17.

T. tephrocephala Lw. Woodcrest Farm, June 15-22; Bingham Falls, June 18-21.

T. trivittata Say. Woodcrest Farm, June 27.

T. vicina Dietz. Woodcrest Farm, along Waterbury R., June 14.

T. youngi Alex. Woodcrest Farm, June 20.

T. (Trichotipula) orepzoides Johnson. Woodcrest Farm, June 15-18; Bingham Falls, June 18-21; Mansfield, 2000-2500 feet, June 24.

Nephrotoma eucerooides Alex. Woodcrest Farm, Waterbury R., June 14.

- N. ferruginea* (Fabr.). Smugglers Notch, June 18.
N. incurva (Lw.). Smugglers Notch, June 18.
N. lugens (Lw.). Woodcrest Farm, Waterbury R., June 18.
N. tenuis (Lw.). Woodcrest Farm, June 20.
Dolichopeza americana Needh. Woodcrest Farm, June 15;
 Bingham Falls, June 21; Mansfield, 2000–2500 feet, June 24.
Oropeza obscura Johnson. Woodcrest Farm, June 20.
Oropeza venosa Johnson. Woodcrest Farm, June 15; Bingham
 Falls, June 21; Mansfield, 2000–2500 feet, June 24.
Phalacrocerca tipulina O. S. Woodcrest Farm, in bogs, June
 18–20.
Cylindrotoma tarsalis Johnson. Woodcrest Farm, June 14;
 Bingham Falls, June 18.
Liogma nodicornis O. S. Woodcrest Farm, June 14–22; Bing-
 ham Falls, June 18–21.
Antocha opalizans O. S. Woodcrest Farm, along Waterbury
 R., June 25.
Helius flavipes (Macq.). Woodcrest Farm, June 17.
Limonia (Limonia) cinctipes (Say). Smugglers Notch, June 16.
L. (L.) indigena (O. S.). Woodcrest Farm, June 15.
L. (L.) macateei (Alex.). Bingham Falls, June 18.
L. (L.) pubipennis (O. S.). Woodcrest Farm, June 15;
 Bingham Falls, June 16–21.
L. (L.) solitaria (O. S.). Along stream, near Stowe, June 14;
 Bingham Falls, June 21.
L. (L.) triocellata (O. S.). Woodcrest Farm, June 17;
 Bingham Falls, June 18.
L. (Dicranomyia) halterata (O. S.). Moss Glen Falls, June 26.
L. (D.) humidicola (O. S.). (*badia* of authors). Woodcrest
 Farm, June 15.
L. (D.) longipennis (Schumm.). Woodcrest Farm, bog, June
 18–20.
L. (D.) morioides (O. S.). Bingham Falls, June 16–21.
L. (D.) profunda Alex. Woodcrest Farm, June 20; Mansfield,
 3200 feet, June 16.
L. (D.) uliginosa Alex. Woodcrest Farm, in bog, June 18–24.
L. (Rhipidia) maculata (Mg.). Woodcrest Farm, June 15.
L. (Geranomyia) canadensis (Westw.). Woodcrest Farm, June
 27.
L. (G.) rostrata (Say). Woodcrest Farm, June 17–22.

Pedicia contermina Walk. Smugglers Notch, remains in spider's web, June 18.

Tricyphona auripennis (O. S.). Smugglers Notch, June 16.

T. calcar (O. S.). Woodcrest Farm, June 15; Bingham Falls, June 18-21; Smugglers Notch, June 16; Mansfield, 2000-3000 feet, June 16-24.

T. inconstans (O. S.). Woodcrest Farm, June 15-20; Mansfield, 2000-2500 feet, June 24.

T. paludicola Alex. Smugglers Notch, June 16.

T. vernalis (O. S.). Bingham Falls, June 16-21.

Amalopina flaveola (O. S.). Woodcrest Farm, June 17; Bingham Falls, June 21.

Rhaphidolabis (*Rhaphidolabis*) *cayuga* Alex. Mansfield, 2500 feet, June 16-17.

R. (R.) forceps Alex. Woodcrest Farm, June 15; Bingham Falls, June 18-20; Mansfield, 2500 feet, June 16.

R. (R.) rubescens Alex. Woodcrest Farm, June 15-19; Bingham Falls, June 18; Smugglers Notch, June 16; Mansfield, 2000-2500 feet, June 24.

R. (R.) tenuipes O. S. Woodcrest Farm, June 15-20.

R. (Plectromyia) modesta (O. S.). Woodcrest Farm, June 15; Bingham Falls, June 18-21; Mansfield, 2000-3500 feet, June 16-24.

Adelphomyia minuta Alex. Woodcrest Farm, June 15-20.

Ula paupera O. S. Woodcrest Farm, June 15; Mansfield, 2500 feet, June 16.

U. elegans O. S. Bingham Falls, June 16; Mansfield, 2500 feet, June 16.

Epiphragma fascipennis (Say). Woodcrest Farm, June 15; Bingham Falls, June 18; Mansfield, 2000-2500 feet, June 24, 3200 feet.

Dactylolabis supernumeraria Alex. Bingham Falls, June 18; Smugglers Notch, June 16, abundant on cliff faces.

Pseudolimnophila contempta (O. S.). Woodcrest Farm, June 15-22; Bingham Falls, June 18-20.

P. inornata (O. S.). Woodcrest Farm, in bogs, June 17-22.

P. luteipennis (O. S.). Woodcrest Farm, June 17.

P. toxoneura (O. S.). Woodcrest Farm, June 15; Bingham Falls, June 18; Mansfield, 2000-2500 feet, June 24.

Limnophila (*Eutonia*) *alleni* Johnson. Woodcrest Farm, in

boggy areas, June 20–22, in two instances hawked by *Cordulegaster* dragon-flies but not caught by them; still other specimens found caught in spiders' webs.

L. (Phylidorea) adusta O. S. Smugglers Notch, June 18.

L. (P.) auripennis Alex. Mansfield, Chin, June 16, among stunted spruce and balsam.

L. (P.) luteola Alex. Woodcrest Farm, in boggy areas, June 17–20.

L. (Ephelia) aprilina O. S. Woodcrest Farm, June 15; Bingham Falls, June 21.

L. (E.) johnsoni Alex. Woodcrest Farm, June 15, Bingham Falls, June 21.

L. (E.) sabrina Alex. Waterbury R., near Stowe, on rank vegetation along stream, June 14.

L. (Lasiomastix) macrocera (Say.). Woodcrest Farm, June 17.

L. (L.) tenuicornis O. S. Woodcrest Farm, June 15.

L. (Prionolabis) munda O. S. Smugglers Notch, June 16; Mansfield, 2000–2500 feet, June 24.

L. (P.) rufibasis O. S. Woodcrest Farm, June 15; Bingham Falls, June 18–21.

L. (Dicranophragma) fuscovaria O. S. Woodcrest Farm, June 18–22; Bingham Falls, June 21.

L. (Prolimnophila) areolata O. S. Woodcrest Farm, June 15; Bingham Falls, June 18–21; Mansfield, 2000–2500 feet, June 24.

L. brevifurca O. S. Woodcrest Farm, June 15; Bingham Falls, June 16; Mansfield, 3000 feet, June 16.

L. laricicola Alex. Woodcrest Farm, in bogs, June 17–22.

L. subcostata Alex. Bingham Falls, June 18–21; Smugglers Notch, June 16; Mansfield, 3000–3500 feet, June 16.

L. unica O. S. Waterbury R., near Stowe, on rank vegetation near stream, associated with *Limnophila sabrina*, June 14.

Shannonomyia lenta (O. S.). Waterbury R., along stream, June 14–17.

Pilaria stanwoodae (Alex.). Woodcrest Farm, in bogs, June 20–22.

P. vermontana Alex. Woodcrest Farm, in bogs, June 22–24.

Eriocera spinosa O. S. Woodcrest Farm, along the Waterbury R., June 25.

Elephantomyia westwoodi O. S. Bingham Falls, June 15.

Lipsothrix sylvia (Alex.). Woodcrest Farm, June 17; Bingham Falls, June 18–21.

- Gnophomyia tristissima* O. S. Moss Glen Falls, June 26.
- Gonomyia (Ptilostena) mathesoni* Alex. Woodcrest Farm, along Waterbury R., June 14.
- G. (Gonomyia) florens* Alex. Woodcrest Farm, June 15.
- G. (G.) noveboracensis* Alex. Woodcrest Farm, along Waterbury R., June 17; Moss Glen Falls, June 26.
- G. (G.) sulphurella* O. S. Waterbury R., near Stowe, June 14; Woodcrest Farm, June 18-22, in bog.
- G. (G.) subcinerea* O. S. Bingham Falls, June 16.
- Rhabdomastix flava* (Alex.). Waterbury R., near Stowe, along stream, June 14.
- Erioptera (Ilisia) armillaris* O. S. Woodcrest Farm, June 27.
- E. (Mesocyphona) needhami* Alex. Woodcrest Farm, June 18-20 in bog.
- E. (Empeda) nyctops* Alex. Bingham Falls, June 16; Smugglers Notch, June 16-18; Mansfield, 2000-3500 feet, June 16-24.
- E. (E.) stigmatica* (O. S.). Woodcrest Farm, June 15-20, in bog; Bingham Falls, June 18-21; Mansfield, 2000-3000 feet, June 16-24.
- E. (Erioptera) chrysocoma* O. S. Woodcrest Farm, June 17-22, in bogs.
- E. (E.) megophthalma* Alex. Woodcrest Farm, June 15-17, in bogs.
- E. (E.) septemtrionis* O. S. Woodcrest Farm, June 17-18, bogs; Lake of the Clouds, June 16; Mansfield, Chin, June 16.
- E. (E.) vespertina* O. S. Woodcrest Farm, June 17, in bog.
- E. (E.) viridula* Alex. Woodcrest Farm, common in bogs and boggy meadows, June 20-27.
- Helobia hybrida* Meig. Lake of the Clouds, June 16.
- Ormosia adirondacensis* Alex. Woodcrest Farm, June 21; Bingham Falls, June 16-18.
- O. dentifera* Alex. Mansfield, 3500 feet, June 16.
- O. deviata* Dietz. Mansfield, 2500 feet, June 16.
- O. innocens* (O. S.). Smugglers Notch, June 16 (*C. L. Farrar*).
- O. megacera* Alex. Woodcrest Farm, in bog, June 18.
- O. meigenii* (O. S.). Mansfield, 2500 feet, June 16.
- O. mesocera* Alex. Mansfield, 2500-3500 feet, June 16-24.
- O. pygmaea* (Alex.). Bingham Falls, June 16; Mansfield, 3500-3800 feet, June 16.
- Molophilus cramptoni* Alex. Mansfield, 2000-2500 feet, June 24.

M. forcipulus (O. S.). Woodcrest Farm, June 17, in bogs.

M. hirtipennis (O. S.). Bingham Falls, June 16-18; Mansfield, 2000 feet, June 24.

M. pubipennis (O. S.). Waterbury R., near Stowe, June 16.

M. quadrispinosus Alex. Smugglers Notch, June 16; Mansfield, 3500 feet, June 16.

DESCRIPTIONS OF NEW SPECIES.

Tipula maritima, sp. nov.

Allied to *T. cunctans* Say; antennae with the flagellum bicolorous, yellow and black; wings with a strong yellow suffusion, the costal margin more brownish yellow, not contrasting markedly with the remainder of the ground-color; male hypopygium with the median notch of the tergite narrowly U-shaped; outer dististyle expanded at distal end, the apex obliquely truncated.

Male.—Length about 13-15 mm.; wing 14-17 mm.

Generally similar to *T. cunctans*.

Antennal flagellum bicolorous, the basal enlargement of the segments dark brown, the remainder yellow. Head gray, median region of the vertex more brownish gray.

Mesonotal praescutum gray, the three praescutal stripes a trifle darker, their edges faintly bordered by darker brown; posterior sclerites of mesonotum gray, the scutellum more reddish gray with a barely indicated median line. Pleura with the anepisternum dark gray, the sternopleurite more reddish yellow, darkened ventrally, the posterior sclerites of pleura more brownish yellow. Legs yellow, the tips of the femora and tibiae infuscated. Wings with a strong yellow suffusion, the costal margin more brownish yellow, not contrasting strongly with the remainder of the wing as is the case in *cunctans*, oblitative areas conspicuous.

Abdomen yellow, the tergites with a nearly continuous median black vitta extending from tergite one through seven; outer sternites with a similar black line; hypopygium pale. Male hypopygium relatively small. Ninth tergite with a relatively deep U-shaped median notch, this much narrower than in *cunctans*, the lateral margins narrowly blackened but nearly smooth. Outer dististyle narrowed basally, the distal end expanded, the apex obliquely truncated. Inner dististyle with the apical beak blackened, simple; blackened flange on margin of blade smooth, in *cunctans* conspicuously serrulate. Mesal margins of ninth sternite produced into a subtriangular pale blade.

Habitat.—Massachusetts.

Holotype.—Male, Polpis, Nantucket Is., October 8, 1925 (*W. S. Brooks*).

Paratopotypes.—Three males, October 1-8, 1925 (*W. S. Brooks*).

Type.—In the collection of the Boston Society of Natural History.

Tipula maritima is readily told from *T. cunctans* Say by the bicolorous flagellum, the strongly tinted wings with the costal margin only slightly darkened, and the details of structure of the male hypopygium. The present species serves to connect

cunctans with other members of the group, as *ultima* Alexander and *tennessa* Alexander.

***Tricyphona johnsoni*, sp. nov.**

Entirely similar and closely related to *T. inconstans* (Osten Sacken), differing most conspicuously in the structure of the ninth tergite of the male hypopygium.

Wings narrower than in *inconstans*. Venation: *Rs* long-spurred at origin; radial field with adventitious crossveins, chiefly arranged in cell R_4 where they vary in number from one to seven. Ninth tergite of the male hypopygium narrowed outwardly, the caudal end conspicuously narrower than the base, the margin gently concave. In *inconstans*, the caudal margin of the tergite is more deeply concave and produced into small sublateral lobes, with a smaller lateral incision on either side, the margin of the tergite fringed with delicate setae.

Habitat.—Massachusetts.

Holotype.—Male, Nantucket Is., June 22, 1927 (*C. W. Johnson*).

Paratopotypes.—Numerous specimens, June 25, 1926; June 7–22, 1927 (*C. W. Johnson*).

Type.—In the collection of the Boston Society of Natural History.

Trichyphona johnsoni is named in honor of the collector of the type-series, my friend, Charles W. Johnson, to whom we owe our greatest advance in knowledge of the Diptera of New England. Although very similar and closely allied to *T. inconstans*, I have no doubt of the distinctness of the present form. The nature of the venation in the type-series of more than thirty specimens has been discussed in detail by Mr. Johnson (*Psyche* 34: 216–217, 4 figs., 1927).

***Erioptera (Erioptera) uliginosa*, sp. nov.**

General coloration dull brown; knobs of halteres darkened; wings with a strong brown suffusion, more saturated in the costal and stigmal regions; male hypopygium with the outer dististyle elongate, expanded at apex into an oval blade; inner dististyle much smaller, simple, narrowed to a point.

Male.—Length about 4.5–4.8 mm.; wing 4.5–5.3 mm.

Female.—Length about 5 mm.; wing 5.3–5.5 mm.

Rostrum and palpi black. Antennae dark brown throughout. Head of male large; eyes very large, separated above, protuberant and contiguous beneath; in female, head and eyes smaller. Head dull brown, the orbits brighter.

Mesonotum opaque dark brown, the praescutum almost covered by three more reddish brown stripes, the dorsum in cases more uniformly brown. Pleura gray. Halteres brownish yellow, the knobs brown. Legs with the coxal brownish gray; trochanters obscure yellow; remainder of legs brown, the femoral bases more brightened. Wings with a strong brown suffusion, more saturated in the costal and stigmal regions; veins brown. Venation: *Rs*

shorter than Sc_1 ; R_{2+3+4} a trifle longer than the basal section of R_5 , the distal section of the latter thickened; vein 2nd A and outer end of second section of Cu_1 strongly sinuous.

Abdomen dull dark brown, including the hypopygium. Male hypopygium with the tergite extensive, the lobes obliquely truncate. Outer dististyle an elongate smooth arm that expands at apex into a long-oval blade. Inner dististyle a much smaller simple blade that narrows gradually to a point. Gonapophyses appearing as strongly curved sickle-shaped hooks that narrow gradually to acute points, their margins smooth. Ovipositor with the valves yellowish horn-color, the tergal valves long and slender, gently upcurved, the margins smooth.

Habitat.—Connecticut.

Holotype.—Male, Manitic Lake, in cranberry bog, June 8, 1929. (C. P. Alexander).

Allotopotypes.—Female, pinned with type.

Paratopotypes.—Fifteen males and females, June 8–9, 1929 (Alexander and Crampton).

Type.—Preserved in the collection of the author.

Paratypes.—In the Boston Society of Natural History and Connecticut Agricultural Experiment Station Collections. Alcoholic material in the collection of Dr. Crampton.

Erioptera uliginosa is undoubtedly a characteristic bog-inhabiting species, associated in nature with other equally characteristic bog forms as *Phalacrocer a tipulina* O. S., *Limonia* (*Dicranomyia*) *uliginosa* Alexander, *L. (D.) sphagnicola* Alexander, *Pseudolimnophila inornata* (O. S.), *Limnophila* (*Phylidorea*) *platyphallus* Alexander, *Pilaria stanwoodae* (Alexander), *P. vermontana* Alexander and *Erioptera ebenina* Alexander. It was formerly considered that the sphagnum bogs in northeastern North America supported a very restricted crane-fly fauna but this is certainly not the case. Many of the bog species are local and most species become more active at dusk, remaining concealed during the hours of bright sunlight.

Erioptera uliginosa has the knobs of the halteres darkened, in this respect agreeing most closely with *E. septentrionis* Osten Sacken and *E. ebenina* Alexander. It differs from the former in the strongly darkened wings and structure of the male hypopygium, as the simple inner dististyle; from *ebenina* it differs in the opaque mesonotum and very different hypopygial structure. In its general appearance, especially the coloration of the body and wings, the new species more closely resembles *E. villosa* Osten Sacken, differing conspicuously in the darkened knobs of the halteres and the structure of the male hypopygium.

Occasional Papers
OF THE
Boston Society of Natural History.

REDESCRIPTION OF *ARMADILLONISCUS*
ELLIPTICUS (HARGER) WITH SOME
ACCOUNT OF ITS HABITS.

(ON ISOPODA: ONISCOIDA, FIRST PAPER.)

BY CHARLES H. BLAKE.

THREE definitely halophile land isopods occur in the Woods Hole region: *Scyphacella arenicola*, *Armadilloniscus ellipticus*, and *Trichoniscus halophilus*. The first two belong to the family Scyphacidae, the third, which will be described elsewhere, to the Trichoniscidae.

In 1878 Harger described a land isopod from near New Haven, Conn., under the name of *Actoniscus ellipticus*. Except for a few specimens from Bermuda seen by Miss Richardson, it does not seem to have been taken again until May, 1929, when I secured a few specimens at Woods Hole, Mass. In September I was able to obtain a considerable number and to make some observations on the living animals.

Occurrence.—The specimens taken in May were on a stone near high watermark under wet, dead eelgrass (*Zostera marina*) and associated with them were *Trichoniscus halophilus*, *Procellio scaber*, and *Armadillidium vulgare*. Those taken in September were in windrows of well-rotted eelgrass just below high watermark. They are most common on pieces of driftwood embedded in the mass and less common on stones and on the grass itself. They are found only in thoroughly wet situations. At this time their associates were a small, slim diplopod, a linyphiid spider and young *P. scaber* and *A. vulgare*.

Habits.—When a specimen in its normal habitat is disturbed the reaction varies. An occasional specimen will run away. Most specimens on a flat surface appress themselves to it and remain motionless. If turned over on the back, they remain

motionless for a short time, with the legs drawn in and the body slightly arched as does *P. scaber*. If further disturbed they will enroll. The enrollment is not perfect, there being a considerable space between the telson and the frons. If occasion demands, they can run rapidly and can turn over in a few seconds, when placed back down.

The food of *A. ellipticus* consists of the dark brown organic detritus which covers the leaves of rotted eelgrass.

Specimens submerged in sea water became immobile in about half an hour. They generally lay ventral side up. In some cases the motion of the pleopods ceased. One such specimen was placed on a dry surface and the attached water removed. It regained full activity in about five minutes. All the specimens which remained submerged regained normal activity in about one and a half hours.

Thirteen specimens were placed in sea water on Sept. 11, 1929. The water was not changed during the experiment.

<i>Days elapsed</i>	<i>Living animals remaining</i>
1	12
2	9
3	5
4	2
15	1
18	1
19	0

Eighteen specimens were placed in fresh water on Sept. 14, 1929.

<i>Hours elapsed</i>	<i>Living animals remaining</i>
4	16
8	7
9	5
22	0

Despite the ability of the animals to withstand a rather prolonged immersion in sea water, they do not seem to voluntarily submit to immersion in brackish water. During September 14 a heavy rain flooded a brackish marsh (between the Copeland house and the Gardiner house). The next morning numerous *A. ellipticus* were found clinging to the sides of partially submerged rocks just above the actual water line and in an unnaturally exposed situation.

Well developed young were found in the marsupia of the females during the first half of September. Many half grown specimens were taken.

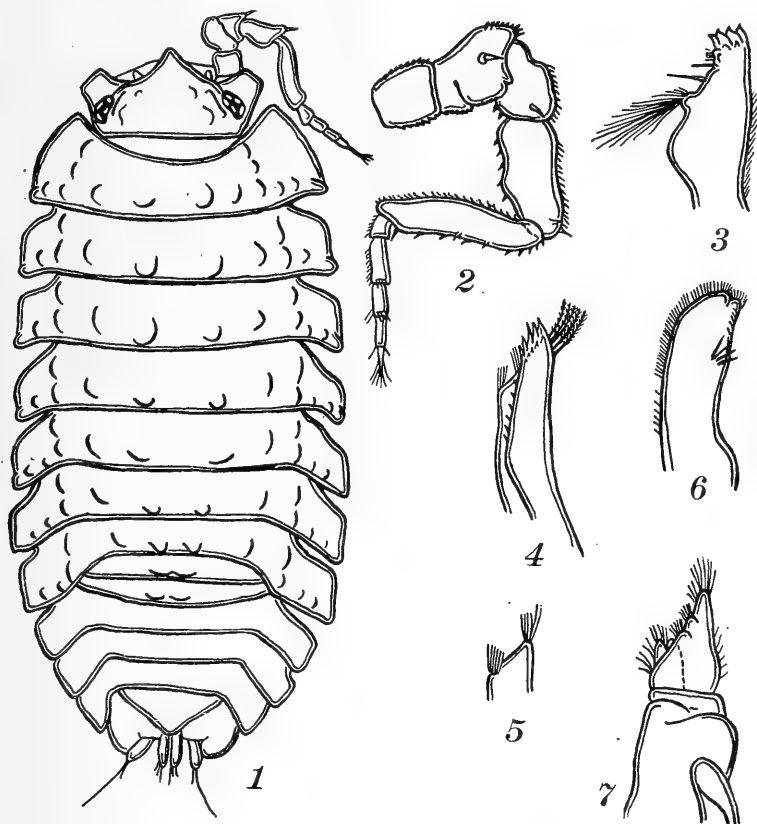


FIG. 1. *Armadilloniscus ellipticus*, dorsal view of female.
 FIG. 2. " " second antenna of male.
 FIG. 3. " " left mandible of male.
 FIG. 4. " " first maxilla of male.
 FIG. 5. " " tip of endopod of first maxilla of male.
 FIG. 6. " " second maxilla of male.
 FIG. 7. " " maxilliped of male, distal portion.

Distribution.—*Armadilloniscus ellipticus* is reported from New Haven, Conn., (Harger 1878) and Bermuda (Richardson 1902). I have taken it at Woods Hole (Bathing Beach and around Great Harbor) and at the head of Quisset Harbor.

Synonymy.—

Actoniscus ellipticus Harger (1878, p. 373; 1880, p. 309, pl. 1, fig. 3).

Armadilloniscus ellipticus Budde-Lund (1885, p. 239).

Actoniscus ellipticus Richardson (1902, p. 303; 1905, p. 634).

Previously both *Actoniscus* and *Armadilloniscus* have been referred to the Oniscidae, the latter being assigned to a special subfamily Armadilloniscinae by Verhoeff (1918, p. 161). Recently (1929, p. 12) I suggested, on the basis of the mouthparts figured for *Actoniscus lindahli* (Richardson, 1905, p. 635, fig. 680), that *Actoniscus* should be referred to the Scyphacidae. This has since been confirmed by an actual examination of the mouthparts of *A. ellipticus* (Fig. 3-7).

Through the kindness of Dr. K. W. Verhoeff I received some specimens of *Armadilloniscus dalmatinus*, one of which I dissected, and have been able to assure myself that *Actoniscus* Harger 1878 is a synonym of *Armadilloniscus* Uljanin 1874. (See Verhoeff, 1918, Pl. 2, fig. 41-43, 50, and here Fig. 11).

Description.—The figures given of *Armadilloniscus ellipticus* (Fig. 1-10) will obviate a detailed description of the appendages. The pigment present is gray brown. The frontal and antennary lobes are plain colored, while the occipital region has white spots. The second to fifth segments of the antennal peduncle are colored dorsally, there is a basal white spot on the fourth segment and a distal white spot on the fifth. The epimera and a broad median band on the pereion are plain colored. The rest of each perional tergum is heavily spotted with white. The pleon is plain colored as well as the peduncles of the uropods except for a submedian white spot on each side of each segment and an ill-defined median white spot on the telson.

The tubercles shown on the dorsum (Fig. 1) are not mentioned by Harger but, in fact, he almost never mentioned the sculpture of land isopods. They occur on all other species of *Armadilloniscus*. In addition the terga, legs, uropods, and antennae are well covered with scales.

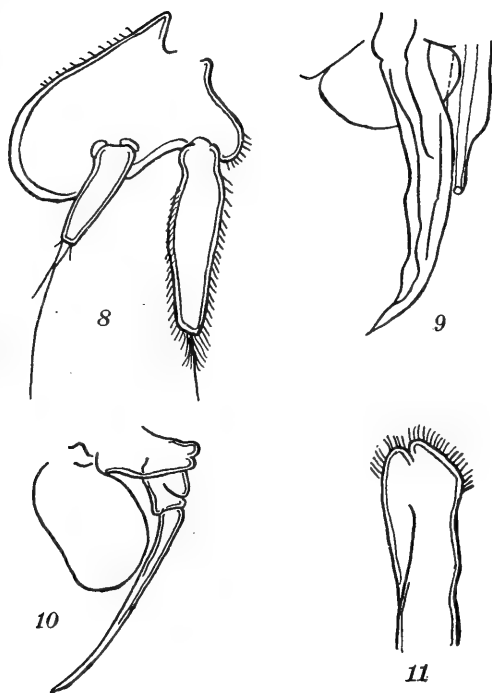


FIG. 8. *Armadilloniscus ellipticus*, uropod of male, ventral view.
 FIG. 9. " " " first pleopod and penis of male.
 FIG. 10. " " " second pleopod of male.
 FIG. 11. *Armadilloniscus dalmatinus*, second maxilla of male.

Remarks on the family Scyphacidae.—Budde-Lund considered the Scyphacidae as close to the Trichoniscidae, which view has been followed by subsequent authors. The resemblance of habitus is very striking in some cases.

Verhoeff (1917, 1928) has grouped the land isopod families in four tribes or superfamilies on the basis, chiefly, of the respiratory organs. Through the kindness of the late Dr. Charles Chilton I have had specimens of *Actoecia* and *Scyphax* for examination in comparison with *Scyphacella* and *Armadilloniscus*. The Scyphacidae, although they lack pseudotracheae (Weisskörper), possess a water conductor (Wasserbahn of Verhoeff) between the endopods of the uropods and hence fall in the Pleurotracheata which includes, among other families, the Oniscidae and Porcellionidae.

The Scyphacidae are distinguished by the four-segmented flagellum of the antenna, the molar process of the mandible which consists of a low base and a tuft of setae, and by the lack of teeth on the tip of the inner lamina of the maxilliped. Their relationships are, on the whole, with the Oniscidae, and not at all with the Atracheata (Trichoniscidae and Ligydidae).

The genus *Armadilloniscus* is sufficiently distinct to be set apart from the rest of the Scyphacidae, retaining the subfamily Armadilloniscinae Verhoeff 1918 and placing the remaining genera in the subfamily Scyphacinae. The first subfamily is distinguished by the tuberculate dorsum and the prominent frontal and antennary lobes. It also has the usual setose spines at the tip of the endopod of the first maxilla replaced by two tufts of fine setae.

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A NEW DEEP SEA FISH.

BY NICHOLAS BORODIN.¹

Haplophryne simus, sp. nov.

Specific characters.—Body short, ovoid, covered with nontransparent skin, forming a kind of balloon. Snout short, abruptly cut. Nostrils large, situated between eyes. The general form of the muzzle as with pug or bulldog. Lower jaw much produced, curved. Eyes large, its pupil situated asymmetrically. The position of the anus is also asymmetrical. P. 15; C. 8, four of these eight rays being bifid.

Description.—Body short, 16 mm. long, without caudal; depth less than $2\frac{1}{2}$ times in the length, covered with smooth, not transparent, loose skin. Head high and long, $2\frac{1}{2}$ in body, with a depressed front, a short upper jaw and projecting lower jaw. Eye large, oval, with asymmetrical pupil, its longer diameter five times in head. Snout short, four times in head. Its tip forms a short rostrum which bears two shortish denticles directed forwards. Nostrils large, two-thirds of eye, having form of an oval, cup-shaped depression, situated on one and the same crossline with the eyes; at the bottom of these depressions two elliptical olfactory apertures. The depressions are rounded with borders elevated over the surface of the cranium. Together with the eyes the nostrils form four holes, all directed forward; between them a rostrum at the top of a short upper jaw, below a much longer, curved lower jaw, both set up with depressible teeth, partly curved. Illicium, if any, is not visible. Pectoral fins are of typical pattern for all pediculate fishes. Caudal long, four times in the body, with four ordinary and four other bifid rays. Dorsal fin is represented with three hair-like rays, situated close to the caudal. Anal, probably of the same shape, does not protrude outside of the balloon of the skin, and thus is invisible. Gill openings are found with difficulty. They appear in the form of a small spot, brighter than the surrounding area, below the pectorals. Still less conspicuous is a small anus (vent), situated a little below and behind the gill opening and asymmetrically on the left side of the body. Color of skin dark gray with some irregular bright regions. The skin is very loose, subjected to great extension and forming a kind of a balloon in which the whole body is included. It is marked with small pores only along the sides of the lower jaw. (Description from the type collected by C. Iselin in 1929, at Lat. $54^{\circ} 50' N.$; Long. $64^{\circ} 70' N.$).

¹ See Proc. N. E. Zool. Club 10: 109-111, 1929; 11: 87-92, 1930.

Dr. W. Beebe in a recent paper described a new species, *Haplophryne hudsonius* (Zoologica, 12, no. 2, 1929). Our specimen has much in common with this new species, but differs from it in having differently shaped snout and lower jaw, eyes oval (not round) skin dully pigmented (not transparent) and some other less important differences.

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REVISIONS OF TWO CENTRAL AMERICAN BIRDS.

BY LUDLOW GRISCOM.

THE present paper contains two more cases where the proper identification of a certain species in the Dwight Collection has involved an extended revision of other extralimital forms, based on material primarily in the Museum of Comparative Zoölogy, which institution also possesses the types of most of the new races diagnosed.

THE RACES OF *Claravis mondetoura* (BONAPARTE).

One of the rarest and most beautiful of New World Doves is *Claravis mondetoura* (Bonaparte). The very few Central American records all come from the cloud forest in the subtropical zone, but the species is as yet unrecorded between Guatemala and Costa Rica, and in eastern Panama, though it will undoubtedly be found in time. It follows, however, that like many other species of the same life-zone, it is broken up into isolated colonies, and when specimens from these various colonies are compared, trenchant differences are disclosed, even with very limited material.

Years ago Salvadori and Salvin & Godman commented on certain differences between Mexican and Guatemalan specimens and others from South America. They were not interested in racial variation, and preferred to wait for Costa Rica and Panama material, before describing a second 'species.' Ridgway confirmed these differences, and recorded still others, but took no action, as his material was also faulty. Additional specimens merely serve to indorse these various racial characters. Thanks to the authorities of the Museums in New York and Cambridge, I have before me the largest and the most representative series geographically ever assembled. It is far from satisfactory,

however, and I suspect the existence of two other subspecies in addition to the ones described below.

1. *Claravis mondetoura mondetoura* Bonaparte.

Type locality.—Caracas, Venezuela.

Range.—Mountains of Venezuela, Colombia, Ecuador and Peru, a scant dozen localities in all.

Adult male.—Back, rump, and upper tail-coverts fuscous or chaetura drab; basal third of outer tail feathers black; axillars and under wing-coverts blackish brown, more or less strongly tipped with cinnamon.

Adult female.—Forehead and chin deeper cinnamon; upper-parts browner, less olive or gray, becoming strongly tinged with rusty on rump and tail coverts; relatively darker and more olive brown below; axillars deep cinnamon rufous.

Remarks.—The diagnosis of males is based on specimens from Bogota and East Ecuador in default of a topotype. The diagnosis of the female is based, however, on 3 topotypes from Merida. I note that two females from Colombia differ markedly from Venezuela specimens in being paler below, more grayish brown, and white in the center of the abdomen. When males can be compared, the Colombian bird may well prove separable. The female at least is a connecting link toward the west Panama form.

Claravis mondetoura pulchra, subsp. nov.

Type.—Mus. Comp. Zool. no. 109,178; adult male, collected at Boquete, 3000 ft., western Panama, March 27, 1901, by W. W. Brown.

Adult male.—Radically different from Colombia and Ecuador males in being deep neutral gray even on rump and upper tail-coverts; axillars uniform very dark gray. (Three specimens).

Adult female.—Forehead pale cinnamon, chin mostly white; rump and upper tail-coverts dark sepia, less rufous; much paler below, even grayer, with more white, than Colombian females; axillars blackish brown. (Two specimens.)

Claravis mondetoura umbrina, subsp. nov.

Type.—Mus. Comp. Zool. no. 116,433; adult female, collected at La Estrella de Cartago, Costa Rica, Dec. 28, 1900, by C. F. Underwood.

Adult male.—Resembling the South American rather than the Chiriqui form in being slightly fuscous above; axillars blackish as in all Central American forms. (One specimen).

Adult female.—Quite different from any other form in that the underparts

are umber or clay brown, and the tips of the outer tail feathers are darker and browner, less grayish white. (The type.)

Claravis mondetoura salvini, subsp. nov.

Type.—Dwight Coll. no. 63,782; adult male, collected at Volcan San Lucas, Guatemala, June 26, 1927, by A. W. Anthony.

Adult male.—Exactly as in South American males above; abdomen and ventral area more extensively white than in any other race; outer tail feathers more extensively black basally than in other races; axillars as in other Central American races. (The type.)

Adult female.—Autoptically unknown to me, but judging by Salvin's detailed description in the *Biologia Centrali Americana*, vol. 3, p. 256, it must be close to the West Panama form, in having the chest and abdomen extensively grayish and whitish.

Remarks.—Mexican records must be allocated here provisionally, as no female exists.

NOTES ON THE MEXICAN ANT-TANAGER (*Habia rubica rubicoides*).

According to Ridgway's treatment (Birds of North and Middle America, pt. 2, p. 144-147) *Habia rubica rubicoides* (Lafresnaye) occupies most of southern Mexico and northern Central America, replaced by two closely allied forms in western Mexico and the usual pale one in Yucatan. In 1905 Bangs described an excellent form *confinis* from eastern Honduras, partially connecting *rubicoides* with *vinacea* of western Panama. In 1927 Dickey and Van Rossem described *salvadorensis* from Salvador, another distinct race connecting *confinis* with *affinis* Nelson of Oaxaca. In 1929 (Bull. Mus. Comp. Zool. 69, p. 427) Peters commented on anomalous specimens from Lancetilla, Honduras, which were nearer to *rubicoides* instead of *confinis*, as might have been expected.

It will be apparent therefore that material has been accumulating for many years, but no general revision has as yet been attempted. In studying the fine series of this species in the Dwight Collection some interesting facts have been brought to light, and one most unfortunate change in names may become necessary. The name *rubicoides* proves to be even more of a composite than previously suspected. It has been my good fortune to have available types or topotypes of every form involved.

Habia rubica rubicoides (Lafresnaye).

Diagnosis.—A relatively small form; adult male with throat light vermillion, passing rapidly into grayish vinaceous rosy red, the gray tone and the rosy shade of the red the two important points, the gray wash strongest on the flanks and vent; adult female correctly described by Ridgway, generally ochraceous olive below, distinctly paler on the throat; wing of males 90–97 (93).

Range.—With the type and a fair series before me, it is obvious that this form is confined to the hot lowlands of eastern Vera Cruz and will presumably be found in Tabasco, Campeche and northern Peten. It is the exact analogue of *H. salvini littoralis* (Nelson), and is very different from the form in the interior of Vera Cruz.

2. Habia rubica holobrunnea, subsp. nov.

Type.—Mus. Comp. Zool. no. 233, 707; adult male, collected in Motzorongo, Vera Cruz, Feb. 20, 1925, by W. W. Brown.

Diagnosis.—Totally different from any other form in northern Central America; adult male with throat scarlet, passing to bright liver red on abdomen, entirely lacking either gray or rose tones; adult female darker and browner above than any other form, almost *uniform brownish* olivaceous ochre below; size similar.

Range.—I have examined twelve specimens from Precedio, Motzorongo and Orizaba, interior of Vera Cruz.

3. Habia rubica nelsoni (Ridgway).

Diagnosis.—Similar to *H. rubica rubicoides*, but slightly smaller and duller in color; adult male a browner red above, the red of throat more flesh colored; female duller and paler.

Range.—Outer two-thirds of Yucatan Peninsula, thus including parts of Campeche and Quintana Roo.

4. Habia rubica confinis (Bangs).

Tanagra ignicapilla Lichtenstein, Preis, Verz. Mex. Vög., 1831, p. 2 (Mexico, *nomen nudum*).

Phænicothraupis ignicapilla Finsch, P.Z.S., 1870, p. 581, in text (Guatemala).

Phænicothraupis rubica confinis Bangs, Proc. Biol. Soc. Wash. 18, 1905, p. 158 (Yaruca, Honduras).

Diagnosis.—Adult male similar to *Habia rubica rubicoides*,

but larger, darker and more brightly colored; purer red, less brown or liver colored above; throat brighter scarlet; abdomen rosier, less gray; wing 96-102 (99); adult female slightly yellower, less brown below, the throat much brighter ochre yellow in marked contrast with chest.

Range.—Yaruca, eastern Honduras (the type series) and 40 specimens from eastern Guatemala.

Remarks.—The males of a beautiful series collected by Anthony in Alta Vera Paz in the Dwight Collection prove to be inseparable from the type series of *confinis* Bangs from eastern Honduras, and quite different from true *rubicoides* Lafresnaye. The females are not quite typical, however, approaching *rubicoides*. It is consequently possible that *ignicapilla* Finsch should replace *confinis* Bangs, although the former did not intend to propose a new name. Finsch did not regard Lichtenstein's name as a *nomen nudum*, and used it as having many years priority over Lafresnaye's *rubicoides*. He accidentally validated the name, however, by giving some comparative description and detailed measurements of a specimen from Guatemala.

As a matter of fact eastern Guatemala is in the general region where three races of this Ant-tanager meet. A series from Secanquim is inseparable from *confinis*. Two specimens from Sepacuite, however, are intermediates. One is *rubicoides* in color, but *confinis* in size. The other is *rubicoides*, showing an approach to *nelsoni*. Many old 'Vera Paz' trade skins examined are also nearer *rubicoides* than *confinis*. Three specimens from British Honduras (Manatee River and Cayo District) are nearest *rubicoides*, but two from the boundary line between British Honduras and Quintana Roo are nearest *nelsoni*. It is a fair presumption, therefore, that specimens from northern and eastern Peten will prove to be variously intermediate between *rubicoides* and *nelsoni*. The fact that specimens nearest *rubicoides* are known from Guatemala is the reason why I do not use *ignicapilla* Finsch to replace *confinis* Bangs. Finsch's specimen measured 94.8 mm., and there is every possibility that it was an intermediate, nearest *rubicoides* in the modern sense.

5. *Habia rubica salvadorensis* Dickey & Van Rossem.

Diagnosis.—Connecting *confinis* Bangs with *affinis* Nelson of

Oaxaca; adult male very close to *confinis*, but red of underparts slightly more pronounced, more vermilion, less washed with gray; female a pale and dull edition of *confinis*, strongly yellow on the throat like that form, but duller brown, less olive and ochraceous both above and below, giving a pronounced clay colored tone; while the male is quite different from *affinis*, the female must be very close indeed, and a comparison has yet to be made.

Three males and four females from Lancetilla, Honduras have already been discussed by Peters (*loc. cit.*), but I cannot agree in referring them to *rubicoides* as here understood and delimited. The males are inseparable from *salvadorensis*, a form not available to Peters last year, and the females are intermediate between *confinis* and *salvadorensis*. They do not have sufficient characters to describe as a new form, but the relationships of these birds are of obvious interest in connection with *confinis*, as Lancetilla apparently is geographically intermediate between Yaruca and Guatemala. It is obvious that more specimens are needed from Honduras, and a better knowledge of the topography there.

A series of nine specimens in New York from northeastern Nicaragua was referred some years ago by Miller and me to *confinis*. In the light of the facts brought out above, they should be critically reexamined.

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A NEW RACE OF *POMATORHINUS RUFICOLLIS* FROM
SOUTH CENTRAL SZECHUAN.

BY OUTRAM BANGS.

THE collection of birds made in Yunnan and Szechuan by Herbert Stevens while with the Kelley-Roosevelt Expedition, was intrusted to me for identification by the authorities of the Field Museum of Natural History. I have now finished with the collection and have written an annotated list of it, which will be published at some future time.

But one new form was found among Steven's birds. This is a race of the very plastic *Pomatorhinus ruficollis* of which a number of Chinese forms have already been named. From all of those the present chestnut backed bird of south central Szechuan seems quite distinct. It may be known as

***Pomatorhinus ruficollis eidos*, subsp. nov.**

Six specimens taken from Omei-shan, Shi-sha-shii and Sui-fu, Szechuan in October, 1929.

Type.—Field Museum of Natural History, Stevens's original no. 1076; adult male. From Omei-shan, south central Szechuan, collected by H. Stevens, October 4, 1929.

Characters.—Most nearly like *P. r. styani* Seeböhm of the lower Yangtse Valley from Hupéh down stream and like that form with brown (not reddish) stripes below, the striping however, in the new form is a little stronger and darker. Differing from *styani* in the much deeper more chestnut color of the upper parts, the whole upper back in the new form being strong chestnut, paling out only on the rump. In *styani* there is a neck bank of pale chestnut, the remaining upper parts being reddish olive to pale olivaceous chestnut in marked contrast. Bill as in *styani*. Wing, 71, 72, 74, 75, 78, 79 mm.

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NEW LAND SNAILS FROM TANGANYIKA TERRITORY.

BY WILLIAM J. CLENCH AND ALLAN F. ARCHER.

THE following new forms herein described are based on material collected by Mr. Arthur Loveridge a few years ago during a trip in Tanganyika Territory, Africa.

Euaethiops, gen. nov.

Description.—Shells ovate-cylindric, imperforate, marked with axial striae intersected by spiral granulations. Nuclear whorl small as in the other Achatinidae. Aperture elongate ovate. Outer and basal margins rather expanded.

Radula of *E. loveridgei* fan-shaped. Central tooth with sharp, pointed cusp; lateral teeth, provided with rather large basal plate, unicuspid; mesocone large and conic; entocone represented by sharp, lateral protuberance; ectocone a mere protuberance; dentine extending from entocone all along the margin of the mesocone as far as the ectocone; formula: $\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$.

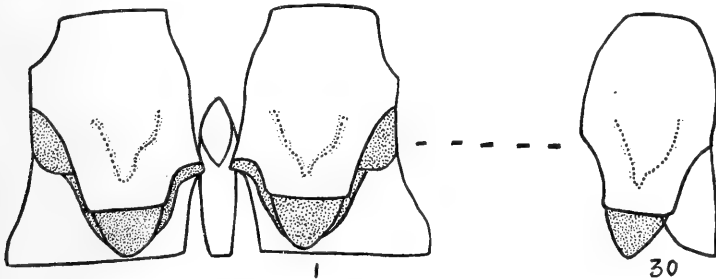


FIG. 1. Radula of *Euaethiops loveridgei*, showing median tooth, first and thirtieth lateral teeth.

Lung long, only moderately vascular both on the cardiac and intestinal sides, differing thus from the heavier venation of *Limicolaria* and *Achatina*. Pulmonary vein large as in the case of Achatinidae in general, and possessing large branches on the cardiac side. Kidney four times the length of the pericardium. Ureter enclosed and extending from the kidney to the rectum at a right angle. Stomach possessing a direct opening on side into kidney, some-

what as in the case of *A. zanzibarica* (dissected by the authors) and other members of the genus *Achatina*. It is, however, round and tumid instead of pear-shaped as in *Achatina*. Liver flat, leaf-shaped, as is typical of many mollusks bearing bulimoid shells.

Genitalia are nearest like those of *Limicolaria*, but differ in several points. Genitalia simple, without accessory organs. Penis thick, moderately long, and curved downward very much as in *Limicolaria*, enveloped in rather thick sheath. Penial retractor, terminal, short, inserted through the sheath and merging with penis at distal end, inserted on the diaphragm as in *Limicolaria*. In *Achatina* the penis is almost straight and curved slightly backward at the distal end, while the retractor muscle in all species heretofore dissected is a branch from the right ocular band. Vas deferens entering the sheath at about two-thirds the distance from the base of the penis; very long, coiling more than half way around vagina before coming into juxtaposition with uterus, and enveloped throughout its whole length by thin transparent membrane.

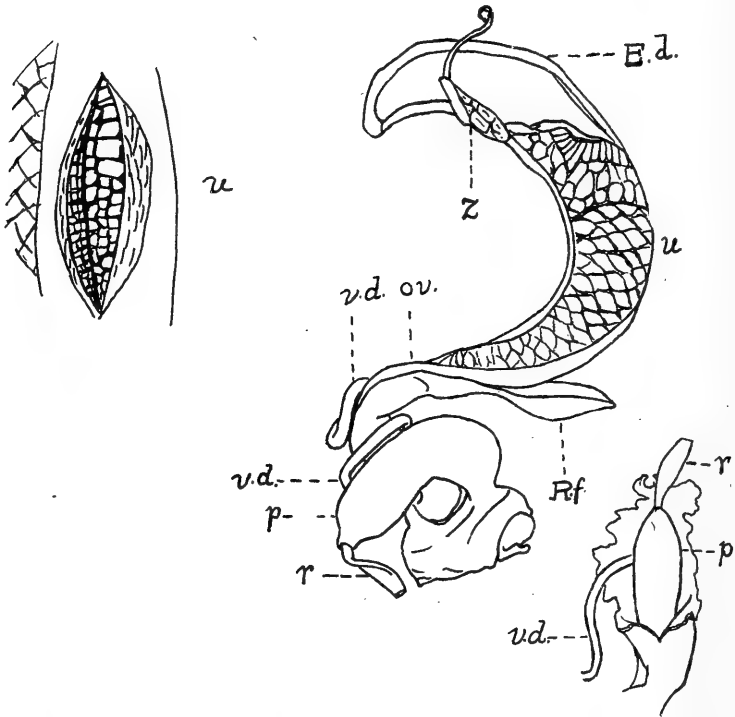


FIG. 2. Genitalia of *Euaethiops loveridgei*, showing penis with lumen partly removed (lower right) and uterus incised on oviducal side (upper left); E. d., albuminiparous gland; z, hermaphrodite duct of ovotestis; u, uterus; ov., oviduct; R. f., spermatheca; v. d., vas deferens; p, penis; r, penial retractor.

Duct of spermatheca quite long, being one-half times shorter, and flat as in *A. panthera*. Vagina short and oviduct only moderately long. Uterus large, long, and composed as in *Limicolaria* of a large sack of translucent membrane filled with closely fitting, leaf-shaped saccules. Albuminiparous gland three sided, columellar, edge keel shaped and coming to a blunt point. Ovotestis short, granulose and bound tightly to the albuminiparous gland.

Length of penis, 10 mm.; of vagina, 7 mm.; of oviduct, 11 mm.; of spermatheca, 23.5 mm.

Remarks.—*Euaethiops* differs anatomically from *Limicolaria* in the following points: a larger, thicker albuminiparous gland; a shorter hermaphroditic duct smoother above but heavily granulose at its entrance into the spermoviduct instead of consisting of a long series of granulations as in *Limicolaria*; a large uterus; a wider, flatter and shorter spermatheca; a longer, more twisted vas deferens; a larger penis; and a much shorter, thicker penial retractor.

The shell differs in having a more elongate aperture, nearly one-half the total length of the shell. The columella bends far backward instead of being almost straight and is *truncate* as in *Achatina*. The lip is marginate and expanded backward at the base.

While the anatomy of *Euaethiops* resembles that of *Limicolaria* in the possession of a penial retractor, its radula is closest to the type found in *Achatina*. The shell has a truncate columella which serves to place it closer to the latter genus. Thus this new form fails to fit into any of the previously described genera.

In the recently erected genus *Limicolariopsis* there is a species known as *L. kivuensis* Preston which bears a superficial resemblance to *E. loveridgei* in that it has a slightly reflected lip. The columella is, however, not truncate. In addition it has a sculptured embryonic whorl as in other species of *Limicolariopsis*. The aperture is likewise typical in being smaller and more ovate, and the whorls more numerous as in *Limicolariopsis*. A dissection of *Limicolariopsis kempfi* Prest. shows that this genus is anatomically the same as *Limicolaria*. However, the anatomy of *L. kivuensis* resembles that of *E. loveridgei* in having a rather similar type of penis, but in all other respects, penial retractor, ovotestis, etc., it is entirely identical with *Limicolariopsis* and *Limicolaria*. It is uncertain just what the true status of *L. kivuensis* is, whether it is a case of convergence or an inter-

mediate form. Were it not for the fact that the majority of its characters seem to resemble those of the typical forms of *Limicolariopsis*, it would seem justifiable to place it in *Euaethiops*. The fact is that in shell characters alone, it is barred from that genus because of its untruncate columella and sculptured embryonic whorl, and must for the present remain in *Limicolariopsis*.

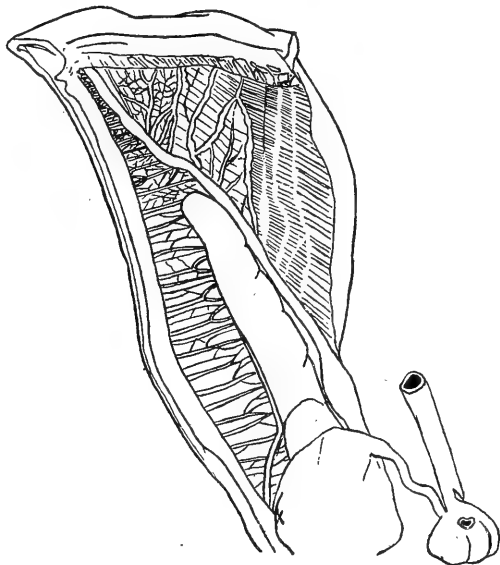


FIG. 3. Pallial system of *Euaethiops loveridgei*, showing vascular system, pericardium, kidney, ureter, intestine and stomach (lower right).

The genus *Euaethiops* belongs next to *Limicolaria*, by reason of the anatomical resemblances between the two. It belongs after *Burtoa* and *Achatina* since its shell characters, such as sculpture, resemble those of the latter.

Genoholotype, *Euaethiops loveridgei* Clench and Archer.

Euaethiops loveridgei, sp. nov.

Plate 16, fig. A.

Description.—Shell, imperforate, ovate-cylindric, rather thick. Nuclear whorl dark mahogany red. Succeeding whorls with snuff brown ground color, ornamented with wavy or zigzag axial, bistre flames. Interior of aperture deep bluish white in the region of the outer lip, but further inside exhibiting the snuff brown color of the exterior, decorated by the same bistre flames.

Apex smooth, obtuse; succeeding whorls slightly convex, the first four slowly increasing, the fifth and final body whorl rapidly increasing downward. Suture somewhat impressed especially on the body whorl. From the second whorl, following the nuclear whorl to the termination of the body whorl or the aperture, shell entirely covered by axial striae, some deeper than others, and intersected at all points by rows of spiral granulations. Whorls 6-6½.

Aperture elongate-ovate. Outer and basal margins rather expanded downward, the expansion being most marked in adult specimens at the base.

Parietal region covered by rather thin, almost transparent callus. Columella long, folded, bluntly truncated, and, when the shell is viewed from the left side, bent backwards to conform with the expansion of the basal margin.

The shell differs from *Achatina* and *Limicolaria* in shape, chiefly as regards the expanded margin of the aperture, a feature peculiar only to parts of the genus *Archachatina*. It is rather more cylindrical than *Achatina*, which is usually elongate-ovate.

Alt.	Diam.	Ap. length	Ap. width	
70.5	33	34.5	16.5 mm.	Holotype, M. C. Z. no. 58934
70	35	37	20	Paratype, M. C. Z. no. 58935
81 ¹	38	37	19.5	Paratype, M. C. Z. no. 58935

Holotype.—M. C. Z. no. 58934; collected in 1926 by Arthur Loveridge, at Bagilo, Uluguru Mts., Tanganyika Territory, Africa.

Achatina madaziniana, sp. nov.

Plate 16, fig. B.

Description.—Shell acutely ovate, imperforate, rather thin but strong. Nuclear whorl pinkish buff. All following whorls as far as body whorl having pinkish buff ground color. Beginning at second whorl from nuclear whorl and continuing to edge of aperture surface covered with rather straight, longitudinal, liver brown flames set apart at irregular intervals from each other, but tending to fuse together on the last fifth of the body whorl. Ground color of body whorl, cinnamon buff.

Nuclear whorl smooth, slightly flattened. Beginning at the second whorl from the nuclear whorl and continuing to the aperture, surface covered with axial striae at first light, but on the body whorl becoming rather definite growth lines.

These striae and growth lines are intersected over most of the surface by spiral lines set apart at rather irregular distances. These lines are obsolescent on the lower half of body whorl. From fourth whorl from apex to edge of aperture there is a series of rough subsutural folds. Whorls 7.

Aperture acutely ovate. Interior translucent, showing the color pattern of exterior. Outer and basal margins very sharp. Columella long, almost

¹Apex of this specimen broken and worn.

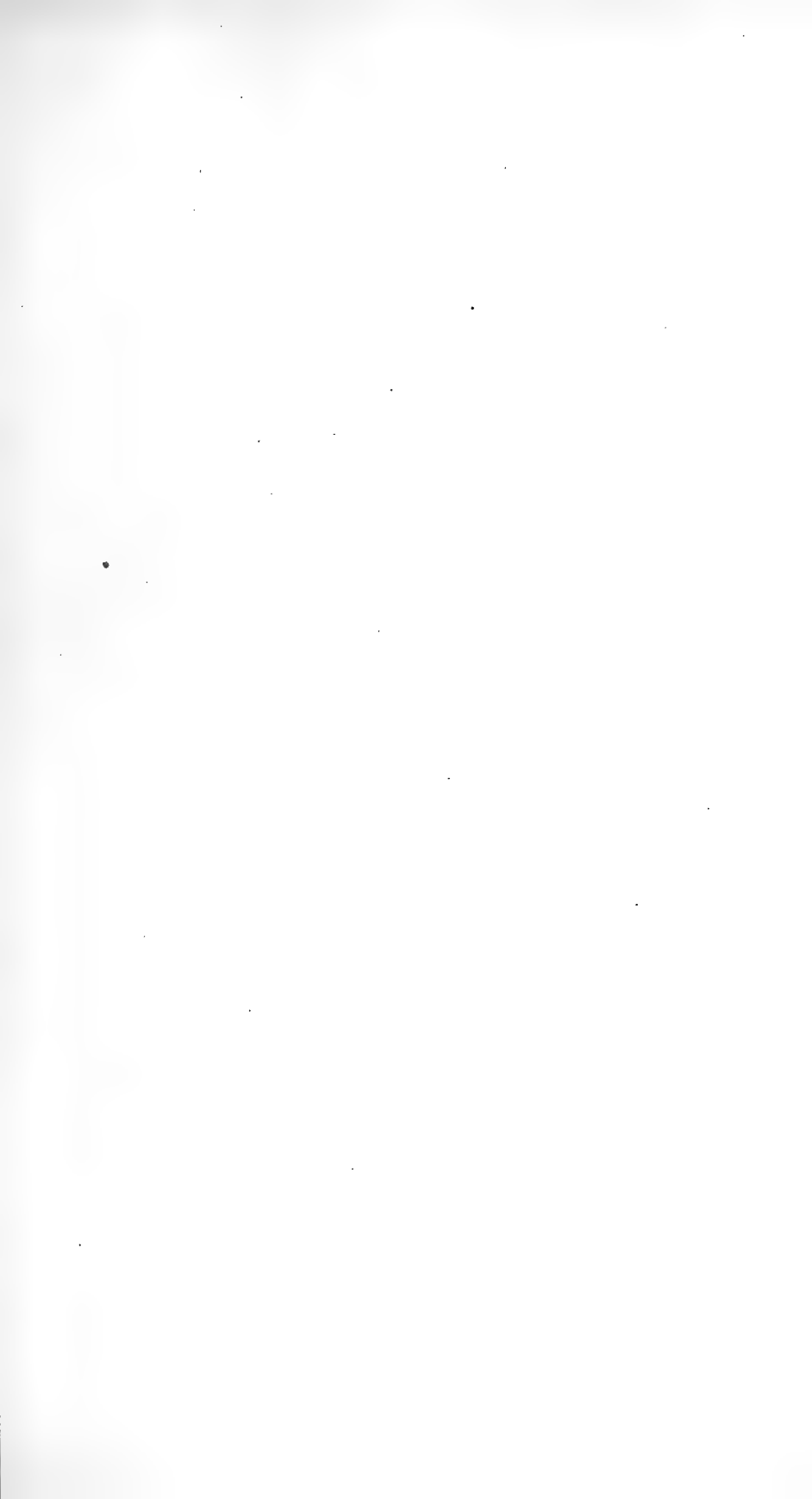
straight and sharply truncate. Parietal wall almost completely lacking a callus.

<i>Alt.</i>	<i>Diam.</i>	<i>Ap. length</i>	<i>Ap. width</i>	
87	44.5	49.5	23 mm.	Holotype, M. C. Z. no. 53185
76	40.5	43	22	Paratype, M. C. Z. no. 53186

Holotype.—M. C. Z. no. 53185; collected Feb. 1923, at Madazini, Tanganyika Territory, Africa, by Arthur Loveridge.

Paratype.—M. C. Z. no. 53186; collected Feb. 1923, at Itende, Tanganyika Territory, Africa, by Arthur Loveridge.

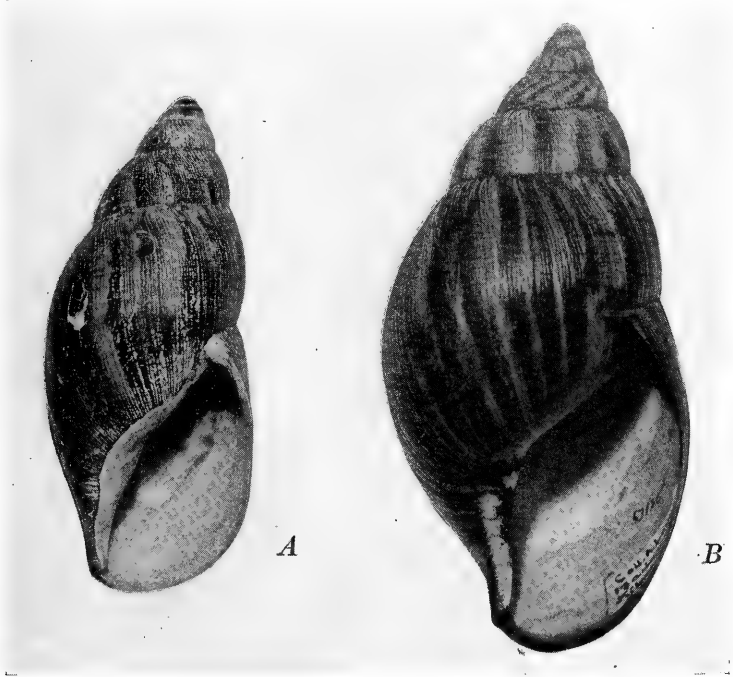
Remarks.—From the shell characters it seems well to place this species next to *Achatina immaculata* Lam. Neither the radula nor the soft parts have been available for examination, so that this designation remains somewhat tentative. Only two specimens are at hand, and the most adult one from Madazini is chosen as the holotype. The second specimen belongs to the same series of material collected by Mr. Loveridge, and since it comes from the same region as the holotype it is considered as a paratype.



EXPLANATION OF PLATE 16.

FIG. A. *Euaethiops loveridgei* Clench and Archer. Holotype, M. C. Z.
no. 58934.

FIG. B. *Achatina madaziniana* Clench and Archer. Holotype, M. C. Z.
no. 53185.



CLENCH AND ARCHER ON NEW LAND SNAILS.

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NOTES ON PHYSIDAE WITH DESCRIPTIONS
OF NEW SPECIES.

BY WILLIAM J. CLENCH.

WILLIAM TURTON (1807, p. 169) in his catalogue published a description of *Bulla rivalis*. According to Kennard and Woodward (1926, p. 99) Turton obtained the diagnosis and the name of this species from Maton and Rackett (1807, p. 126) in a paper which had been presented to the Society three years before it was published. Their locality citation is Hampshire, England. Both made the same reference to Chemnitz (1786, vol. 9, pl. 103, fig. 877-878) which is listed as *Bulla fontinalis* Linné. On the same plate two additional figures of *Physa* are given (fig. 879-880) with a caption of *Bulla fontinalis Indiae Occidentalis*. Hence the original diagnosis was assumed to be wrong by many subsequent writers and the species credited to the West Indies. Kennard and Woodward (1926, p. 99) have given a complete synonymy for this species, recognizing it as a British form. Unfortunately, however, they have included in their synonymy a large number of North American species of *Physa* with no reasons stated for so doing. It is quite impossible to understand why two distinctive species as *Physa osculans* and *P. heterostropha* should be synonymized under any European species of *Physa*.

The non-recognition of *B. rivalis* Turton by British scientists as a local species seems to be fair proof that it has no value whatsoever and is at best only an ecological form of the well known European *Physa fontinalis* Linné. Adding this species to the synonymy of *Physa fontinalis*, does not mean that the list of synonyms appended by Kennard and Woodward (1926, p. 99-100) to *P. rivalis* should be carried over at all. Many of their so-called synonyms are recognizable species.

Chemnitz's name being non-binomial cannot stand. Sowerby (1822) lists *Limnea (Physa) rivalis* as 'a species which has been admitted into the English catalogue, but we only know it to be found in Guadaloupe.' Subsequent authors have credited *rivalis* to Sowerby on the basis of this work. The figures given by Sowerby are excellent and as this constitutes the first recognizable figure of the West Indian form (in lieu of any description), the species really dates from Sowerby, but the name, of course, must be tabled as a homonym. The younger Sowerby (1873, species no. 31) also added to the confusion by quoting the earlier Sowerby, as to the name *P. rivalis*, but giving an entirely new locality, namely, Columbia River. This error was later copied by Clessin (1886, p. 331) who regarded *P. rivalis* as a good species, though elsewhere (1886, p. 281) he treats it as a synonym of *P. sowerbyana*, referring in both cases to the same figure contained in *The Genera of Recent and Fossil Shells*. The first available name for this West Indian form seems to be *Physa marmorata* Guilding. The synonymy would then be as follows:

Physa marmorata Guilding.

- 1822 *Limnea (Physa) rivalis* Sby., Genera of Recent and Fossil Shells. London, *Limnea. non Bulla rivalis* Turton, British Fauna, p. 169, 1807; *non Bulla rivalis* Mat. and Rack., p. 126, 1807; *non Physa rivalis* Potiez and Michaud, Galerie des Mollusques, vol. 1, p. 226, pl. 22, fig. 21-22, 1838.
- 1828 *Physa marmorata* Guilding, Zoological Journal, vol. 3, p. 534.
- 1845 *Physa brasiliensis* 'Koch', Phil.-Conch. Cab. (2), vol. 1, pt. 17, p. 10, pl. 1, fig. 18.

The distribution of *Physa marmorata* Gld. seems to be quite general as it is known from several of the Lesser Antilles and the northeastern part of South America. The following records are known (all being listed as *P. rivalis* Mat. and Rack.): Trinidad, (Guppy); Brighton, Grenada (E. A. Smith); Antigua (Pilsbry and Brown); St. Thomas (E. A. Smith); Para, Papary Lake and Ceara-Mirim, all in Brazil (Fred Baker).

This species is quite possibly a member of the genus *Aplexa*. Shell characters alone, however, are not sufficiently diagnostic

to render its exact determination possible. Irrespective, however, of its generic placement, the specific name will remain the same, as Sowerby's *rivalis* was listed as a *Physa*.

Fred Baker (1914, p. 661) records *P. sowerbyana* Orb. as a synonym of *P. rivalis* Mat. and Rack. A careful study of both figures and specimens separates these forms as quite distinct and demonstrates that *P. sowerbyana* is certainly a true *Physa* while *P. rivalis* (= *marmorata*), as stated above, is possibly an *Aplexa*.

H. B. Baker (1930, p. 36) in a recent publication on Venezuelan Mollusca has treated *Bulla rivalis* Mat. and Rack. as an *Aplexa* and has considered it as a member of the South American fauna. The citation of Hampshire, England, as the type locality by these authors precludes any assumption that their species was anything else other than British. This form considered by Baker is apparently *Aplexa peruviana* Gray.

P. rivalis Pot. and Mich. is a synonym of *Aplexa peruviana* Gray, the figures given by these authors being practically the same. The following synonymy is given for the Peruvian species:

Aplexa peruviana Gray.

- 1828 *Physa peruviana* Gray, Spic. Zool. pt. 1, p. 5, pl. 6, fig. 10. Between Lima and Callao.
- 1838 *Physa rivalis* Pot. and Mich., Gal. des Moll., Paris, vol. 1, pl. 22, fig. 21-22, p. 226; *non B. rivalis* Turton; *non B. rivalis* Mat. and Rack.; *non P. rivalis* Sby.
- 1839 *Physa peruviensis* 'Muhlfeldt', Anton, Verzeichniss der Conchylien welche sich in der Sammlung von H. E. Anton befinden, Halle no. 1785.¹
- 1845 *Physa antonii* Küster, Conch. Cab., vol. 1, pl. 17, p. 11, pl. 2, fig. 6-8.
- 1887 *Aplecta carolita* Jousseau, Bull. Soc. Zool. France, vol. 12, p. 184, pl. 3, fig. 5.
- 1887 *Aplecta martinidella* Cousin, Bull. Soc. Zool. France, vol. 12, p. 262, pl. 3, fig. 5. (*Nomen nudum* referring to the figure of *carolita*.)

¹ I have been unable to see this paper, but the same species with the name changed to *P. antonii* is described and figured by Küster in the *Conchylien Cabinet*.

1930 *Aplexa rivalis rivalis* Mat. and Raek., Baker, H. B.,
Occas. Papers Mus. of Zool. Univ. Michigan 210, p. 36.

An examination of several lots of *Physa*, distributed by local collectors as *P. heterostropha acuta* Drap. from southern California agree in description and figure with *P. osculans* Hald. described from Mexico. The name *P. fontinalis acuta* (Drap.) was first used by Hannibal (1912, p. 164) in an all inclusive synonymic grouping of the American Physidae.

The name *P. heterostropha acuta* appeared later as a modification of Hannibal's grouping. Hannibal's work has no basis of fact upon which to stand.

Haldeman first published *P. osculans* (1843, p. 29, pl. 2, fig. 11-13) with three figures. His figure 13, in the original diagnosis was said to probably be another species. Binney (1865, p. 83) in error, considering Haldeman's figures 11 and 12 to be *P. heterostropha*, assigned figure 13 to *osculans*. Fischer and Crosse (1886, p. 101) likewise noted the discrepancy in Haldeman's figures, assigning a new name for figure 11 (*conoidea*), limiting *P. osculans* to figure 12, but putting it in the synonymy of *P. mexicana* Phil. and definitely assigning figure 13 to the genus *Aplexa*, the species probably being *A. nitens* Phil.

A careful comparison of figures bears out these contentions that Haldeman's figure 13 is *Aplexa nitens*, but in regard to *P. osculans*, this name has priority of two years over that of *P. mexicana* Phil. Pilsbry (1891, p. 323) pointed out that *P. boucardi* C. and F. is also a synonym of *P. osculans*. The following is a résumé of the above, using Haldeman's plate figures for the final assortment of forms.

Physa osculans Haldeman.

- 1843 *Physa osculans* Haldeman, Mono. Limniades, pt. 6, p. 29, pl. 2, fig. 12.
1845 *Physa mexicana* Phil., Conch. Cab., vol. 1, pt. 17, p. 5, pl. 1, fig. 3-4.
1881 *Physa boucardi* C. and F., Journ. de Conch., vol. 29, p. 334; Miss. Sci. Mex., Moll. vol. 2, p. 102, pl. 30, fig. 4-4a.

- 1912 *Physa fontinalis scuta* (Drap.), Hannibal, Proc. Mala. Soc. vol. 10, p. 164 (part).

Physa conoidea C. and F.

- 1843 *Physa osculans* Haldeman (part), Mono. Limniades, pt. 6, pl. 2, fig. 11.
 1886 *Physa mexicana conoidea* C. and F., Miss. Sci. Mex., Moll. vol. 2, p. 101, pl. 39, fig. 8-8a.

Aplexa nitens Phil.

- 1837 *Aplexa suturalis* Beck, Index Moll., p. 117 (*nomen nudum*).
 1843 *Physa osculans* Haldeman (part), Mono. Limniades, pt. 6, pl. 2, fig. 13.
 1845 *Physa nitens* Phil., Conch. Cab. (2), vol. 1, pt. 17, p. 5, pl. 1, fig. 1-2.
 1886 *Aplecta nitens* Phil., Miss. Sci. Mex., Moll. vol. 2, p. 88, pl. 39, fig. 1a-1b.

F. C. Baker (1926, p. 197) in a revisional paper on some fresh water shells proposed that the name *Physella* Haldeman (1843, p. 38) should replace the name *Physa* in North America on the grounds that the North American forms differed anatomically from the European. Baker emended Haldeman's description, selecting the same type *Physa (Physella) globosa* Haldeman. An examination of the original specimens of Haldeman shows them to be materially different from any other known American *Physa*. As mentioned by Pilsbry (1925, p. 326) the nearest species in size and general form is that of *Physa (Petrophysa) zionis* Pils. Both of these species occupy very unusual habits. *P. globosa* is found on submerged rocks in the rapids at the mouth of the Nolachucky River in eastern Tennessee. *P. zionis* lives on the vertical canyon walls with algae in the seepage water of springs. This last species is from Zion Canyon, Zion National Park, Utah.

The specimens of *P. globosa* described by Haldeman are adult and as stated above differ materially from any other known form. For this reason Baker is in error in his use of the name *Physella*, which must be retained only for the single species

Physa (Physella) globosa, and not be used in the generic sense for many of the North American forms. The anatomy is still unknown, the two specimens of the original series are the only ones that have ever been found.

Haldeman's name *Physodon* (1843, p. 39) and its emendation by Baker is untenable for subgeneric use as the main character for which the name was established, on the presence of columellar teeth, is not a constant character at all and at best can only be considered of specific value. An examination of several hundred specimens from one locality of *P. microstoma* the type of *Physodon*, shows this character to be present in only a comparatively few individuals. Specimens of this species from other localities are entirely without the character.

Anatomically, there seems to be no justification as yet, to split this genus into groups worthy of generic or subgeneric headings other than *P. globosa* and *P. zionis*. By this is meant the forms that are normally associated with *P. fontinalis* (Linné) of Europe and *P. heterostropha* (Say) of North America. The elaboration of mantle digitations in *Physa fontinalis* (Linné) does not, in my opinion, constitute sufficient grounds to separate all North American forms when this same character, though less developed, in the American forms is stated by Baker (1928, p. 409) to be 'not constant enough to furnish criteria for specific determination.' Emendations of previous names, especially when such are not based on the original material are prone to lead to serious errors. Observations made by different authors on the same material or the same species adds materially to the sum of knowledge, but assumptions with no supporting facts lead to trouble and confusion. The emendations made by Baker cannot validate these names when their establishment in the first place was based, as with *Physella*, upon a species, the shell of which is absolutely different from all other *Physas* and with *Physodon* upon a character inconsistent within the species itself.

The subgenus *Alampetis* was proposed by von Martens (1898, p. 368) the type selected being *P. osculans* Hald. (first species under this name in his monograph), though he specifically mentions *P. ancillaria* Say as belonging to this subgenus as well. The main character upon which this subgenus was erected was that of a smooth surface as compared with a glossy surface as

exhibited by *P. fontinalis*. If such be held to be of taxonomic value, the species *Physa gyrina* Say could be classified under two subgeneric headings, as forms of this species, even from a single locality, exhibit both a dull and shining surface, due to the presence or absence of sculpture. This is also true of several other American species. With our present knowledge of these forms it seems best to relegate this name to the synonymy of *Physa*. If, however, the American forms must be placed in a different genus from the European for no other reason than that they happen to occupy two different continents, the name *Alampetis* would replace *Physella* Baker as it has twenty-six years' priority. The names would then stand as follows:

Alampetis v. Martens 1898, synonym of *Physa* Drap.

Petrophysa Pilsbry 1925, as a subgenus, type *P. zionis* Pilsbry.

Physella Baker 1926, synonym of *Physa* Drap.

Physella Haldeman 1843, as a subgenus, type *P. globosa* Hald.

Physodon Baker 1926, synonym of *Physa* Drap.

Physodon Haldeman 1843, synonym of *Physa* Drap.

F. C. Baker (1928, p. 408) has stated in very broad terms the distribution of the family Physidae as follows: 'Distribution: North America, Europe, Asia, East Indies, Africa, Madagascar, New Caledonia, Australia.'

Chamberlin and Jones (1929, p. 158) in their descriptive catalogue of Utah mollusks evidently obtained their information from Baker by stating the distribution of Physidae as follows: 'A nearly cosmopolitan family absent, however, from South America.'

It is exceedingly unfortunate that the above statements are on published record. Such general remarks are copied by zoogeographers and incorporated into papers dealing with the distribution of animals and inferences drawn which are not in accord with the facts. Representatives of Physidae are known from North America, Central America, South America, and the West Indies. They are also common in Europe and are *possibly* found across northern Asia. They are entirely absent from southern Asia, the East Indies, Madagascar, New Caledonia, and Australia. In Africa they are limited to the northern part,

which in reality is part of the south European fauna. Thiele's central African record is still open to question.

The omission of South America by Baker was assumed by Chamberlin and Jones to mean that Physidae was absent from there. South America has a large number of species of this family.

Cockerell (1929, p. 379) has recently recorded that 'New Caledonia is very rich in species of the genus *Physa*, and those I collected have a very ordinary appearance so far as can be seen from the shell One of the New Caledonian species, *Physa ventricosa* of Gassies, has been referred to *Bulinus*, which has nothing to do with true *Physa*.'

So far all New Caledonian forms investigated (both shell and soft parts) as well as material from other sources in the southern Pacific have proven to be *Bulinus* and not *Physa*. E. von Martens (1897, p. 6) stated that all of the forms from the East Indies and southern Pacific islands described as *Physa* were probably *Isidora* (= *Bulinus*). Suter (1913, p. 610) in his manual followed von Martens adding several other localities as areas from which the family Physidae is absent.

Physa distorta Haldeman.

Physa distorta Haldeman, originally described from Ohio, seems to be without much question the southern European *Bulinus contortus* Mich. An examination of the types with specimens of *B. contorta* contained in the collection at the Academy of Natural Sciences of Philadelphia shows them to be the same. The types are umbilicated as stated by Haldeman, a character not possessed by any known *Physa*. Haldeman also placed *P. distorta* in the subgenus *Diastrophia* Gray (now a synonym of *Bulinus*) which had as its type *Physa* (= *Bulinus*) *contorta* Mich.

1840 *Physa distorta* Haldeman, Supplement to Mono. Freshwater Univalve Moll. p. 2; *P. (Diastrophia) distorta* Haldeman, Mono. Freshwater Univalve Moll., 'Physidae', p. 35, 1843.

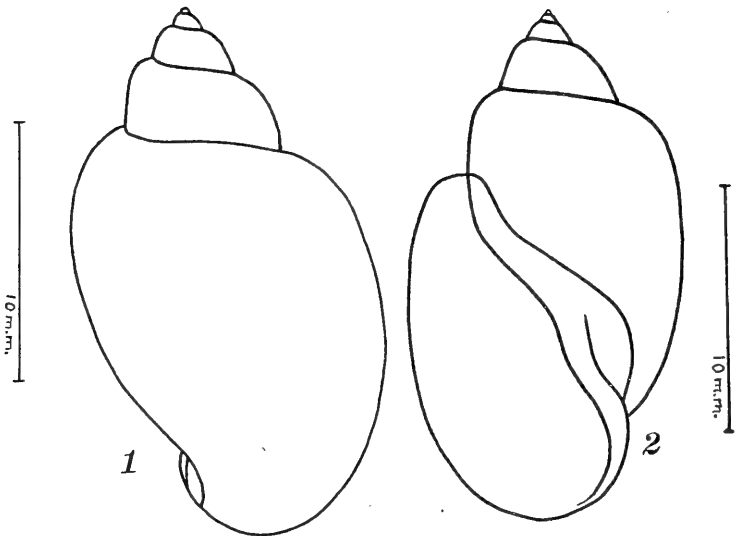
Physa hawnii Lea.

Physa hawnii was originally described from Verdigris River, Kansas. Under this name it has seemed to have remained entirely unknown. It has been known best as *P. albofilata*, a form of the same species from northern Arkansas. F. C. Baker (1928, p. 453) is certainly correct in placing *P. albofilata* in the synonymy of *P. hawnii*. They are practically identical in all characters. *Physa albofilata* was never described. Named by Ancey, then communicated to Sampson, it was distributed as such for many years. The casual remarks about its affinities (Sampson, *loc. cit.*) cannot be construed as constituting a description. *P. hawnii* is, however, quite separable from *P. gyrina* Say and should not be considered a variety of it as listed by Baker.

- 1864 *Physa hawnii* Lea, Proc. Acad. Nat. Sci. Phila. for 1864, p. 115; Journ. Acad. Nat. Sci. Phila. vol. 6, p. 165, pl. 24, fig. 84, 1866; Observations, vol. 2, p. 121, pl. 24, fig. 84, 1867.
- 1894 *Physa albofilata* 'Ancey' Sampson, Arkansas Geol. Surv., vol. 2, of Rep. for 1891, p. 194.
- 1901 *Physa gyrina albofilata* Sampson, Crandall, Nautilus vol. 15, p. 54.
- 1928 *Physella gyrina hawnii* Lea, Baker, Bull. 70, Wisconsin Geol. Nat. Hist. Surv. pt. 1, p. 453.

Physa salina, sp. nov.*Fig. 1 and 2.*

Description.—Shell sinistral, imperforate, rather large and elongate, medium heavy. Color, light yellowish brown. Whorls 5, rather flat; body whorl very large, nuclear whorl deep reddish brown and smooth. Spire produced. Aperture elongate-ovate, flaring basally. Palatal lip marginate. Parietal lip of only a thin callous on the body whorl. Columella heavy, twisted, and folded back over the inner side of the lip. Sutures very deeply impressed and sharply indented. Sculpture of very fine cross striae. Axial riblets occasionally produced by the grouping of several very fine axial lines.

FIG. 1 AND 2. *Physa salina* Clench.

Measurements

Length	Width	Ap. Length	Ap. Width	
20.5	11.	14.	6.5 mm.	Holotype
22.	12.	14.5	7.	Paratype
21.	11.	14.	7.5	"
19.	10.	13.	7.	"
21.	10.5	13.	6.5	"

Holotype.—M. C. Z. no. 79387; collected at a brackish spring, Skeen's Ranch, Promontory, Box Elder Co., Utah, in 1877. R. E. Call Collection.

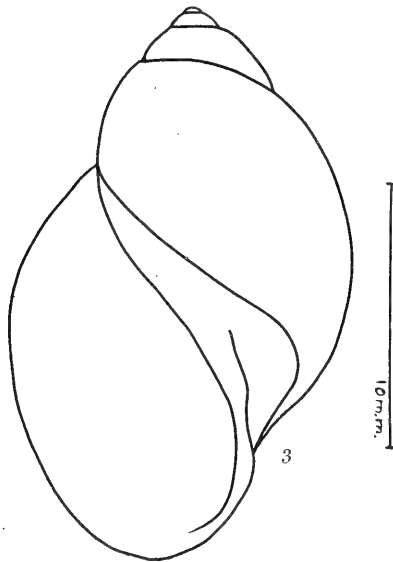
Paratypes.—M. C. Z. no. 4239; data same as for holotype.

Remarks.—This species is in all probability an offshoot of *P. smithiana* stock and can be placed after this species. Though slightly striate, it has nothing in common with *P. virgata* other than this character. *P. salina* is quite remarkable for possessing such straight sided whorls, and having very deeply indented sutures. This last character is not exceeded or even equalled by any other species of *Physa* known to me. Its straight sided whorls are quite similar to those produced in certain species of the genus *Bulinus*, especially *B. contortus* Mich.

Physa plena, sp. nov.

Fig. 3.

Description.—Shell large in size, imperforate, sinistral, globose to globose-ovate. Color light brown to dark straw sometimes tinged with vinous on the body whorl. Whorls 5, convex, last considerable inflated. Spire produced, less so on juvenile specimens. Aperture large, ovate or ovate elliptical, not notable flaring basally. Parietal lip of a moderately strong deposit on the body whorl. Palatal lip thin, marginate. Columella whitish, rather wide, slightly twisted and inclined a little to the left. Sutures impressed, though not deeply, usually margined inferiorly, with a light yellowish straw line. Sculpture of moderately fine growth lines, irregularly spaced, sometimes body whorl strongly malleated. An occasional indication of cross striae. Varicose bands brownish red when viewed from within the aperture, yellow-straw from without.

FIG. 3. *Physa plena* Clench.

Measurements.

Length	Width	Ap. Length	Ap. Width	
21.	13.	14.	8. mm.	Holotype
22.5	14.5	16.5	8.	Paratype
19.5	13.	14.5	7.5	"
19.	13.	14.5	8.	"
18.5	12.	13.5	6.5	"

Measurements—Continued.

Length	Width	Ap. Length	Ap. Width	Paratype
21.5	13.5	16.5	7.	"
20.	12.5	14.	6.5	"
18.5	12.	14.	6.5	"
18.	12.5	14.	6.5	"
18.5	11.5	12.5	6.5	"
17.5	11.	13.	6.	"
19.	11.5	15.	6.	"
19.	12.5	14.5	7.	"

Holotype.—M. C. Z. no. 51850; and paratypes, M. C. Z. no. 51851, collected at Reed Spring, Centerville, Reynolds Co., Missouri, by P. S. Remington.

Remarks.—A very large species, exceeded in size only among the east American forms by *Physa parkeri* DeCamp. The type series contains the largest examples, though these are only slightly larger than specimens of this species from other localities.

This is an apparent offshoot of *P. hawnii* stock and so far as known, is limited to the northern area of the Ozarkian region.

***Physa remingtoni*, sp. nov.**

Fig. 4.

Description.—Shell sinistral, imperforate, medium in size, rounded-elliptical. Color rather dark reddish horn, whorls 5, slightly shingled, well rounded. Whorl preceding body whorl decidedly convex. Spire rather short and obtuse.

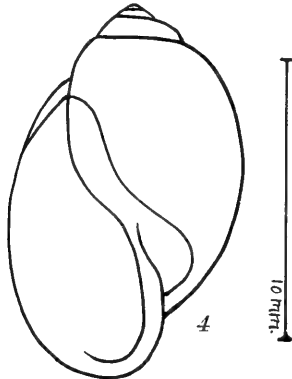


FIG. 4. *Physa remingtoni* Clench.

Aperture rounded-ovate, slightly flaring at the base, proportionately large for the size of the shell. Parietal lip as a very thin deposit on body whorl, usually margined by a fine hair-like line. Palatal lip usually labiate a little below edge, rather thin. Columella whitish, not twisted, inclined slightly to the left, terminating more or less gradually in the body whorl. Sutures only slightly impressed. Sculpture of numerous, more or less regularly spaced fine growth lines. Varicose bands yellowish externally, deep chestnut when viewed from within the aperture. Cross striae usually present but very fine, lacking in all juvenile specimens.

Measurements.

<i>Length</i>	<i>Width</i>	<i>Ap. Length</i>	<i>Ap. Width</i>		<i>Type</i>
13.5	8.	10.	4.5 mm.	U. of M. 32663	Holotype
13.5	8.5	9.5	4.5	Remington 1668	Paratype
13.	8.	9.	4.5	"	"
12.5	9.	10.	5.	"	"
13.	8.	9.	4.5	U. of M. 32664	"
13.	8.	9.	4.	"	"
12.5	8.	9.	4.	"	"
13.5	8.	9.5	4.5	M. C. Z. 50964	"
13.	8.5	9.5	4.5	"	"
12.5	8.	9.5	4.5	"	"
13.	8.5	10.	4.5	Walker 82647	"
12.	8.	9.	4.5	"	"
12.5	8.	9.5	4.5	A. N. S. P.	"
12.	7.5	8.5	4.5	"	"
12.	7.5	8.5	4.	U. S. N. M. 362881	"
11.5	7.5	8.5	4.	"	"

Holotype.—Museum of Zoology, University of Michigan, no. 32663; collected at Round Spring, 12 miles north of Eminence, Shannon Co., Missouri, by P. S. Remington, June 7, 1925.

Remarks.—A medium sized species, not readily associated with any other form. Its obtuse spire would seem to place it nearest to *P. microstoma* Hald.

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A REVIEW OF THE RACES OF *PICUS LINEATUS* LINNÉ.

BY JAMES L. PETERS.

RIDGWAY in the sixth part of the *Birds of North and Middle America* admitted three subspecies of *Ceophloeus lineatus* from Mexico and Central America, viz. *scapularis*, *similis* and *mesorhynchus*, the characters of *C. l. lineatus* also being shown in the key. Cory (*Cat. Birds Amer.* pt. 2, no. 2, 1919, p. 457-459) recognized the four races characterized by Ridgway and added *C. l. improcerus*, named by Bangs and Penard the year previously. In 1926 Chapman (*Bull. Amer. Mus. Nat. Hist.* 55, p. 370) showed that *C. fuscipennis* (Sel.) was only subspecifically distinct from *C. lineatus* thus bringing the number of recognized races to six. In this paper I have recognized the six forms referred to, and in addition have set up *leucopterylus* of Reichenbach for the birds from the extreme northeastern part of the range of the species, and have described the race inhabiting northwestern South America and Panama eastward of the Canal Zone.

Ceophloeus lineatus.

Specific characters.—Male with entire top of head and nape crimson with a conspicuous occipital crest of the same color; rest of upper parts including wings and tail black, or brownish black; outer scapulars white on the outer webs and tips, partially so on inner webs, forming a distinct stripe; circumorbital and auricular regions slaty gray; anterior part of lores buffy yellow continued as a narrow white suborbital stripe onto the sides of the neck where it becomes greatly widened, extending as a broad white stripe out to the sides of the chest; malar stripe dull crimson; throat white, the central portion of each feather more or less widely blackish; foreneck and chest black or brownish black, sides of chest and posterior underparts white or buffy, sometimes regularly barred with blackish bars of varying width, sometimes obsoletely barred or spotted. Basal half of inner webs (including shafts) of primaries and secondaries pale buffy yellow, lemon yellow or yellowish white, deeper on the inferior surface. Bill,

yellowish white, horn color, or dusky. Wing 167–200 mm.; bill 35–45 mm. Female, similar to the male but malar stripe slaty black and with pileum (but not the crest) black, auricular patch darker. Wing 170–197 mm.; bill 34–43 mm.

***Ceophloeus lineatus scapularis* (Vigors).**

Picus scapularis Vigors, Zool. Journ. 4, 1829, p. 354, San Blas (Nayarit), Mexico.

Subspecific characters.—Subocular and subauricular stripe indistinct or obsolete (except buffy loreal portion); ground color of posterior underparts buffy whitish, paler on sides, regularly barred with blackish brown; basal portion of flight quills pale buffy;¹ streaking on throat black and white in about equal amounts; bill whitish or pale horn color.

Size small. 1 male, wing 172 mm., bill 35.5 mm.; 1 female, wing 171 mm., bill 34 mm.

Specimens examined.—1 male and 1 female from Alamos, southern Sonora.

Range.—Western Mexico from southern Sonora south to western Oaxaca.

***Ceophloeus lineatus leucopterylus* (Reichenbach).**

Campephilus lineatus var. ? *c. leucopterylus* Reichenbach, Handb. Scans. Picinae, 1854, p. 392, pl. 647, fig. 4319, 4320. (Mexico.)

Subspecific characters.—Similar to *C. l. scapularis* but subocular and auricular stripe well developed; ground color of posterior under parts averaging more buffy; basal portion of flight quills much deeper buff. Size larger. Wing, 12 males, 177–189 (184) mm.; bill 37–40.5 (38.9) mm. Wing, 7 females, 169–185 (178.4) mm.; bill 34.5–37 (36.1) mm.

Specimens examined.—12 males and 7 females from State of Tamaulipas (Ciudad Victoria, Tampico, Altamira, Santa Leonor, Rio Martinez, Cañon Guiaves, Rio Santa Engracia).

Range.—Southern Tamaulipas and probably adjacent portions of San Luis Potosi, Nuevo Leon and Vera Cruz.

Remarks.—Ridgway declined to recognize a race of *Ceophloeus*

¹ Ridgway (Birds No. and Mid. Amer., pt. 6, 1914, p. 148) states that this color varies with the age of the specimen and freshness of plumage; this is true, but in some races this color is deeper than in others.

lineatus from northeastern Mexico because of the lack of any other character in addition to that of size; the mensural character along however is sufficiently great to be of subspecific value.

I believe that Reichenbach's name as cited must apply to this large northern race. There is no trouble in reconciling most of his measurements in inches and lines with the dimension in millimeters given here. I have omitted his detailed bill measurements because of the uncertainty of how they were taken; his tail measurements also can only be approximated. His wing of 7'' 4''' (if in Pied du Roi) corresponds to 183 mm. (191.5 mm. if in Rhineland foot), the tarsus, 1'' 2''' , about the maximum for Tamaulipas birds, I measure 1'' 1''' to 1'' 1 $\frac{3}{4}$ ''' , the measurements for the toes and claws being duplicated in Tamaulipas birds. *Campephilus leucorhamphus* Reichenbach is a synonym of *Picus similis* Lesson as will be shown under the next subspecies.

***Ceophloeus lineatus similis* (Lesson).**

Picus similis Lesson, Compl. Oeuvr. Buffon, 20, 1847, p. 204 (San Carlos, Republic of Central America = Salvador).

Subspecific characters.—Similar in color to *C. l. leucopterylus*; when seen in series perhaps a little less buffy below and less distinctly barred. Size smaller. 17 males, wing 167–180 (174.5) mm.; bill 35–41 (38.7) mm. 12 females, wing 170–179 (173.4) mm.; bill 34–39 (37.1) mm.

Specimens examined.—*Mexico*: Vera Cruz: Antigua, 1 female; Oaxaca: Chivela, 2 males, Lagunas, 1 female; Tapanatepec, 1 male, Sta. Efigenia, 1 male; Yucatan: Chichen Itza, 1 male, 1 female; San Felipe, 1 female; Quintana Roo: Camp Mengel, 1 female. *British Honduras*: Belize, 1 female. *Guatemala*: Motagua River, 1 male; Progreso, 1 male, 1 female; Secanquim, 1 female; Finca Cipres, 1 male; Finca Carolina, 1 male; Hacienda California, 1 male. *Honduras*: Lancetilla, 1 male; Le Ceiba, 1 male; Yaruca, 1 male, 1 female; boundary between Honduras and Nicaragua 180 miles from the Pacific Coast, 2 males. *Costa Rica*: Tenorio, 1 female; Bolson, 2 males, Barranca Punta Arenas, 1 female.

Range.—Southeastern Mexico in the lowlands at least from Central Vera Cruz and southeastern Oaxaca south through Central America to northwestern Costa Rica.

Specimens listed from Oaxaca show an approach to *scapularis* in the somewhat paler buff underwing; birds from northwestern Costa Rica average larger than specimens from the rest of the range, thus approaching *mesorhynchus*.

Remarks.—*Campephilus leucorhamphus* Reichenbach (*Handb. Scan. Picinae*, 1854, p. 393, pl. 648, figs. 4327, 4328, Mexico) is without much doubt referable to this subspecies. Using the measurement as in the foregoing race Reichenbach's wing of 6'' 9'' equals 168 mm., if in Pied du Roi, or 176.3 mm. if in Rhineland measurement.

***Ceophloeus lineatus mesorhynchus* Cabanis and Heine.**

Ceophloeus mesorhynchus Cabanis and Heine, *Mus. Hein.* pt. 4, heft 2, 1863, p. 86 (Costa Rica).

Subspecific characters.—Similar to *C. l. similis* but ground color of posterior underparts more brownish buff, the dark marking on that part of the body generally reduced to obsolete bars or spots; underwing slightly paler buff; bill blackish or bluish-black. Size averaging very slightly larger. 6 males, wing 172–181 (175.6) mm.; bill 36–42 (39.5) mm. 4 females, wing 174.5–184 (179.1) mm.; bill 36–39 (37.5) mm.

Specimens examined.—*Costa Rica*: Paso Real, 1 male; Pozo Azul, 1 female; Boruca, 1 male, 1 female; Pozo del Rio Grande, 1 male, 1 female; El General, 1 male, 1 female. *Panama*: Almirante, 1 male, 1 female; Chiriquicito, 1 male.

Range.—Costa Rica (except northwestern portion); western Panama.

Remarks.—This race is readily distinguished from the other Mexican and Central American forms by its dark bill (nearly black in skins). From the other dark-billed races occurring from the Canal Zone to Peru and eastern Brazil it may be told by its buff (rather than pale yellow or yellowish white) basal underwing surface, and generally by its smaller size. The specimen from Chiriquicito is intermediate between *mesorhynchus* and examples from the Canal Zone of the next form.

***Ceophloeus lineatus nuperus*, subsp. nov.**

Type.—Museum of Comparative Zoology no. 105969; adult male from La Concepcion, 3000 feet, Santa Marta, Colombia, collected February 13, 1899 by W. W. Brown.

Subspecific characters.—Similar to *C. l. mesorhynchus* Cabanis and Heine, but posterior underparts barred, giving a squamate appearance; pale underside of wings pale yellowish white instead of buffy.

This form differs from *scapularis* in having a well developed white subocular stripe, pale yellow instead of buff underwing basal surface, dark (instead of white) bill and slightly larger size. From *C. l. leucopterylus* it differs chiefly in pale yellowish white (instead of buff) underwing lining; dark (instead of white) bill and much smaller size. From *C. l. similis* it differs in the same respects as it does from *leucopterylus*, but is nearly the same size. From *C. l. lineatus* it differs in being more heavily streaked with black on the throat, in having the posterior underparts more broadly barred with black, with pale ground color more washed with buff and in being smaller. *Nuperus* differs from *improcerus* in being much more broadly barred and more buffy on the posterior underparts and being a deeper shade of yellowish white on the undersurface of the wings. It may be distinguished at a glance from *C. l. fuscipennis* by reason of the blackish shade of the plumage and black shafts on the wing and tail feathers, *fuscipennis* having the plumage washed with brownish, the shafts of the quills being distinctly brown. *Nuperus* requires no comparison with the very different *C. erythroptus* which is specifically distinct and which lacks the white scapular bar. Of the other two species in the genus, *schulzi* and *galeatus*, the former is entirely black below, and the latter has an unstreaked buff throat, completely barred underparts, and buff (instead of black) back, rump, and upper tail coverts.

Measurements.—10 males, wing 172–183 (177) mm.; bill 35–40.5 (38.6) mm. 2 females, wing 182–184 (183) mm.; bill 38.5–39 (38.75) mm.

Range.—Panama from the Canal Zone southward, Colombia west of the eastern Andes; the Santa Marta region.

Specimens examined.—Panama: Canal Zone, 3 males, 1 female; Darien, 2 males. Colombia: Rio Cauca, Guabinas, 1 male; Santa Marta Region, 4 males, 1 female.

***Ceophloeus lineatus lineatus* (Linné).**

Picus lineatus Linné, Syst. Nat. ed. 12, 1, 1766, p. 174 (Cayenne).

Subspecific characters.—Similar to *C. l. nuperus* but throat less heavily streaked, as a rule the white, greatly predominating; ground color of posterior underparts white, washed with yellowish buff; the bars broad, well defined and black with no trace of brown; base of lower mandible usually pale bluish horn. Size large. 9 males, wing 177–200 (189.8) mm.; bill 38–45 (41.9) mm. 5 females, wing 185–197 (188.8) mm.; bill 35–38 (37.1) mm.

Specimens examined.—Colombia: Villavicencio, 1 male. Venezuela: Trinidad, 1 male. Surinam: vicinity of Paramaribo, 6 males, 4 females. Peru: Perico, 1 male, 1 female.

Range.—Eastern Colombia to the Guianas and south to Amazonian Peru and northwestern Brazil. Eastern and southern limits not known. Hargitt records specimens in the British Museum from Chapada and Corumba, Matto Grosso; it has also been recorded from the Rio Pilcomayo. Birds from the southern localities may represent still another race.

Remarks.—Surinam birds may be regarded as topotypical of the subspecies. Compared with them the Trinidad specimen is small, having a wing of only 177 mm., in color characters it agrees well with Surinam birds and is doubtless referable to the same form. The pair from Perico have the large size of the typical birds, but the posterior underparts are suggestive of the *mesorhynchus* type of marking.

***Ceophloeus lineatus improcerus* Bangs and Penard.**

Ceophloeus lineatus improcerus Bangs and Penard, Bull. Mus. Comp. Zool. 62, no. 2, 1918, p. 58 (Bahia. Based on four Bahia 'trade skins.').

Subspecific characters.—Similar to *C. l. lineatus* Linné but ground color of posterior underparts usually pure white and black bars rather narrower; smaller.

Measurements.—2 males, wing 173–174 mm.; bill 38.5–42 mm. 2 females, wing 172–183 mm.; bill 35–38 mm.

Range.—Bahia, and probably other parts of eastern Brazil; limits not known.

***Ceophloeus lineatus fuscipennis* (Sclater).**

Dryocopus fuscipennis Sclater, Proc. Zool. Soc. London, 1860, p. 286 (Babahoyo, Ecuador).

Subspecific characters.—Similar to *C. l. mesorhynchus*, but the black parts of the plumage, particularly the breast, wings, and tail, decidedly brownish black; shafts of wing and tail feathers brown, paler than the quills.

Measurements.—2 males, wing 171–184 mm.; bill 39–40 mm. 1 female, wing 173 mm.; bill 39 mm.

Specimens examined.—Ecuador: Daule, 1 male, 1 female; San Jose, 1 female.

Range.—Western Ecuador and northwestern Peru.

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NOTES ON *SHEPPARDIA CYORNITHOPSIS* WITH
DESCRIPTION OF A NEW RACE.

BY HERBERT FRIEDMANN.¹

THE little aberrant thrushes sometimes known as akalats are scarce birds in collections, and their racial forms are consequently poorly understood. In the second part of his *Systema Avium Aethiopicarum* Sclater (1930, p. 477) lists three races of *Sheppardia cyornithopsis* and mentions a Nyasaland bird in another genus as *Alethe sharpei* (p. 480). This last is, however, not an *Alethe*, but a race of *Sheppardia cyornithopsis*. Sclater's arrangement of *Alethe* is unfortunate as it contains not only a *Sheppardia*, but two forms (*poliothorax* and *polioparea*) that are not even thrushes, but babblers of the genus *Illadopsis*.

Sheppardia cyornithopsis ranges from Cameroon across the Belgian Congo to Uganda and southwestern Kenya Colony, and also occurs in the Nyika Plateau, north of Lake Nyasa. Between the last named locality and the Lumbwa country in southwestern Kenya Colony the species was not known to exist. Consequently, it was rather surprising to find that Loveridge had obtained three specimens of this species in the Uluguru Mountains. These appear to represent an undescribed form, which I take pleasure in naming after the distinguished ornithologist of Harvard University, to whom I am indebted for the privilege of studying the splendid Tanganyikan material under his care.

Sheppardia cyornithopsis bangsi, subsp. nov.

Type.—Museum of Comparative Zoölogy no. 134507; adult male, collected in the Uluguru Mountains, Tanganyika Territory, May 23, 1921, by Arthur Loveridge.

Subspecific Characters.—Somewhat intermediate between *sharpei* of the Nyika Plateau and *aequatorialis* of Uganda and southwestern Kenya Colony. It agrees with the former in having wide white superciliaries, and the whole

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of the abdomen (except the sides and flanks) white; and agrees with *aequatorialis* in the ochraceous wash of the orange-tawny of the throat and breast; differs from both in being slightly more greenish olive (less brownish olive) above; tail longer than in *sharpei* (51 mm. as against 45 mm. in *sharpei*).

Range.—Known only from the Uluguru Mountains.

Remarks.—The races of *Sheppardia cyornithopsis* are as follows:

1. *S. c. cyornithopsis* (Sharpe). Found in the rain forest of Cameroon.

2. *S. c. lopezi* (Alexander). This is said by Sclater (*loc. cit.*) to inhabit the Uele, Ituri, and Semliki districts of the Belgian Congo. Similar to the nominate form, but the sides and flanks less reddish, more brownish.

3. *S. c. aequatorialis* (Jackson). This form occurs from the mountain forests west of Lake Albert, east through Uganda to Mt. Elgon, Kakamega-Kaimosi, and the Lumbwa country, southwestern Kenya Colony. This race resembles *lopezi*, but has the underparts more ochraceous and the white abdominal area considerably more restricted in size.

I do not know if the birds of the Kivu district are *aequatorialis* as indicated by Sclater. Gyldenstolpe (*Kunzl. Sv. Vet. Akad. Handlgr.*, 1924, p. 159) refers a bird from the Kivu region to this race with the comment that when more material from there becomes available, the Kivu birds may prove to be a distinct form.

4. *S. c. sharpei* (Shelley). A race known only from the unique type, taken on Masisi Hill, Nyika Plateau, north of Lake Nyasa. This form differs from all the above in having rather wide white superciliaries and a black loreal spot; tail 45 mm.

5. *S. c. bangsi* Friedmann. From the Uluguru Mountains. Similar to *sharpei* in having wide white superciliaries and a black loreal spot, and in the extent of the white abdominal area; otherwise similar to *aequatorialis*; tail 51 mm.

An immature female of *bangsi* resembles the adults, but has tawny orange terminal shaft stripes on the feathers of the forehead and crown.

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A ROCK THRUSH NEW TO SCIENCE FROM NORTHERN
KENYA COLONY.

BY HERBERT FRIEDMANN.¹

AMONG the isolated mountain masses of eastern Africa few that have been so little worked have yielded as many endemic forms as have the Urageess—Lololokui peaks. The distinctness of their avifauna is so marked that as experienced a worker as van Someren (*Nov. Zool.* 29, 1922, p. 49) in discussing the races of the Turaco, *Turacus hartlaubi*, was willing to admit the distinctness of a race from Urageess without having seen any material, ' . . . because the avifauna of that district is most remarkable.' The rock thrush described in this paper is the latest addition to the unusual fauna of this interesting mountain area.

Petrophila rufocinerea tenuis, subsp. nov.

Type.—United States National Museum no. 217733; adult male, collected at the summit (6,000 feet) of Mt. Lololokui, on September 15, 1911, by Edmund Heller.

Subspecific characters.—Generally paler, especially on the breast and abdomen, than either the nominate form or the southwestern Arabian race, *sclateri*; the dark tips of the rectrices as in *sclateri*, 10–13 mm. wide.

Range.—Known only from the type locality.

Remarks.—In his description of *sclateri* (*Nov. Zool.* 24, 1917, pp. 459–460) Hartert writes that there, ' . . . is probably a third race in East Africa. A male collected by William Doherty on the Escarpment, Kikuyu Mountains, has the brown on the inner web of the outer rectrices nearly 15 mm. wide, and a wing of about 90 mm. A female from the same place has also rather much brown on the lateral rectrices, while two young females are rather brown on the upperside. More material will very likely show the Kikuyu bird to belong to a third subspecies,

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for it can hardly be the Arabian form, and its habitat is also far away from Abyssinia and north Somaliland.'

Van Someren (*loc. cit.*, p. 241) obtained two birds at Naivasha which agreed with the Arabian form, but not with Doherty's birds. He raises the question as to whether *sclateri* may not be migratory. I have seen no material from southern Kenya Colony and therefore cannot say much about either Doherty's or van Someren's birds. However, experience with other birds would lead me to feel that their birds may be a fourth race, but hardly the same as those inhabiting the Uraguess-Lololokui area. For one thing, the paler coloration is so uniform in the three birds from the latter region that Hartert would have noted it, had it been present in Doherty's Kikuyu series.

Material examined.—*Petrophila rufocinerea rufocinerea*: 2 adult males, 4 adult females, 1 immature male, all from Ethiopia; *Petrophila rufocinerea tenuis*: 1 adult male, 2 adult females, from Mount Lololokui.

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THE FORMS OF THE WHITE-BROWED ROBIN-CHAT,
COSSYPHA HEUGLINI HARTLAUB.

BY HERBERT FRIEDMANN.¹

THE treatment of the forms of the White-browed Robin-chat in Sclater's *Systema Avium Aethiopicarum* (pt. 2, 1930, p. 470-471) is incomplete and, as far as the material examined by me is concerned, inaccurate. He lists three races; I recognize five, one of which is new at this point. The new one is the most southeastern of the five and extends the known range of the species southward along the coast for about 500 miles beyond the limits given by Sclater. It may be known as

Cossypha heuglini euronota, subsp. nov.

Type.—Museum of Comparative Zoology no. 134467; adult female, collected at Lumbo, Mozambique, on July 17, 1918, by Arthur Loveridge.

Subspecific characters.—Similar to *intermedia* of coastal Kenya Colony, but much more olive greenish above, having practically no slate blue on the upper back; slightly paler below. Size as in *intermedia*. In other words, it has the coloration of *heuglini* and the dimensions of *intermedia*.

Measurements of type.—Wing 83, tail 79, culmen from base 20 mm.

Range.—Known only from the type locality. It may be that Thomson's Rovuma birds and Grote's Mikindani specimens (*Journ. f. Ornith.*, 1913, p. 141) are of this form.

Remarks.—The races of this bird may be briefly summarized as follows:

1. *C. h. heuglini* Hartlaub: from the Omo valley and extreme southern Shoa (under 5000 feet), to the Upper White Nile, west to Darfur and the Shari River, south throughout Uganda (except in southern Ankole Province) and the western half of Kenya Colony to the Ikoma district and the Usambara Mountains, Tanganyika Territory.

2. *C. h. occidentalis* Reichenow: south Ankole, and the eastern

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Ituri district, Belgian Congo, to Ruanda and Lake Kivu. Similar to *heuglini* but very much darker and richer rufous below, and generally darker above.

3. *C. h. intermedia* (Cabanis): the coastal belt of eastern Africa from the Juba River south to the Pangani River. Similar to *heuglini* but darker below (not as dark as *occidentalis*), and smaller (wings in males, 90-98 as against 100-108 mm. in the nominate form; wings in females 82-88 as against 89-95 mm. in *heuglini*.)

4. *C. h. euronota* Friedmann: range and characters as given above.

5. *C. h. subrufescens* Bocage: Nyasaland, west through northern Rhodesia and the Katanga to Loango and Angola, south to northern Bechuanaland, Mashonaland, and the northeastern Transvaal. This race differs from the first four in that it has the middle pair of rectrices blackish brown, not olive brown.

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NEW SNAKES FROM COSTA RICA AND PANAMA.

BY EMMETT R. DUNN.¹

WHILE on Barro Colorado Island in July, 1930, Mr. James Zetek showed me some snakes which he had taken on the Island and in the neighborhood of Ancon. Among the latter was a species of *Sibynophis* which seems new and remarkable. It may be called

Sibynophis zeteki, sp. nov.

Type.—Museum of Comparative Zoology no. 29060.

Type locality.—Ancon, Canal Zone, Panama.

Diagnosis.—Close to *S. venustissimus* of Nicaragua and Costa Rica, but with light instead of black snout, and with black rings in contact with the red bands instead of light.

Description.—Female: scales 17; ventrals 142; anal divided; caudals 65 +; oculars 1-2; temporals 2-2; supralabials 8, infralabials 10; third, fourth, and fifth supralabials in contact with eye; four infralabials in contact with anterior chin shields which are much longer than those posteriorly; snout white; black dots on the labials under the eye; parietals and nape black; black dots on postoculars, temporals, and last labial; a light ring two scales long followed by a black ring $1\frac{1}{2}$ scales long back of nape; this followed by a red band 9 scales long, the scales tipped with black; then black, yellow, black, each ring two scales long; then red again. etc.; 12 red bands on body, varying in length from 9 to 3 scales; tail with three broad red bands separated by three black rings which in turn are separated by light rings; the combination about equal to one red band, and being made up in about the proportion of 1 black, 1 yellow, 6 black, 1 yellow, 1 black; throat and belly light; a black dot on each subcaudal; length 531 mm., tail 166 mm., imperfect.

Remarks.—The arrangement of color bands in this species is that of *Lampropeltis*, while the arrangement in *S. venustissimus* is that of *Micrurus*. The scalation is scarcely different from that of *S. venustissimus*. The type locality of *S. venustissimus* is Matagalpa, Nicaragua. I have also seen specimens from

¹ Contribution from the Department of Biology, Haverford College, No. 3.

Bluefields, Nicaragua, and from Rio Banana, Bonilla, Colombaria, and Zent, Costa Rica.

The genus *Sibynophis* is interesting in its distribution. *S. collaris* of southern Asia has been compared with *S. annulatus* of Mexico and Guatemala and found generically identical. The genus is not found in either the United States or South America. Thus it is not, strictly speaking, Neotropical. There are a number of similar cases which I hope to treat later in a distributional paper.

Sibynophis seems to have four American species which may be distinguished as follows:

A. Not ringed; striped anteriorly, uniform posteriorly; 181 ventrals.

Sibynophis sumichrasti (Bocourt).
Henicognathus sumichrasti Bocourt,
1886, Miss. Sci. Mex., p. 628, pl. 41,
fig. 5; Tehuantepec, Mexico.

AA. Ringed; 135-157 ventrals.

B. Ringed with black, yellow, black, and red anteriorly; uniform or striped posteriorly. . . . *Sibynophis annulatus* (Duméril and Bibron).

Enicognathus annulatus Duméril
and Bibron 1854, Erp. Gen. vol. 7,
p. 335, pl. 80, fig. 1; Mexico. (I have
seen it from Tabasco and Guatemala.) The British Museum has it
from Vera Paz.

BB. Ringed throughout.

C. Ringed with red, yellow, black, yellow, red; snout black.

Sibynophis venustissimus (Günther).
Henicognathus venustissimus Günther
1894, Biol. Centr. Amer., p. 144,
pl. 51, fig. C; Matagalpa, Nicaragua,
(Also Bluefields, Nicaragua, and
Rio Banana, Bonilla, Colombaria,
and Zent, Costa Rica.)

CC. Ringed with red, black, yellow, black, red; snout white.

Sibynophis zeteki Dunn. Ancon,
Canal Zone, Panama.

In addition to the original localities for specimens of the genus *Trimetopon* (Cartago and San Jose, Costa Rica), specimens have been seen from La Palma, Turrialba and Reventazon (= La Junta), Costa Rica, and from Ancon and Pedro Miguel in the Canal Zone. These are easily divisible into three species, two of which need naming.

- A. Prefrontals fused; ventrals 141-154; scales 15-17; a white dot on each scale.....*Trimetopon gracile* (Günther).

This is *Ablabes gracilis* Günther 1872, Ann. Mag. Nat. Hist. (4), 9, p. 18, pl. 3, fig. D; Cartago, Costa Rica; type, Brit. Mus. Nat. Hist. no. 71-11-22-19, 20. It includes *Trimetopon phiolepis* Cope 1885, Proc. Amer. Phil. Soc. 22, p. 177; San Jose, Costa Rica. The British Museum has it from Turrialba and from La Palma. I have taken it from the latter locality.

- AA. Prefrontals fused; ventrals 122; scales 15; uniform, back of head white.

Trimetopon simile, sp. nov.

- AAA. Two prefrontals; ventrals 141-153; scales 15; a lateral white stripe.

Trimetopon barbouri, sp. nov.

***Trimetopon simile*, sp. nov.**

Type.—Museum of Comparative Zoology no. 15263, received from the Museo Nacional de Costa Rica.

Type locality.—Reventazon, Costa Rica (= La Junta).

Description.—Scales 15; ventrals 122; anal divided; caudals 69; prefrontals fused; oculars 1-2; temporal 1-1; supralabials 7, infralabials 7; third and fourth supralabials are below the eye; four infralabials are in contact with the anterior chin shields which are longer than those posteriorly; black, white below; head white as far forward as middle of frontal, and including third labial; a black spot on seventh labial; length 155 mm., tail 50 mm.

***Trimetopon barbouri*, sp. nov.**

Type.—Museum of Comparative Zoology no. 23877.

Type locality.—Pedro Miguel, Canal Zone, Panama.

Description.—Male: scales 15; ventrals 153; anal divided; caudals 58; oculars 1-2; temporals 1-1; two prefrontals; two nasals; supralabials 7, infralabials 8; third and fourth supralabials in contact with eye; four infralabials in contact with anterior chin shields; darkish, light below; no light collar; a stripe from eye to fifth and sixth labials; a stripe from parietal on second temporal and seventh labial; a light stripe on fifth scale row and upper half of fourth; first, second, and one-half of third rows lighter; length 260 mm., tail 65 mm.

Variation.—Of four from Ancon (Mus. Comp. Zool. no. 23873-23876) two have ventrals 141 and 149.

Remarks.—The genus is composed of these three obviously related forms, but *barbouri*, with its normal prefrontals, is not very remote from some of the Central American forms of *Liophis* (*Rhadinea*), approaching such forms as *calligaster* and *seperaster*.

In another direction I believe it has affinities with *Leptocalamus* (the coloration of *simile* is like that of *Leptocalamus torquatus*) and with *Arrhyton*. The hemipenis of the three is quite similar and peculiar.

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LAND SHELLS FROM LUBANG ISLAND,
PHILIPPINES.

BY WILLIAM J. CLENCH AND ALLAN F. ARCHER.

THE following list and new forms are based upon a collection made by Señor Pedro de Mesa, formerly of Lubang Island, now a resident of Calapan, Mindoro, Philippine Islands. It is quite probably complete in the larger forms of land mollusks to be found on this small island.

Lubang Island is situated some 17 miles off the northwestern end of the Island of Mindoro and about 25 miles west of Luzon. Its mollusk affinities are quite apparently with those of Luzon and not Mindoro, although there are a few species common to all three islands. Perhaps the most outstanding of the Lubang element is that of *Helicostyla cepoides* Lea. The affinities of this species are clearly with those of the *Helicobulinus* group of Luzon and the Central Philippines. Likewise the presence of *H. pithogostra* on Lubang is another connecting link with the Luzon fauna. This species is widely distributed throughout Luzon and the Central Philippines, but is not known to occur in Mindoro.

Helicostyla cincinniformis, another species peculiar to the Island, belongs in the section *Hypselostyla*, a stock which is found largely in Luzon and the central Philippines, and probably had its start in Luzon. It has no known representatives in Mindoro.

The authors are indebted to Mr. E. G. Vanatta for the determination of *Pseudhelicarion compactus* Q. and M., and to Señor de Mesa for his kindness in supplying the material for study.

1. *Pseudhelicarion compactus* Quad. and Mllf.
2. *Hemiglypta blainvilliana* Lea.
3. *Rhysota ovum* Val.
4. *Obba listeri* Gray.
5. *Obba planulata* Lam.
6. *Eulota fodiens* Pfr.
7. *Chloraea fibula* Brod.
8. *Helicostyla cepoides* Lea.
9. *Helicostyla pithogastra* Fér.
10. *Helicostyla cincinniformis* Sby.

Pl. 17, fig. 3.

Helix cincinniformis Sby. 1841, Proc. Zoöl. Soc. London, p. 17; *Bulimus cincinniformis* Pfr. 1848, Monogr. 2, p. 9; Pfr. 1850, Conchyl. Cab. 1, pt. 13, sec. 1, p. 181, pl. 53, fig. 6, 7; Reeve 1849, Conch. Icon. 5, pl. 6, fig. 28; Desh. in Fér. 1850, Hist., pl. 157, fig. 3, 4; *Helicostyla cincinniformis* Pils. 1892, Man. of Conch., 8 ser. 2, p. 18; *Cochlostyla cincinniformis* Semper 1912, Reis. im Arch. der Phil., 10, p. 262; *C. cincinniformis unitaeniata* Mllf. Semper 1912, *op. cit.*, p. 263, fig. 6.

The form *Cochlostyla cincinniformis unitaeniata* Mllf. refers to a figure representing a typical specimen of *H. cincinniformis*, and therefore is an absolute synonym.

H. cincinniformis appears to be the most abundant form of this group on Lubang.

11. *Helicostyla cincinniformis lubanensis*, var. nov.

Pl. 17, fig. 1.

This variety is very distinct from *Helicostyla cincinniformis* Sowerby as figured by Pilsbry (Man. of Conch. part 2, vol. 8, p. 18, 1892, pl. 6, fig. 21, 22, 24) in being without the dark brown bands at the periphery, at the base, and at the sutures. A few specimens, however, show a slight tendency towards producing mikado brown bands at the periphery and suture, but in some individuals these are obsolete.

Description.—Shell imperforate, ovate-conic, moderately thin, quite transparent in young specimens. White or ivory yellow, the latter color being usual in young specimens, while in adults it is chiefly present in the parietal region. Mikado brown subsutural and peripheral bands present in some

individuals, but obsolete in others. The bands frequently tessellated with cartridge buff hydrophanous spots.

Nuclear whorl slightly depressed in most individuals, but succeeding whorls rapidly descending to body whorl. Whorls $5\frac{1}{2}$ to 6. Body whorl slightly angulate medially. Aperture quadrate, showing a broad angle at the juncture of the columella and the parietal wall, and wide at its base. Peristome thin, narrow, but sharply reflected. Columella wide above and fairly straight, but gradually narrowing where it shades off into the base of the aperture.

The aperture of *H. cincinniformis* is more oblique than that of *H. cincinniformis lubanensis*, while the columella of the former is straight and rather thick above, becoming sharply constricted below, contrasting with the almost straight columella of the latter. In the general varieties of shape and size *H. cincinniformis* and *H. cincinniformis lubanensis* are practically alike.

Alt.	Diam.	Ap. Length	Ap. Width	
50	31	21	15 mm.	Holotype, M. C. Z. no. 79166
42	27.5	19	13.5	Paratype, M. C. Z. no. 79165
44.5	30.5	20.5	15.5	" " " "
42.5	27	20	13	" " " "

Holotype.—M. C. Z. no. 79166. *Paratypes*.—M. C. Z. no. 79165. Pedro de Mesa, collector, Lubang, P. I.

12. *Helicostyla cincinniformis tritaeniata* Milf.

Pl. 17, fig. 2.

13. *Helicostyla cincinniformis ultima*, var. nov.

Pl. 17, fig. 4.

Description.—Shell, ovate-conic, moderately thin. White at nuclear whorl shading off into an ivory yellow ground color on the body whorl and the preceding whorl. Lower two-thirds of body whorl covered with seal brown wash which in turn shades off into ivory yellow at the parietal region. This wash terminates at the edge of the peristome. Seal brown band above the sutures sometimes extending below the sutures, but fading out as it approaches the nuclear whorl. Median line of the body whorl and margins above and below the sutures often tessellated with cartridge buff hydrophanous spots.

Nuclear whorl slightly flattened, moderately descending to the body whorl. Whorls $4\frac{3}{4}$. Body whorl angulated at mid-line. Aperture quadrate, forming rather broad angle at the point where the columella and parietal wall meet. Peristome narrow, thin, sharply reflected, tinged with seal brown at the edge. Columella straight, thin, narrowing where it shades into the peristome.

Alt.	Diam.	Ap. Length	Ap. Width	
35.5	25	18	13 mm.	Holotype, M. C. Z. no. 79169
43	31	20.5	15	Paratype, M. C. Z. no. 79170
42.5	39.5	20.5	14	" " " "
31.5	24	16.5	12	" " " "

Holotype.—M. C. Z. no. 79169. *Paratypes*.—M. C. Z. no. 79170. Received from P. de Mesa June, 1929, who collected them in Lubang, P. I.

Remarks.—This variety differs from *H. cincinniformis* as well as the two previous varieties in being smaller and squatter. There is a complete lack of the dark brown bands of the straight species, but instead a new element comes in, *viz.*, the seal brown wash on the body whorl. This, too, is the color of the supersutural and subsutural bands, while the usual hydrophanous yellow spots appear at the angle of the body whorl, and on the upper and lower margins of the suture.

14. *Helicostyla cincinniformis demesana*, var. nov.

Pl. 17, fig. 5.

Description.—Shell squat, ovate-conic, rather thin; nuclear whorl cacao brown; ground color of shell white, having cacao brown bands on the periphery of the body whorl, above and below the sutures, and at the base around the columella. In addition, as in the previously described variety, there is a seal brown wash which covers the lower two-thirds of the body whorl as far as the base. Bands, subsutural, supersutural and peripheral, tessellated with cartridge buff hydrophanous spots, absent, however, in the region of the nuclear whorl.

Nuclear whorl less flattened than in the previous variety. Whorls 5, body whorl being rather angulate medially.

Aperture widely quadrate, forming a broad angle at the juncture of the columella and parietal wall. Peristome thin, narrow, rather sharply reflected, tinted with cacao brown. Columella as in previous variety straight, thin, slightly constricted where it blends with the peristome.

<i>Alt.</i>	<i>Diam.</i>	<i>Ap. Length</i>	<i>Ap. Width</i>	
35.5	25.5	17	13.5 mm.	Holotype, M. C. Z. no. 79171
31.5	24.5	16	12	Paratype, M. C. Z. no. 47216
32.5	24	15.5	11	" " " "
32.5	25.5	16.5	13	" " " "
32.5	23.5	15.5	11	Archer collection 4801.

Holotype.—M. C. Z. no. 79171; received from P. de Mesa, June, 1929, who collected it in Lubang, P. I.

Remarks.—This variety differs from *H. cincinniformis* in its smaller size, and its squattiness. Morphologically it is like the previous variety, *H. cincinniformis ultima*. Moreover it has the same seal brown wash on the body whorl, but resembles the typical form in having the same set of bands.

15. *Leptopoma immaculatum* Chem.16. *Leptopoma kejong*, sp. nov.

Pl. 17, fig. 6.

Description.—Shell perforate, acutely turbinate, rather thin, translucent, apex acute, obtusely carinate.

Embryonic whorl glassy with few exceedingly fine raised spiral threads. Color milky white or consisting of axial zigzag streaks of Sayal brown very faint on the early whorls. On body whorl below the periphery the axial color streaks usually become straight and extend into the umbilicus, and in addition are fainter.

Sculpture consisting of innumerable very minute spiral threads, occasionally become slightly wavy at irregular intervals. Growth lines very fine and less pronounced than the spiral lines. A few examples in the type series have four or five more or less pronounced spiral riblets.

Whorls 5, convex, suture impressed.

Aperture rounded, but not holostomatous, reflected, inner lip consisting only of a very faint callous, just thick enough to cover the sculptural character of the body whorl. Columella nearly straight, slightly reflected over the umbilical area.

Alt.	Diam.	Ap. Length	Ap. Width	
12.5	12.5	7	6.5 mm.	Holotype, M. C. Z. no. 47224
11.5	12	6	5.5	Paratype, M. C. Z. no. 47225
11.5	12.5	6.5	5.5	“ “ “ “
12	12.5	6.5	6	“ “ “ “
11	11.5	6.5	6	“ “ “ “

Holotype.—M. C. Z. no. 47224. *Paratypes.*—M. C. Z. no. 47225. Lubang Island; Pedro de Mesa, collector, 1929.

Remarks.—This species is quite specifically distinct from *Leptopoma immaculatum* Chem. from this same locality. *L. immaculatum* is much larger and has a more pronounced sculpture both in the development of the spiral threads and riblets. On the Lubang specimens of *L. immaculata* there is far less tendency to produce the axial color areas.

17. *Cyclophorus reevei* Hid.18. *Cyclophorus reevei lubanicus*, var. nov.

Pl. 17, fig. 7.

Description.—Shell perforate, turbinate, rather thick, with a prominent apex.

Embryonic whorl white, shading into Vandyke brown on next three whorls. Beginning at second whorl, a series of axial Vandyke brown stripes forming a solid band of color on the early whorls and gradually becoming more distinctly

striped on the later whorls. The base of the body whorl is a solid band of the same color. This solid band extends up to just a little below the periphery. The color in between the stripes is ivory white.

Sculpture consisting of very fine threadlike spiral lines crossed by very faint axial striae. A series of about five very well defined riblets begins a short distance below the periphery and extends to the suture. These riblets have their origin just beyond the embryonic whorl and extend as far as the peristome. Body whorl slightly descending the last one quarter of the whorl before the aperture. Whorls $5\frac{3}{4}$, convex, regularly increasing. Peristome heavy, nearly holostomatous, outer rim duplex, minutely laminated, reflected. Inner lip thinly calloused on body whorl.

Alt.	Diam.	Ap. Length	Ap. Width	
16	14	6.5	6.5 mm.	Holotype, M. C. Z. no. 47221
15.5	14	6	6	Paratype, M. C. Z. no. 79175
15.5	14.5	6.5	6	" " " "
16	15	6.5	6.5	" " " "
16	15	7	6	" " " "

Holotype.—M. C. Z. no. 47221. *Paratypes*.—M. C. Z. no. 79175. Pedro de Mesa, collector, Lubang, P. I. Received from Pedro de Mesa, June 10, 1929.

Remarks.—This form is smaller than the type species. However, it resembles it in color and shape, though the aperture is inclined at a greater angle. *C. reevei* is reported from Tablas, Mindoro, and Lubang. An examination of specimens of *C. reevei* from Lubang reveals some which apparently intergrade with this new variety.

19. *Helicina ignava*, sp. nov.

Text fig. 1.

Description.—Shell, depressed conic, imperforate, rather thick, spire acute. Embryonic whorl citron yellow, and succeeding whorls of same color. Base of shell slightly lighter in tone.

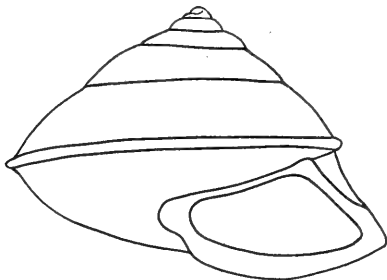


FIG. 1. *Helicina ignava*.

Sculpture consisting of axial striae which begin just beyond the embryonic whorl and continue as far as the edge of the peristome. On the last whorl these lines cross the periphery and continue to the columella. Suture slightly impressed especially at the embryonic and nepionic whorls, and at the body whorl it is paralleled by a supersutural depression which continues onward above the periphery as far as the peristome. Periphery sharply keeled.

Embryonic whorl high and abruptly merging into later whorls. Body whorl somewhat rounded above periphery, but rather flat at the base, and slightly descending at aperture. Peristome expanded with area of depression behind it. Columella flat, slanting outwards and forming a definite angle at the juncture with the base of the peristome. Though imperforate, there is a depression at the umbilical region, which is quite well defined.

<i>Alt.</i>	<i>Diam.</i>	<i>Ap. Height</i>	<i>Ap. Width</i>	
9	12.5	4.5	5 mm.	Holotype, M. C. Z. no. 79176
9	12.5	4.5	5	Paratype, M. C. Z. no. 47227
8.5	12	4.5	5	" " " "
8.5	12	4	5	" " " "

Holotype.—M. C. Z. no. 79176. *Paratypes*:—M. C. Z. no. 47227. Lubang Island, Pedro de Mesa, collector, 1929.

Remarks.—There are two Philippine species that are more or less closely allied to this one. These are *H. acuta* Sby. and *H. acutissima* Sby. *H. ignava* differs from *H. acuta* in being higher spired and in possessing an umbilical depression. It differs from *H. acutissima* in having a solid yellow color and in not possessing a subsutural band of color. Two specimens in the Museum of Comparative Zoölogy collection from Agcalatao, Tablas, are very close to this form, but differ sufficiently in minor detail to be held subspecifically distinct. These are a little smaller and the umbilical depression is much less developed. For this subspecies we propose the name *Helicina ignava tablasensis*.

EXPLANATION OF PLATE 17.

FIG. 1. *Helicostyla cincinniformis lubanensis* Clench and Archer. Holotype
M. C. Z. no. 79166.

FIG. 2. *Helicostyla cincinniformis tritaeniata* Milf.

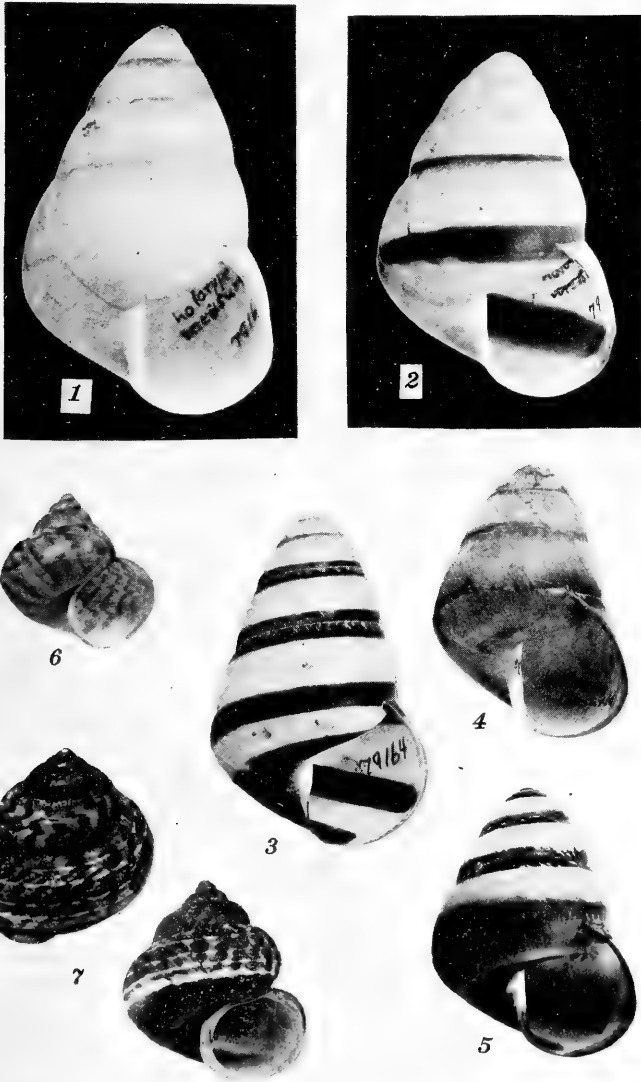
FIG. 3. *Helicostyla cincinniformis* Sby.

FIG. 4. *Helicostyla cincinniformis ultima* Clench and Archer. Holotype,
M. C. Z. no. 79169.

FIG. 5. *Helicostyla cincinniformis demesana* Clench and Archer. Holo-
type, M. C. Z. no. 79171.

FIG. 6. *Leptopoma kejong* Clench and Archer. Holotype, M. C. Z. no.
47224. About $1\frac{1}{2}$ \times .

FIG. 7. *Cyclophorus reevei lubanicus* Clench and Archer. Holotype (lower
figure), M. C. Z. no. 47221. About $1\frac{1}{2}$ \times .



CLENCH AND ARCHER ON LAND SHELLS FROM LUBANG ISLAND.

Occasional Papers
OF THE
Boston Society of Natural History.

NEW LAND ISOPODS FROM NEW ENGLAND.

(ON ISOPODA ONISCOIDA, SECOND PAPER.)

BY CHARLES H. BLAKE.

IN the course of my collecting trips in New England I have taken two members of the family Trichoniscidae which appear to be undescribed. One belongs to the typical subgenus of *Trichoniscus*, the other to Kesselyák's recently proposed genus *Miktoniscus*.

The record of *Trichoniscus demivirgo* from Mount Desert Island and Figure 1, *g-h* are published with the kind permission of Mr. William Procter, Director of the Biological Survey of the Mount Desert Region, to whom my best thanks are due.

Trichoniscus (Trichoniscus) demivirgo, sp. nov.

Fig. 1, *a-h*.

Description of female.—The ground color is salmon. This is overlain by a heavy, dark brown reticulation. The general form of the body is about as in *T. caelebs* (= *pusillus* G. O. Sars). The surface of the head, terga, and uropods is densely scaly. The head and dorsum are sparsely beset with short setae. Tubercles are wanting. Length, 3.2-4.0 mm.

The eyes are conspicuous and triocellate. The antennal lobe is nearly semicircular, slightly angulated ventro-laterally, and ends abruptly ventrally to the middle of the eye. The anterior margin of the lobe bears three small spines, rather distant from one another. Seen from above, the medio-anterior margin of the lobe is slightly excavate.

The telson has the posterior margin slightly excavate and provided with a pair of fine spines just medial to the corners. Adventitious additional spines may occur still more medially.

The mouthparts are as in other members of the subgenus. The thoracic legs and the uropods show nothing noteworthy, except that the uropods are strongly divergent.

The pleopods are especially distinguished by the strong development of the lateral scaly areas on the bases of the first two pairs and the exopod of the second pair. The endopod of the third pair is about as wide as long and has a

well-marked lateral lobe. The medial and posterior margins are somewhat indented or crenate. The endopod of the fifth pair has the lateral margin concave and crenate. Exopods I-III and V exhibit the characteristic forms shown in Fig. 1, e-h.

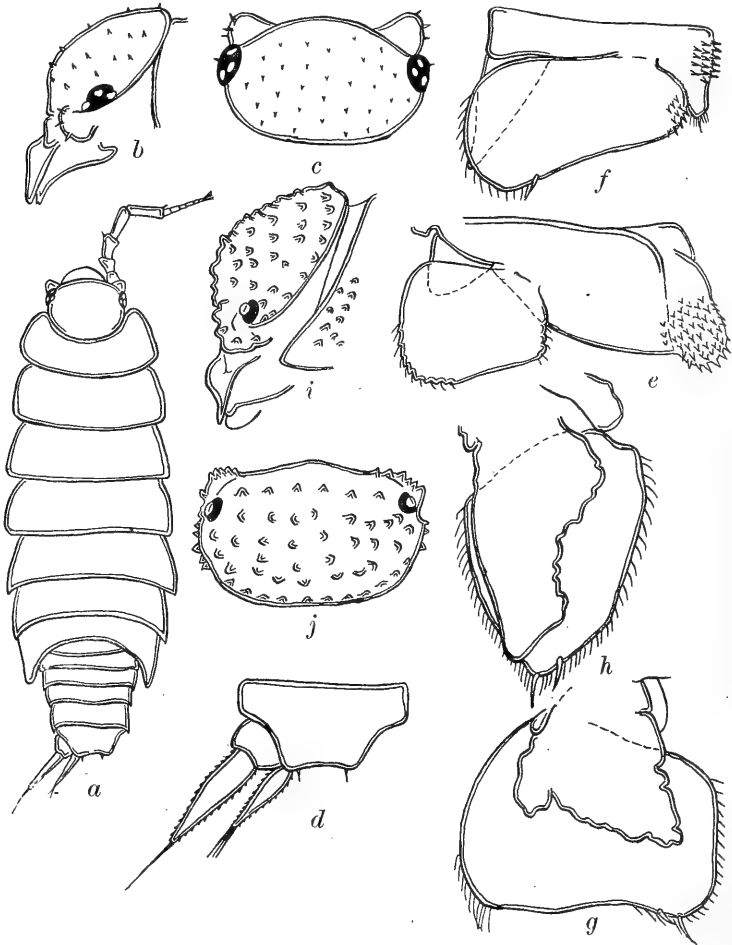


FIG. 1, a. *Trichoniscus demivirgo*, dorsal view of female.
 b. " " " lateral view of head.
 c. " " " dorsal view of head.
 d. " " " telson and left uropod.
 e. " " " pleopod I (Sharon specimen).
 f. " " " pleopod II (Sharon specimen).
 g. " " " pleopod III (Mount Desert Island specimen).
 h. " " " pleopod V (Mount Desert Island specimen).
 i. *Miktoniscus halophilus*, lateral view of head, female.
 j. " " " dorsal view of head, female.

Of this species, belonging to the so-called *caelebs* group, only the female has so far been taken.

Type.—A female from Middlesex Fells, Mass., is in the collection of the Boston Society of Natural History (Crust. 1144). Cotypes are in the author's collection (M196).

Occurrence.—This species has been taken in damp, shady places, under stones or the decaying leaves and wood of deciduous trees. It avoids exclusively coniferous woods. It is distinctly gregarious.

Distribution.—Maine: Mount Desert Island (Biol. Surv. Mt. Desert Region),? Westbrook (Norton 1909, p. 251, as *T. pusillus*); Mass.: Middlesex Fells (type locality), Boston, Forest Hills, Sharon, Woods Hole, Nantucket.

Remarks.—The simultaneous examination of specimens from several localities has enabled me to form an idea of the range of variation shown by the pleopods in this species and to supplement the characters noted above.

Pleopod I. The scales on the lateral portion of the basis are sharply pointed. (Compare this with *Miktoniscus halophilus*, p. 345.) The exopod is very constant in outline, with the posterior margin slightly convex and the posterior margin distinct and about half as long as the medial. The setae at the postero-medial angle are variable, even entirely wanting. The endopod is marked by its triangular form with the medial margin sagittal, not oblique, and forming a distinct postero-medial angle.

Pleopod II. The scales on the lateral portion of the basis are again sharply pointed. The tip of the lobe is provided with a few setae. The basal lateral margin has about six scales standing out from the margin at right angles to it. The endopod barely exceeds the medial margin of the exopod. The exopod has the posterior margin slightly concave. The lateral margin is two-thirds as long as the medial. The spine at the postero-medial corner is not always present.

Pleopod III. The exopod is nearly rectangular with the posterior margin slightly concave. One prominent spine is always present at the postero-medial corner and a second, smaller spine sometimes occurs just lateral to it. The endopod, excluding the lateral lobe, is subtriangular, crenate on both free margins. A marked indentation, of variable size, is present on the lateral

margin near the tip. The whole organ is quite variable in its details.

Pleopod IV is intermediate between III and V in form.

Pleopod V. The exopod appears to be ovate but is actually four sided. The true posterior margin is bounded by the tip and by an angulation about one-third the way up the lateral margin. A terminal spine seems to be always present, a second, smaller spine sometimes occurring lateral to the first.

In spite of the variation noted above, certain characters, especially the details of the exopods and the general outlines of the endopods are very constant. These with the form of the antennal lobe may be taken as diagnostic of the species. From my study of *T. demivirgo* and comparison with available figures, I am strongly in favor of Racovitza's view that it is possible to distinguish the females of this subgenus in the absence of males.

The present species adds another name to the list of those which would, according to Verhoeff, fall into the composite species *T. caelebs*. The *caelebs* question has been recently discussed in detail by Herold (1929). My own view of the matter, after a careful consideration of the various views, is to avoid the formation of a composite species and to restrict *T. caelebs* to the form described by G. O. Sars (1898, p. 161, pl. 72, fig. 1) as *T. pusillus*. It is greatly to be desired that the parthenogenetic females be studied sufficiently to enable them to be placed under definite specific names.

The subgenus Trichoniscus.—I think that there is now no doubt that this name should be applied to the group which Racovitza designated as *Spiloniscus*. The subgenus is a rather large one, but I have not found any characters which yield a satisfactory basis for a further division. It is probable that when we have a more detailed knowledge of the general structural characters of the various species this division may be possible.

The nearly 30 species which may be assigned to this subgenus can be arranged in convenient, if somewhat artificial, groups as shown in the following key.

- | | |
|--|---|
| 1. Ocelli wanting | 2 |
| 1. Ocelli one on each side, dorsum tuberculate | ? <i>thielei</i> Verhoeff. |
| | (This may belong in <i>Miktoniscus</i> .) |
| 1. Ocelli 3 (2-5) on each side | 3 |

2. Dorsum tuberculate.....*tenebrarum* Verhoeff.
 2. Dorsum not tuberculate.....*gachassini* (Giard).
 3. Dorsum tuberculate.....*bureschi* Verhoeff.
 inferus Verhoeff, *pygmaeus* Sars,
 sorrentinus Verhoeff,
 3. Dorsum not tuberculate.....*alemannicus* Verhoeff,
 biformatus Racovitza, *caelebs* Verhoeff,
 caroli Verhoeff, *corcyraeus* Verhoeff,
 demivirgo Blake, *elisabethae* Herold,
 fragilis Racovitza, *maritimus* Verhoeff,
 muscivagus Verhoeff, *nivatus* Verhoeff,
 noricus Verhoeff, *omblae* Verhoeff,
 plävicensis Verhoeff, *provisorius* Racovitza,
 rhenanus Gräve, *riparius* Dahl, *simplicifrons*
 Verhoeff, *sulcatus* Verhoeff, *verhoeffi* Dahl.

The genus *Miktoniscus* Kesselyák (1930) removes from *Trichoniscus* the species characterized by the presence of monocellate eyes, tuberculate dorsum and one and two penicils respectively on right and left mandibles. It is further distinguished by peculiarities of the seventh pereopods and first two pairs of pleopods in the male. I extend it here to include, besides the genotype *M. linearis* (Patience) and the new *M. halophilus*, also *M. chavesi* (Dollfus), comb. nov., which is doubtfully distinct from *linearis*. It is probable that *Trichoniscus thielei* Verhoeff belongs here.

***Miktoniscus halophilus*, sp. nov.**

Fig. 1, *i-j*; Fig. 2, *a-i*.

Trichoniscus halophilus Blake (1930, p. 279), *nomen nudum*.

Description.—The female, when alive, is salmon colored. This color fades out after death, leaving a yellowish, cutaneous pigment. The pereion has two submedian bands of white spots (fenestrae in the pigmentation). The surface of the head and pereion is thickly, but irregularly, beset with acute tubercles. The first three pleon segments bear each a row of tubercles. Length of body, 4.5–4.7 mm.

The eyes are densely black, each provided with a single large lens. The antennal lobe is large and seen from the side, semicircular.

The tip of the telson is truncate and without spines. The terminal margin may be either slightly concave or convex.

The appendages show nothing of especial note. Pleopods I–III and V are shown in Fig. 2, *f-i*. The scales on the lateral portion of pleopod I are blunt ended.

The male is a little more slender than the female and shows the usual sexual peculiarities of the pleopods and pereopod VII (Fig. 2, *c-e*). Otherwise, the two sexes are alike. Length, 4.3–4.5 mm.

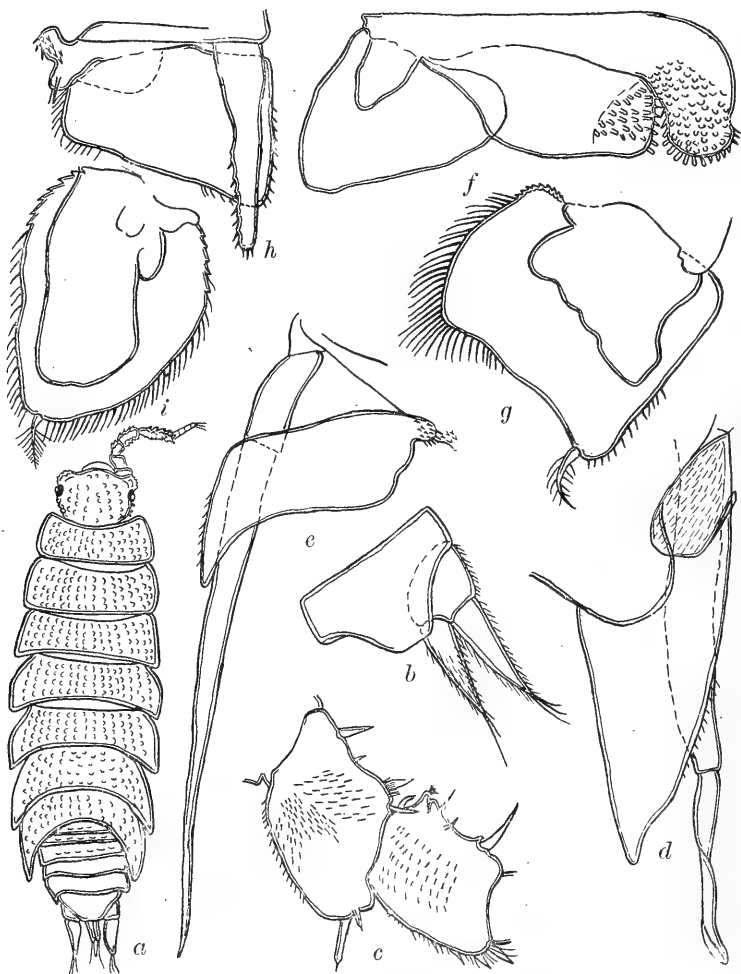


FIG. 2. *a.* *Miktoniscus halophilus*, dorsal view of female.
b. " " " " telson and right uropod, male.
c. " " " " segments 4-5, pereopod VII, male.
d. " " " " pleopod I, male.
e. " " " " pleopod II, male.
f. " " " " pleopod I, female.
g. " " " " pleopod III, female.
h. " " " " pleopod II, female.
i. " " " " pleopod V, female.

The male pleopods are subject to some variation. The lateral margin of the exopod of pleopod I may or may not have a reentrant angle about one-third the distance from tip to base. The inner distal angle of the basis may be rounded or rectangular. The serration of the inner margin of the exopod of pleopod II is almost imperceptible. The medial margin of the basis of pleopod I is produced basally into a lobe which is folded over ventrad.

The medial, distal, scaly area on the third segment of pereopod VII is replaced by rows of minute spines, doubtless representing scales. There is a marginal double row of these spines, one-third the length of the margin, and two shorter sub-marginal rows rather distinctly separated from each other. The indentation of the medial edge of the fifth segment is sub-basal, not median as in *linearis*.

Type.—A male from Katama, Marthas Vineyard, Mass., is in the collection of the Boston Society of Natural History (Crust. 1146). Cotypes, male and female, are in the same collection (Crust 1147) and in the author's collection (M223).

Occurrence.—This species appears to be exclusively an inhabitant of salt marshes and similar situations. I have taken it in company with *Armadillidium vulgare*, *Porcellio scaber*, *Philoscia muscorum*, and once with *Armadilloniscus ellipticus*.

Distribution.—Mass.: Woods Hole, Katama on Marthas Vineyard (type locality), and between Shimmo and Polpis on Nantucket.

Remarks.—The present species differs from *linearis* in being stouter, lacking spines at the tip of the telson, and having tubercles only on the first three pleon segments. *Trichoniscus thielei* lacks tubercles on the second pleon segment. *Halophilus* may be further distinguished from both *linearis* and *chavesi* by details of the pleopods I–II in the male.

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Occasional Papers
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DISTRIBUTION OF NEW ENGLAND WOOD LICE.

(ON ISOPODA ONISCOIDA, THIRD PAPER.)

BY CHARLES H. BLAKE.

THE records in the literature pertaining to the Oniscoida of New England are so few as to be of little assistance in determining their real distribution. My collecting trips of the past two years have resulted in a considerable number of records which add materially to our knowledge.

In addition to the more specific distributions indicated under the various species, it is now possible to draw some general conclusions. First, no wood lice are found in the White Mountain area above an altitude of 650-700 feet. Similar lacunae have not yet revealed themselves in the Green Mountains and the Berkshires but my collecting in the latter regions has not been so detailed: Second, there is a well-defined halophilous group, the Scyphacidae and *Miktoniscus*. Third, a few forms are coastal or southern in distribution, for example, *Armadillidium vulgare*.

I am very grateful to Mr. William Procter, Director of the Biological Survey of the Mount Desert Region, for his permission to include, from the records of the Survey, the species from Mount Desert Island, Jonesport, and Beals Island, Me. Thanks are also due to Mr. S. N. F. Sanford of the Boston Society of Natural History for enabling me to examine all the material of this group in the collection of the Society.

Family LIGYDIDAE.

LIGYDA Rafinesque.

Ligyda oceanica (Linné).

This species I have not taken personally. The only record is Newport, R. I. (Harger 1880, p. 310). I have, however, seen a cast skin on the rocks at East Gloucester, Mass. It is, of course, halopetrophilous.

Family TRICHONISCIDAE.

TRICHONISCUS Brandt.

Subgenus *Trichoniscus*, s. str.**Trichoniscus (Trichoniscus) demivirgo** Blake.

I have no records to add to the distribution of this species (Blake 1931, p. 343). It occurs near the coast from Mount Desert Island, Me. to Nantucket, Mass.

MIKTONISCUS Kesselyák.

Miktoniscus halophilus Blake.

To the distribution (Blake 1931, p. 347) of this species also I have nothing to add. It appears to be distinctly southern and may eventually be found on the salt marshes of Rhode Island and Connecticut.

CORDIONISCUS Gräve.

Cordioniscus stebbingi (Patience).*Trichoniscus stebbingi* Patience (1907, p. 42).

This species, which is new to the New England fauna, I have only from a hothouse in Cambridge, Mass. It occurs under pots where it is both wet and muddy.

Family SCYPHACIDAE.

SCYPHACELLA S. I. Smith.

Scyphacella arenicola S. I. Smith.

This species has been reported within New England only from Woods Hole and Nantucket, Mass. (Harger 1880, p. 308). It may be found eventually on many sand beaches from Monomoy Island west.

ARMADILLONISCUS Uljanin.

Armadilloniscus ellipticus (Harger).

I have already reported (1930, p. 281) on the distribution of this animal.

Family ONISCIDAE.

ONISCUS Linné.

Oniscus asellus Linné.

Previous records.—Me.: Freeport (Rathbun 1905, p. 45).

Mass.: Woods Hole (Rathbun 1905, p. 45), Salem, Beverly (Richardson 1905, p. 600).

R. I.: Providence (Rathbun 1905, p. 45).

Conn.: New Haven (Kunkel 1918, p. 240).

New Records.—Me.: Mount Desert Island, Jonesport (Biol. Surv. Mt. Desert Region), Blue Hill, Farmington.

N. H.: Center Harbor.

Mass.: Bridgewater (Coll. Boston Soc. Nat. Hist.), Prides Crossing, Nahant, Middlesex Fells, Cambridge, Boston, Roxbury, Sudbury, Needham, Blue Hills, Sharon, Nantucket.

R. I.: Barrington (Coll. Boston Soc. Nat. Hist.).

The distribution of this species is still very imperfectly known. It appears to be rather generally distributed, at least near the coast, from New Haven to Boston. The only inland records are Farmington, Me., Center Harbor, N. H., and Sudbury, Mass. North of Boston it seems to be definitely synanthropic.

PHILOSCIA Latreille.

Subgenus *Philoscia* Verhoeff.

Philoscia (*Philoscia*) *muscorum* (Scopoli), var. *sylvestris* (Fabricius).

I have followed the view of Dahl and Herold as to the name of this variety.

Previous records.—Mass.: Barnstable, Woods Hole (Harger 1880, p. 307), Salem (Richardson 1905, p. 605).

Conn.: Stony Creek (Harger 1880, p. 307).

New records.—Me.: Mount Desert Island (Biol. Surv. Mt. Desert Region), Blue Hill.

Mass.: East Braintree (Coll. Boston Soc. Nat. Hist.), Nahant, Roxbury, Sharon, Duxbury, Wellfleet, Edgartown, Nantucket.

R. I.: Riverview, Newport.

Herold (1929, p. 616) has pointed out that this form is definitely associated with soils of a marked salinity. This is apparently true in New England. The only exception known to me is Sharon, Mass.

Family PORCELLIONIDAE.

CYLISTICUS Schnitzler.

Cylisticus convexus (De Geer).

Previous records.—Mass.: Mt. Lebanon (Stuxberg 1875, p. 62), Warwick (Richardson 1905, p. 610).

Conn.: New Haven (Kunkel 1918, p. 243).

New records.—Me.: Mount Desert Island, Jonesport (Biol. Surv. Mt. Desert Region), Blue Hill, Strong, Gilead.

Mass.: Prides Crossing, Roxbury, Needham, Dennis, Woods Hole.

A general statement of the distribution of this species can not yet be made. In Maine it is evidently synanthropic.

PORCELLIO Latreille.

Subgenus *Porcellio* Dahl.

Porcellio (Porcellio) pictus Brandt, comb. nov.

Previous records.—Conn.: Goshen (Rathbun 1905, p. 46), New Haven (Kunkel 1918, p. 244).

New records.—Me.: Hampden.

Vt.: Larrabees Point (under stones on the shore of Lake Champlain).

Mass.: Dover, Sudbury.

R. I.: Wickford (on the beach).

The highly discontinuous distribution of this species as known at present is doubtless due to its usually xerophilous habits and the corresponding paucity of suitable locations.

Porcellio (Porcellio) scaber Latreille.

Previous records.—Me.: Freeport (Rathbun 1905, p. 46).

Mass.: Lawrence, Woods Hole (Rathbun 1905, p. 46), Salem, Beverly, Penikese Island (Richardson 1905, p. 622).

Conn.: West Haven (Rathbun 1905, p. 46), New Haven (Kunkel 1918, p. 246).

New records.—Me.: Mount Desert Island, Jonesport, Beals Island (Biol. Surv. Mt. Desert Region), Quahog Bay¹ (Coll. Boston Soc. Nat. Hist.), Blue Hill.

Mass.: Bridgewater, North Wrentham (Coll. Boston Soc. Nat. Hist.), Prides Crossing, Boston, Roxbury, Blue Hills, Sudbury, Wellesley, Needham, Duxbury, Cedarville, Dennis, Wellfleet, Mashpee, Edgartown, Nantucket.

R. I.: Wickford.

This species, unlike *P. pictus* is strongly hygrophilous and hence, more coastal in distribution. It is very sharply localized

¹ No state given on label.

in its inland occurrences. Toward the north it is somewhat synanthropic.

PORCELLIONIDES Miers.

Subgenus *Porcellionides*, nom. nov.

Metaponorthus Verhoeff (1918, p. 129).

Porcellionides (*Porcellionides*) *pruinus* (Brandt), comb. nov.

Previous records.—Mass.: Beverly, Salem (Richardson 1905, p. 628).

New record.—Mass.: Boston.

This form is definitely synanthropic in New England.

TRACHELIPUS Budde-Lund.

Trachelipus Budde-Lund (1908, p. 281); *Tracheoniscus* Verhoeff (1917, p. 209).

Subgenus *Trachelipus*, nom. nov.

Tracheoniscus Verhoeff (1917, p. 210).

Trachelipus (*Trachelipus*) *rathkei* (Brandt), comb. nov.

Previous records.—Me.: Freeport (Rathbun 1905, p. 46), Portland, Westbrook, Washington Junction (Norton 1909, p. 251).

Mass.: Lawrence, Lanesboro (Rathbun 1905, p. 46), Salem, Beverly (Richardson 1905, p. 617).

R. I.: Providence (Rathbun 1905, p. 46).

Conn.: New Haven (Kunkel 1918, p. 247).

New records.—Me.: Mount Desert Island, Jonesport, Beals Island (Biol. Surv. Mt. Desert Region), Blue Hill, Brooklin, Hampden, Newport, Farmington, Strong, Dixfield, Gilead.

N. H.: Lancaster, Glen, North Woodstock, Center Harbor.

Vt.: Guildhall, Walcott, Charlotte.

Mass.: Middlesex Fells, Cambridge, Boston, Roxbury, Needham, Sudbury, Sharon, Williamstown.

R. I.: Riverview, Smithfield.

Conn.: Kent.

The wide distribution of this form is correlated with its moisture requirement which is intermediate between and less restricted than those of *P. scaber* and *P. pictus*. A discussion by Dahl (1916, p. 63) is illuminating in this connection. It should

be noted that this species is entirely absent from southeastern Massachusetts where it is replaced by *P. scaber* even in the less moist places.

Family ARMADILLIDIIDAE.

ARMADILLIDIUM Brandt.

Subgenus *Armadillidium* Verhoeff.

Armadillidium (*Armadillidium*) *vulgare* (Latreille).

Previous records.—Mass.: (Gould 1841, p. 336), Salem (Richardson 1905, p. 666).

R. I.: Providence (Rathbun 1905, p. 47).

Conn.: New Haven (Kunkel 1918, p. 252).

New records.—Mass.: Nahant, Cambridge, Boston, Brookline, Roxbury, Mattapoisett, Wellfleet, Mashpee, Woods Hole, Edgartown,

R. I.: Riverview, Wickford.

This species is distinctly southern in distribution, occurring as far north as Salem, Mass., and only near the coast. I have not found it even at Sharon where *Philoscia muscorum* occurs.

Armadillidium (*Armadillidium*) *nasatum* Budde-Lund.

Armadillidium quadrifrons Stoller (1902, p. r211).

Previous record.—Mass.: Cambridge (Blake 1929, p. 11).

New record.—Conn.: Middletown.

Like *Cordioniscus stebbingi* this is a hothouse species.

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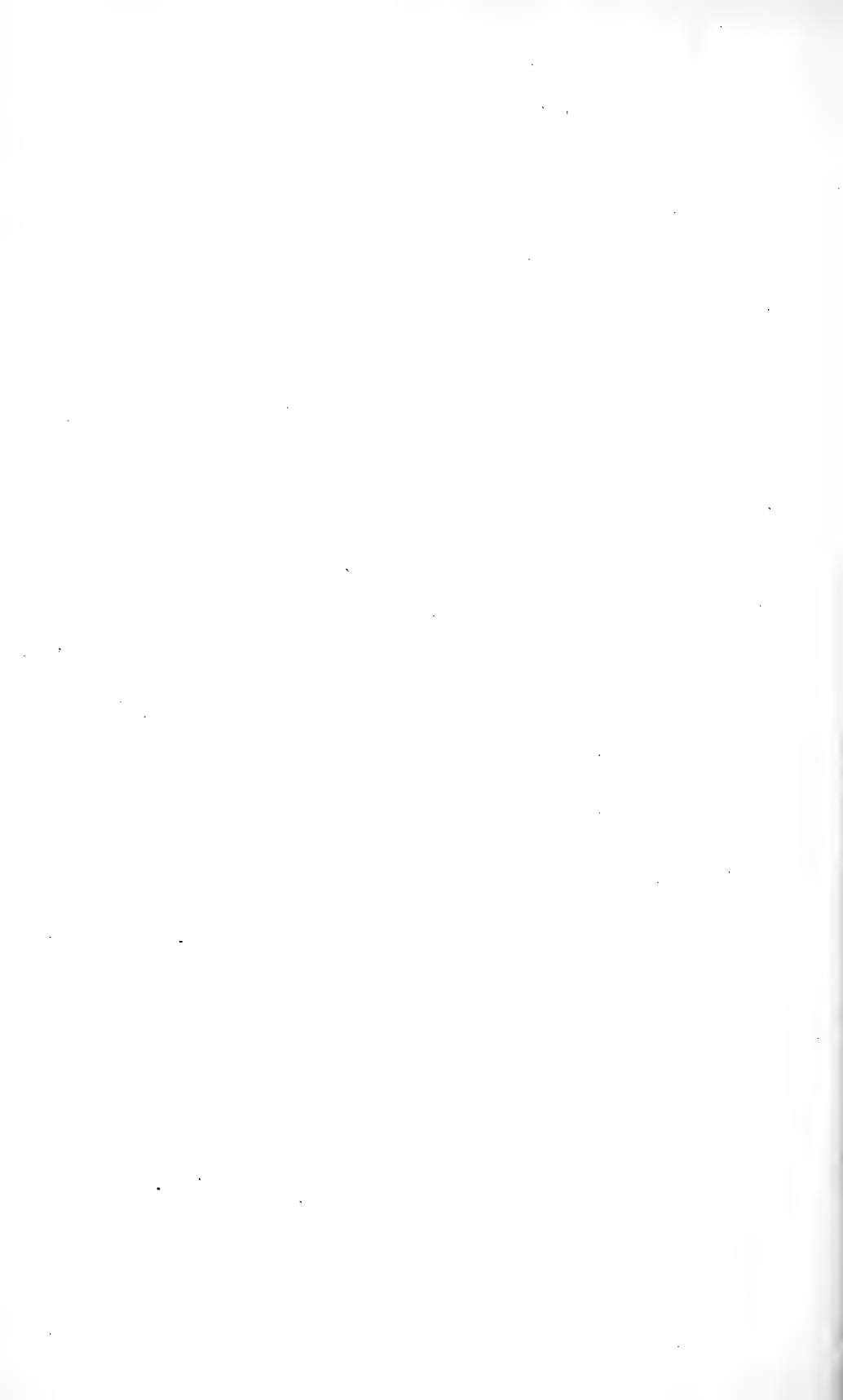
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Occasional Papers
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STUDIES OF AFRICAN LAND AND FRESH-WATER
MOLLUSKS.

I. ON SOME AFRICAN SPECIES OF *BULINUS*.

BY JOSEPH BEQUAERT AND W. J. CLENCH.

DR. P. L. Le Roux, Veterinary Research Officer of the Union of South Africa, has recently sent for identification several species of *Bulinus*, some of which are of importance in the life cycle of trematodes. Considerable difficulty was experienced in attempting to name them. We trust that the following notes, with the appended photographs, may contribute to a better understanding of the genus.

In the course of our studies we have been brought to suggest some synonymies. Undoubtedly many of the published names will eventually disappear. For the present, however, we feel reluctant to 'lump' most of these names, since Africa seems to possess more distinct species of *Bulinus* than might be suspected at first.

Bibliographic references contained in Pilsbry and Bequaert's recent compilation of the literature (1927, *Bull. Amer. Mus. Nat. Hist.* 53, p. 132-142) have not been repeated here.

***Bulinus senegalensis* O. F. Müller.**

Physa vitrea 'Parreyss' Sowerby 1873, *Conch. Icon.* 19, *Physa*, pl. 8, fig. 65 (Lake Mareotis, Egypt).

The original reference of *P. vitrea* was overlooked by Pilsbry and Bequaert (1927). Jickeli (1874) listed *P. vitrea* 'Parreyss' as a synonym of *Bulinus forskalii* (Ehrenberg), but Sowerby's figures render this synonymy untenable. Moreover, the *Mus. Comp. Zoöl.* has two specimens from Lake Mareotis, received from Parreyss as '*Physa vitrea*.' These specimens agree so well with the description and figures given by Pilsbry and Bequaert of *B. senegalensis* (after topotypical material), that we do not hesitate to refer them to that species.

Bulinus coulboisi (Bourguignat).

A young shell collected by the senior author on the beach of Lake Tanganyika, at Albertville, Belgian Congo, agrees well with Bourguignat's description and figures of *coulboisi*. We also refer to the same species a series of poorly preserved *Bulinus* found by the senior author on the northeastern shore of Lake Kivu, at Mai na Moto near Kisenje. None of our specimens are fit to be figured or measured.

B. randabeli (Bourguignat) is probably not separable from *B. coulboisi*. Both may be identical with *B. zanzebaricus* (Clessin), originally described from Zanzibar (perhaps really not from the island, but from the mainland), but reported also from Ruanda, east of Lake Kivu, by Thiele.

Bulinus masakaensis (Preston).

Plate 18, figure 11.

Preston's species seems to be represented by a small lot of snails collected by the senior author at Bufundi, on the western shore of Lake Bunyoni, Uganda. As may be seen by comparing our figures, this snail is exceedingly similar to the South African *B. corneus* and perhaps will eventually be united with it. The columella shows, however, a slight twist.

Length	Width	Ap. Length	Ap. Width	
10.0	6.5	7.5	3.5 mm.	Fig. 11
10.0	6.5	6.5	3.5	

Bulinus corneus (Morelet).

Plate 18, figure 7.

A series of specimens from Swinburne, Orange Free State (Dr. F. G. Cawston, collector), appear to be Morelet's species. E. von Martens and Connolly have synonymized *corneus* with the earlier *B. zanzebaricus* (Clessin), and this procedure may be correct. The species is, however, quite distinct from the specimens of Lakes Tanganyika and Kivu which we call *B. coulboisi*.

Length	Width	Ap. Length	Ap. Width	
11.5	8.0	7.5	5.0 mm.	Fig. 7
10.5	7.5	7.5	4.5	
10.0	7.0	7.0	4.0	Apex corroded
8.5	7.5	6.5	4.0	

Bulinus comptus (Melvill and Ponsonby).

Plate 18, figure 6.

A lot of snails from the Mooi River, Natal, collected by Dr. F. G. Cawston, appear to represent this species. As pointed out by Connolly (1912), it may be distinguished from *B. tropicus* 'by the curve of the outer lip, which may be called normal and regular in *tropicus*, but in *comptus* is usually distinctly flattened and almost incurved for a short way below the suture.' In *comptus* the aperture is nearly semielliptical in outline. Moreover, a careful study of Krauss' description and figures of *Physa diaphana* fails to disclose any real differences from *B. comptus*, so that we are inclined to regard *comptus* as a synonym of *B. diaphanus* (Krauss).

Length	Width	Ap. Length	Ap. Width	
14.5	9.5	10.0	5.0 mm.	Fig. 6
16.5	10.0	10.0	5.0	
13.0	8.5	8.5	4.0	
12.5	7.5	8.0	4.0	
11.5	7.0	7.5	3.5	

Bulinus alluandi (Dautzenberg).

Plate 18, figure 8.

Four snails collected by Dr. Glover M. Allen in Lake Nganga, near Mt. Kenya, Kenya Colony,¹ fit the descriptions and figures of *B. alluandi* better than those of any other Central African form. As our figures show, it is very close to *B. corneus* and *B. masakaensis*. All three forms may possibly be mere variations or races of one specific type. For the present we hesitate to offer synonymies. We may call attention to the very long and broad aperture of *B. alluandi*, which, together with the short, obese spire and the wide umbilicus, seems to characterize the species.

Length	Width	Ap. Length	Ap. Width	
12.0	9.0	8.5	5.0 mm.	Fig. 8
9.0	6.0	6.5	4.0	
16.0	11.5	11.5	6.0	Apex broken
13.0	8.0	8.5	4.5	

¹ According to Dr. Allen, Lake Nganga is a small crater lake between Mt. Kenya and Fort Hall.

Bulinus contortus (Michaud).

The Mus. Comp. Zoöl. possesses three lots of this species, from southern France, Syracuse (Sicily), and Corsica, which agree in every respect with Michaud's original description and figures of *contortus*.

<i>Length</i>	<i>Width</i>	<i>Ap. Length</i>	<i>Ap. Width</i>	
9.5	6.5	6.0	3.5 mm.	France
10.0	7.0	7.0	4.0	"
11.0	8.0	8.0	4.5	Corsica
10.5	7.0	7.0	4.0	"
7.5	5.5	5.0	2.5	Syracuse
6.5	5.5	4.5	2.5	"

Connolly (1912, *Ann. S. Afr. Mus.* 11, pt. 3, p. 244) records *B. contortus* from Cape Province, S. Africa, but we have not seen South African *Bulinus* agreeing in every respect with our Palearctic specimens of *contortus*. There seems to be no difficulty in separating *B. tropicus* and we believe that *B. cyrtonotus* is even more distinct.

Bulinus mareoticus (Sowerby).

Two specimens from Lake Mareotis, Egypt, received from Parreyss, at the Mus. Comp. Zoöl. and labelled '*mareotica*,' agree with Sowerby's figure of that species. It has often been regarded as identical with *B. contortus* (Michaud), but our specimens appear to be quite distinct, having among other points a much lower spire and a relatively longer aperture.

<i>Length</i>	<i>Width</i>	<i>Ap. Length</i>	<i>Ap. Width</i>
4.5	3.0	2.5	1.5 mm.
4.5	2.5	2.5	2.0

Bulinus angolensis (Morelet).

Plate 18, figure 10.

Two specimens, without definite locality, from Geale's collection, now at the Mus. Comp. Zoöl., were labelled '*Physa angolensis*,' Sowerby's misspelling of '*angolensis* Morelet.'¹ These specimens agree better with Sowerby's figure than with that of Morelet. We have, however, compared them with six cotypes

¹ These were probably part of a lot collected by Geale in Damaraland, some of which he sent to the British Museum (see Connolly 1912, *Ann. S. Afr. Mus.* 11, pt. 3, p. 244).

of *angolensis*, from Angola, received from Morelet, and are unable to separate them. The species belongs in the group characterized by an extremely reduced spire, so that the ellipsoidal aperture approaches the whole length of the shell. *B. strigosus* (von Martens) and *B. nyassanus* (F. Smith), which we have not recognized in our material, appear to be nearly allied to *B. angolensis*, as is also *B. coulboisi*.

The specimen figured, from the Geale lot, could not be measured.

Length	Width	Ap. Length	Ap. Width	
11.0	6.5	8.0	3.0 mm.	Coll. Geale
11.0	9.0	9.0	5.0	Cotype
11.5	9.5	10.0	6.0	"
10.0	7.5	8.0	5.0	"
10.5	8.0	8.0	4.5	"
9.0	7.5	8.0	3.0	"

Connolly (1912) calls attention to the analogy between *angolensis* and *parietalis* (Mousson), and quite possibly these two names apply to the same species.

Bulinus truncatus (Audouin).

Physa truncata 'Férussac' Audouin 1826, Explication Sommaire des Planches de Mollusques, p. 34 (Egypt; based upon pl. 2, fig. 27 of Savigny 1812, Description de l'Égypte, H. Nat., Zoologie, Coquilles, published without name). Not *Physa truncata* H. Adams 1861, of Australia.

Savigny's figure 27, 1', supposed to be natural size, shows a shell 5.25 mm. long and 3.5 mm. wide, with the aperture 4 mm. long. We have recognized this species in a snail collected at Wadi Feran, Egypt, by Dr. Phillips in 1914. This measures: length, 6 mm.; width, 4.5 mm.; length of aperture, 4.5 mm.; width of aperture, 2.5 mm.

Pallary (1909, *Mém. Inst. Égyptien* 6, pt. 1, p. 52) states that *P. truncata* was based upon young specimens of *Isidora brocchii* Ehrenberg (1831). Even if this were correct, Audouin's name would have to be used for the species, since it was published five years earlier. So far as we have been able to trace, no figure based upon Ehrenberg's types has been published. The dimen-

sions given by Ehrenberg for his largest specimens are: length, 7.35 mm.; width, 4.2 mm.; length of aperture, 5.7 mm.

Bulinus cyrtonotus (Bourguignat).

Plate 18, figures 1-5.

This species has been regarded as identical with *Bulinus tropicus* (Krauss) by Jickeli (1874) and Connolly (1912, *Ann. South Afr. Mus.* 11, pt. 3, p. 248), and this synonymy was adopted by Pilsbry and Bequaert (1927). Mr. P. L. Le Roux has sent us a large lot of a *Bulinus* from the Aapies River near Onderstepoort, Transvaal, which differ conspicuously from *tropicus*, as shown by our figures 1 to 4. For a time we even believed we had an undescribed species, until we happened to see Bourguignat's figures of his *Physa cyrtonota*. A comparison of these figures with our photographs will leave little doubt regarding the true identity of the Aapies River snails. It may be noted that Aapies River is part of the upper drainage of the Olifants River, whence *B. cyrtonotus* was originally described.

Another lot of snails, which we likewise refer to *B. cyrtonotus*, was found by Dr. Le Roux in a spring on a farm close to Bloemhof, western Transvaal. Some of these specimens are unusually large and have the aperture relatively longer. One of these is shown in Plate 18, figure 5.

The following description, based upon the series from the Aapies River, may help to recognize the species.

Shell.—Sinistral, large, widely umbilicate and deeply perforate, turbinate, medium solid. Color light straw to white. Whorls $4\frac{1}{2}$ to 5, strongly convex; body whorl large and well rounded; nuclear whorl milky white, smooth, flattened. Spire acute and produced. Aperture evenly rounded, broadly ellipsoidal to sub-circular, a little longer than wide, slightly flaring basally. Palatal lip acute, parietal lip very short, limited only to a narrow area of a rather thin callus on the body whorl; columella not twisted, slightly folded over but not closing the umbilical region, inclined slightly toward the left and forming only a very slight angle with the parietal lip. Sutures deeply impressed, occasionally slightly indented. Sculpture consisting of innumerable, very fine, axial riblets (growth ridges), irregularly spaced.

Length	Width	Ap. Length	Ap. Width	
13.0	8.5	7.5	5.5 mm.	Apies River Fig. 1
12.0	8.0	8.0	5.5	" " " 2
10.5	7.0	6.5	4.0	" " " 3
12.0	8.0	8.0	5.0	" " " 4
12.5	9.0	7.0	5.0	" "
11.0	8.0	7.5	5.5	" "
13.5	8.5	8.0	5.5	" "
12.5	9.0	7.0	5.0	" "
11.5	8.0	7.5	5.0	" "
11.5	9.0	8.0	6.0	" "
14.0	10.0	9.5	5.5	Bloemhof. Fig. 5

Bulinus verreauxii (Bourguignat).

Plate 18, figure 9.

Two specimens obtained by Dr. P. L. Le Roux at the Farm 'Goedemoed,' in the Field Cornetry of Goudini, Worcester, Cape Province, agree well with Bourguignat's figures of *verreauxii*, which was originally described from the Olifants River, Transvaal, and the 'Kynsna' (probably Knysna, Cape Province).

The species is more slender than the other South African species, with a long, semielliptical aperture and a high spire.

Length	Width	Ap. Length	Ap. Width	
13.5	7.5	8.5	4.5 mm.	Fig. 9
13.5	8.5	8.5	4.0	

Dr. Le Roux has figured four of these shells in 1929 (*15th Rept. Dir. Vet. Serv. Union South Africa*, p. 436, fig. 18 to 21). He states that some of these snails were infected with cercariae of *Fasciola hepatica* and a *Paramphistomum*.

Bulinus crystallinus (Morelet).

Plate 18, figure 13.

The Mus. Comp. Zoöl. possesses a fairly large lot of cotypes, from Angola, received from Morelet. The species is the nearest approach we have seen from central Africa to *B. senegalensis* O. F. Müller; but it has the individual whorls straighter than in that species, with a trace of a shoulder below the suture.

Length	Width	Ap. Length	Ap. Width	
7.0	4.5	4.5	2.0 mm.	Fig. 13
7.0	4.0	4.5	2.0	
7.5	4.5	4.5	2.5	
7.5	4.5	4.5	2.5	
7.0	4.5	4.5	2.0	
5.2	3.4	3.3	1.5	

Bulinus tropicus (Krauss).

Plate 18, figure 12.

B. tropicus is probably the most common and most widely distributed of the South African species of the genus and consequently has prime importance as a potential host of helminth parasites. We have seen in all five lots which appear to be *tropicus*, although there is some variation in the development of the spire. One lot was obtained by Dr. F. G. Cawston in Congeela Park, Durban, Natal. The other lots were sent by Dr. P. L. Le Roux, from the following localities: Pretoria, Transvaal, close to the town; Breezy Brae, Arlington Sta., Orange Free State; Fickburg, Orange Free State; and Kei Road, Cape Province.

Dr. Le Roux has figured this species (1929, *15th Ann. Rept. Dir. Vet. Serv. Union South Africa*, p. 436, fig. 14 to 17 and 32 to 33). We do not believe that *Bulinus schackoi* (Jickeli), described from Abyssinia, is identical with *B. tropicus*. Jickeli's figures are much more like the form from Uganda, which we show in our figure 11 as *B. masakaensis* (Preston).

Bulinus craveni (Sturany) (= *Physa lirata* Craven) is certainly identical with *tropicus*, as claimed by Connolly (1912) and Dupuis (1923). *B. cyrtonotus* (Bourguignat), however, is, we believe, a distinct species, as shown above.

Length	Width	Ap. Length	Ap. Width	
10.5	8.0	7.5	4.0 mm.	Congeela Park
11.0	7.0	7.5	4.0	"
11.5	8.5	6.5	5.0	Pretoria
12.5	8.0	8.0	4.5	"
10.0	7.5	7.0	4.5	Kei Road, Fig. 12
9.5	6.5	6.0	3.5	"
12.0	8.5	8.0	4.5	Fickburg
13.0	9.5	8.5	5.0	"
9.0	7.5	6.5	4.0	Arlington Sta.
9.5	6.5	6.5	4.0	"

Dr. Le Roux writes us that at the Farm Breezy Brae, *B. tropicus* is the intermediate host of *Cotylophoron cotylophorum* of sheep and cattle.

***Bulinus cernicus* Morelet.**

Bulinus forskalii cernicus Clench 1930, *Nautilus* 43, p. 93.

After a new study of a series of cotypes of Morelet's *Physa cernica*, we have reached the conclusion that this form is fully entitled to specific rank. In general outline it is intermediate between *B. crystallinus* and *B. canescens*, forming one more link in the passage from *Bulinus*, proper, to the subgenus *Pyrgophysa*.

***Bulinus (Pyrgophysa) canescens* (Morelet).**

Plate 18, figure 14.

The Mus. Comp. Zoöl. has 7 cotypes of this species received from Morelet, and obtained in Angola. It is a well-characterized form, much less turreted than the subgenotype.

<i>Length</i>	<i>Width</i>	<i>Ap. Length</i>	<i>Ap. Width</i>	
11.0	5.5	5.5	2.5 mm.	Fig. 14
10.0	4.5	5.0	2.5	
10.5	5.0	5.0	2.5	
10.0	4.0	4.5	2.0	

***Bulinus (Pyrgophysa) forskalii* (Ehrenberg).**

Plate 18, figures 15-16.

The Mus. Comp. Zoöl. possesses a series of 11 cotypes of *Physa semiplicata* Morelet, from Angola, received from Morelet. One of these specimens is shown in Plate 18, figure 15. After carefully comparing them with a series of *B. forskalii* from Egypt, one of which is shown in Plate 18, figure 16, we are unable to separate *semiplicata* even as a variety. We have also reached the conclusion that *Physa scalaris* Dunker (= *P. dunkeri* Germain) is identical with *B. forskalii*. At any rate Dunker's figures agree well with some of Morelet's cotypes of *P. semiplicata*.

On the other hand, we cannot follow E. von Martens in regarding *Isidora lamellosa* Roth as the young of *B. forskalii*. Small specimens in our Egyptian lot of *forskalii*, some of them even smaller than Roth's type, are much more slender and are not visibly ribbed. Roth's figures are more like specimens from Lake

Mareotis, figured by Reeve as *Physa vitrea*, which we regard as identical with *Bulinus senegalensis* O. F. Müller.

Length	Width	Ap. Length	Ap. Width	
10.5	4.0	4.5	2.0 mm.	Cotype
				<i>semiplicata</i> , Fig. 15
11.5	4.5	4.0	2.0	"
11.0	4.5	5.0	2.0	"
11.0	4.5	4.5	2.0	"
8.0	3.5	2.5	1.8	Egypt, Fig. 16
7.2	2.5	2.4	1.5	"
7.5	2.2	2.3	1.5	"

***Bulinus* (*Pyrgophysa*) *wahlbergi* (Krauss).**

Plate 18, figure 17.

Pyrgophysa scalaris Dautzenberg 1890, Mém. Soc. Zool. France 3, p. 133, pl. 1, figs. 12a-b. Not *Physa scalaris* Dunker.

A numerous series collected by the senior author at Albertville, Belgian Congo, in a swamp on the shores of Lake Tanganyika, are readily distinguished from *B. forskalii* by the more slender outline and the deeply contracted sutures. Among the published figures they agree best with *Physa wahlbergi* Krauss, described from the Limpopo River, Transvaal, as well as with Dautzenberg's supposed *scalaris* from Bakel, Senegambia. As we have shown above, the true *Physa scalaris* Dunker appears to be identical with *B. forskalii*.

The following measurements are based upon the Albertville series.

Length	Width	Ap. Length	Ap. Width	
8.0	3.0	3.0	1.5 mm.	Fig. 17
8.5	3.0	4.0	1.5	
10.4	3.5	3.0	2.0	
8.5	3.0	2.8	1.5	

B. wahlbergi, as here understood, is in our opinion a distinct species. What Sowerby (1873, *Conch. Icon.* 19, *Physa*, pl. 8, fig. 58) has figured as '*Physa walbergii*,' from the Nile, is an entirely different form, which appears to be identical with *B. forskalii*.

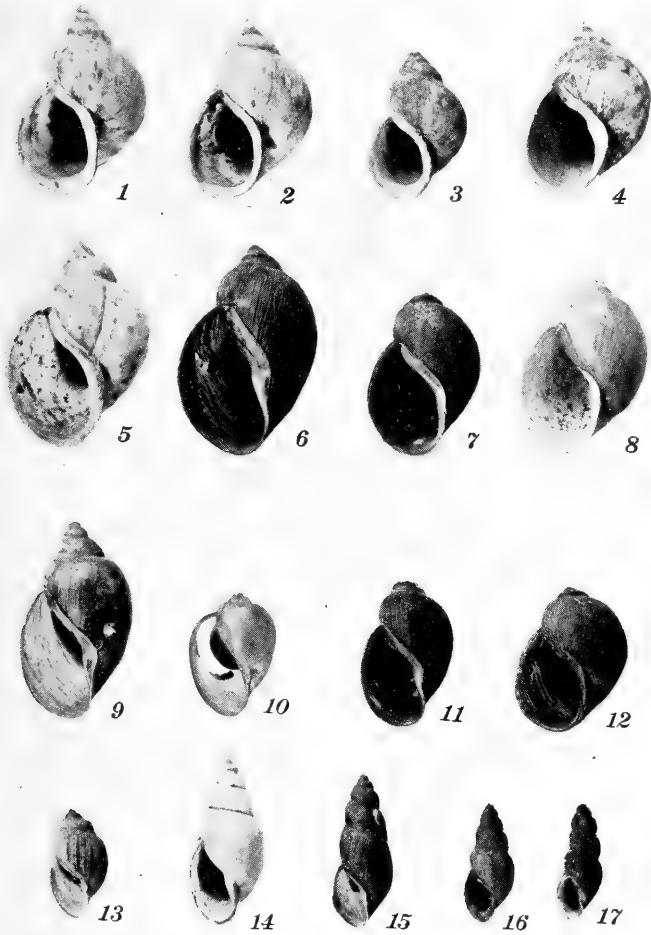
There has been only one previous record of a *Pyrgophysa* from Lake Tanganyika, viz., that of Germain (1908, *Rés. Scientif. Voy. Afrique Foá*, p. 640), who recorded *Physa dunkeri* Germain

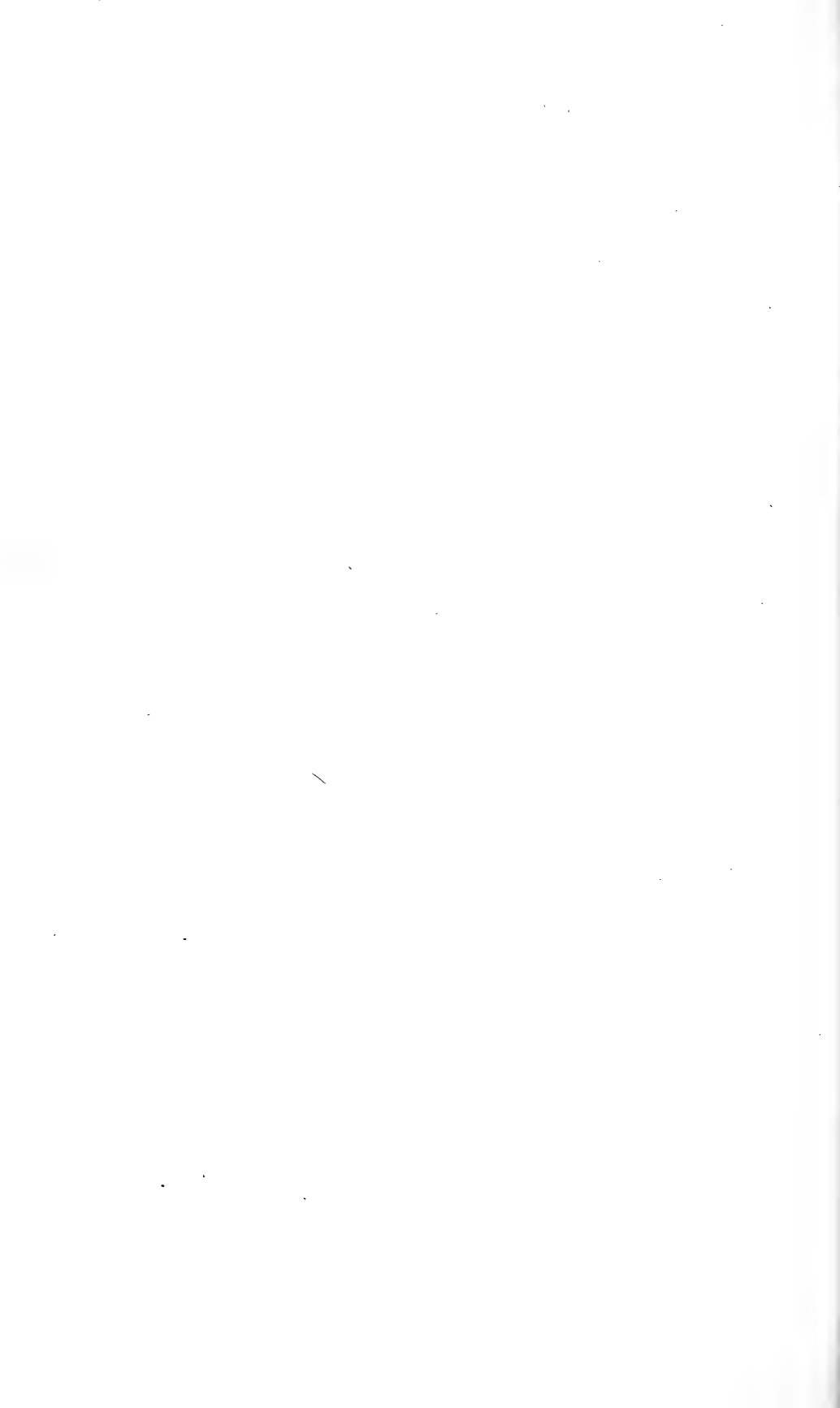
(= *Physa scalaris* Dunker) from the southern end of the Lake. Most likely the specimens seen by Germain were of the form here referred to as *B. wahlbergi*.

EXPLANATION OF PLATE 18.

- FIG. 1-4. *Bulinus cyrtonotus* (Bourguignat). Aapies River.
FIG. 5. " " Bloemhof.
FIG. 6. " *comptus* (Melvill and Ponsonby).
FIG. 7. " *corneus* (Morelet).
FIG. 8. " *alluaudi* (Dautzenberg).
FIG. 9. " *verreauxii* (Bourguignat).
FIG. 10. " *angolensis* (Morelet).
FIG. 11. " *masakaensis* (Preston).
FIG. 12. " *tropicus* (Krauss).
FIG. 13. " *crystallinus* (Morelet).
FIG. 14. " (*Pyrgophysa*) *canescens* (Morelet).
FIG. 15. " " *forskali* (Ehrenberg). Angola.
FIG. 16. " " " Egypt.
FIG. 17. " " *wahlbergi* (Krauss).

All figures twice natural size.





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A COMMON ARBOREAL MOSS MITE
HUMEROBATES HUMERALIS.

BY ARTHUR PAUL JACOT.

SINCE this arboreal acarion of the family Oribatidae has not previously been recorded from New England, though common, and since it has never been properly figured nor its external morphology been fully appreciated, the present contribution has been prepared.

Description.—Cephaloprothorax as seen from above (Pl. 19, fig. *a, b, d-f*) short, conical, with convex sides, outline broken by rostro-lamellar ridges and tectopodia I, the latter forming very prominent lateral horns if viewed from somewhat in front (Pl. 19, fig. *a*); seen from side (Pl. 19, fig. *b*), semiconical, slightly undulate, with somewhat protuberant rostrum; lamellae slender blades of subequal diameter throughout, slightly undulate on lateral edge, with well-defined, basal channel; apex free, truncate (Pl. 19, fig. *b, d-f*) to slightly emarginate to receive the bristle; restro-lamella ridge undulate, springing from median edge of lamellae, converging, terminating close beside rostrum, distant from lamellar bristles. I should here point out that the rostro-lamellar ridge in *Schelorbitates* diverges to rostral bristles, so that it is a parallel phenomenon without direct phylogenic relations. So prominent are these ridges as to form two prominent nubbins on each side of rostrum *tip* even when viewed from below (Pl. 19, fig. *a*), though this is partly due to their being produced ventrad of camerostome rim! (Pl. 19, fig. *b, d, f*); translamella not developed, but apex of lamellae with a median truss which has the appearance of a rudimentary or fragmentary translamella; bristles long, slightly hispid, rostral bristle almost ciliate in some, inserted at juncture of distal end of tectopodia I and side of cephaloprothorax, interlamellar inserted very close to rim of notogaster; tectopodia I slender, cuneate blades, longitudinally

ribbed, prominently scalloping outer edge, springing from close beneath pseudostigmata as a slender ridge (Pl. 19, fig. *b*), shortly directed ventro-anteriad to rim of camerostome but not extending beyond it (Pl. 19, fig. *b, f*) though extending anteriad as prominent cusps, broadly separated from cephaloprothorax (Pl. 19, fig. *a, f*). Thus these tectopedia extend anteriad much further than is customary in many genera, being remote from insertion of legs I (Pl. 19, fig. *b*). In figure *f* one looks directly down on the left tectopedium, so that it appears as an undulate rib. Tectopedia II, seen dorso-ventrally (Pl. 19, fig. *a, e*), appear as broadly spoon-shaped ears, housing the tiny pseudostigmatic organs (Pl. 19, fig. *e*) which are far above them; seen from the side they appear as long, broad blades (Pl. 19, fig. *b*) springing from below pseudostigmata and extending almost directly ventrad to slightly beyond lower edge of cephaloprothorax; seen somewhat from side (Pl. 19, fig. *f*, where apex is stippled) they have the appearance of a projecting tongue or blade, an edge of which is applied to cephaloprothorax. In figure *a* the central ridge indicates their concave, boat-shaped nature; figure *d* shows how legs I are housed between tectopedia I and II.

Pseudostigmata not, or barely visible, from above. Figures *g* and *h* show the very slight rim as viewed somewhat from in front. Pseudostigmatic organ with head subequal to exposed portion of pedicel, obovate, apex *oblique*, rather flatly convex, compared to the whole animal unusually small; center filled with eyed, Prunuslike bodies. Lamellar areae porosae invisible or lacking; anterior (figure *b*) slender, close under rim of notogaster, not visible from above; apodemata I not causing an evagination of sides of cephaloprothorax (Pl. 19, fig. *a*).

Notogaster longer than broad (Pl. 19, fig. *c* is of the much broader Hawaiian race), shaped much like a man's cap without visor (Pl. 19, fig. *b*), anterior rim gently convex; seen from above the posterior outline is found to vary considerably from rounded to tri-subhedral and from smooth to two furrowed, these furrows evidently being short, vertical grooves, sometimes visible sometimes not, depending on angle of vision. They are as remote as twice their diameter, *i. e.*, close to median plane. Adalar areae porosae slender, close to pteromorphae, mesonotical elongate oval, much more approximate than adalar, posterior mesonotical

shorter, more remote, posterior nearly round, more approximate than mesonotical, pseudofissurae short, length of mesonotical areae porosae distant from these bodies; pseudoforamina as in Pl. 19, fig. *b* and *c*. Pale spot at anterior end seems to be due to lack of pigment as also to local translucency. Overlapping sides of notogaster unusually broad (deep), with rim strongly contracted (Pl. 19, fig. *b*), so that it may be detracted until below (covering insertion of) postanal bristles. Pteromorphae more than semi-circular, nearly as broad as long, so as to extend far below leg insertions, in fact so far down on sides as to reach to within the breadth of a genital cover from genital aperture. Anterior edge strongly undulate (Pl. 19, fig. *d-f*) but middle of anterior edge extending well beyond (anterior of) median edge, thus broadly overlapping upper half of tectopedia II. Posterior edge extending far enough back as to be attached on sides of notogaster and not (as in *Scheloribates*) on lower rim (Pl. 19, fig. *b*). Surface faintly veined (Pl. 19, fig. *b, c, f*), with a pseudoforamen (or bristle insertion) near antero-dorsal corner; pseudofissurae near center, transverse, short (Pl. 19, fig. *b*).

Ventral plate (Pl. 19, fig. *a*) with anterior half strongly constricted, quite flat (Pl. 19 fig. *b*), anal aperture remote from posterior edge, this area strongly transversely depressed (!) (Pl. 19, fig. *b*); anal aperture broader than long, sides gently convex, only slightly tapering, posterior corners somewhat angular, no anterior emargination! covers crenelate along median edge, anterior pair of cover bristles fairly long, inserted close to anterior rim, posterior pair slightly shorter, closer to median than to posterior edge; postanal bristles rather short, median pair more remote than posterior cover bristles, more approximate than center of covers; outer pair more remote than center of covers, fairly close to median pair, further from aperture than median pair; paranal bristles at center of covers, more distant from pseudofissurae than length of latter, sometimes opposite anterior sometimes posterior end of pseudofissurae, sometimes dissimilar in the one individual (as in Pl. 19, fig. *a*); pseudofissurae short, on outer rim of aperture; paramesial bristles fairly long, inserted more remotely than diameter of anal aperture, more distant from genital aperture than diameter of one of its covers. Genital aperture broader than long, sides nearly straight, an-

terior edge rather flattened, posterior edge only slightly convex, corners neatly rounded, thickened rim distinct, narrow; covers with two pairs of fairly long, peripheral bristles; the four median pairs laterad of longitudinal center except the fourth pair which are slightly mediad of center and very close to posterior edge, anterior pair more remote than peripheral, antero-central pair closer to anterior pair than are postero-central pair to posterior pair; sternal bristles fairly long; posterior pair slightly more remote than median pair of peripheral cover bristles; more remote than their distance from margin of genital aperture; middle pair near median ends of apodemata and half way between them, though often nearer apodemata II; anterior pair (gular bristles) slightly more remote than second pair, more approximate than median ends of apodemata. Other bristles as in Pl. 19, fig. *a*. Labial bristles quite approximate tectopedia III slender, posterior margin emarginate.

Legs armed with fairly long bristles, those of ventral face of tarsus unusually long; terminated by tri-homohamate ungues, outer hooks longer by reason of their flattened shaves, and less bent at distal half. Tarsi stout cuneate, ventral face with the usual three bristles fairly long, multi-short-ciliate, the proximal inserted less than the diameter of the segment from proximal end, closer to second than second is to third, followed by a pair of much shorter, ciliate bristles, this pair with a short, smooth bristle inserted closely distad; dorsal face with proximal bristle medium in length, inserted slightly proximad of middle of segment; slightly distad of center are three bristles inserted nearly at same point (!) (a fairly short, a long [longest of tarsi I] and a medium long one), all three on a small swelling of the dorsal face; half way between this trio and the distal end a couple (!) of long (!) to fairly long bristles, inserted side by side, very finely barbed; another fairly long, faintly barbed, inserted quite close to distal end; a stout, barbed, lateral bristle inserted less than diameter of segment from proximal end and near dorsal face (is this really the dorso-proximal?); a median bristle inserted on transverse plan of ventro-proximal, medium long; another median, barbed bristle inserted on transverse plane of trio, extends quite half its length above tarsus in Plate 19, figure *i*. Tibiae almost oblong, *i. e.*, with proximal end only slightly narrower than

distal end, with a slight swelling on dorsal face at proximal end; major bristle very long, stout, extending far beyond unguis hooks, inserted quite close to distal end of segment, with a fine, medium long bristle inserted proximally, close to its base; the two ventral bristles medium in length, long ciliate, one inserted slightly less than diameter of tarsus from distal end, the other slightly more distal; lateral bristle long, fine, barbed, extending to insertion of dorso-proximal; median bristle similar to lateral but shorter, inserted on transverse plane of ventral. Genuals cuneate, half length of their tibia, with a bristle inserted on each face, the dorsal very long, curved, extending nearly to distal end of tibia without straightening; the lateral the next longest; median quite stout; the ventral the shortest; median and lateral inserted slightly less than diameter of segment from distal end; the other two still closer to distal end. Femora broad, compressed, with relatively short, not clearly demarcated pedicel, ventral face with very slight flange; dorsal stout, edge with three bristles, proximal inserted near proximal end of body of segment, medium long, stout, barbed, the other two inserted somewhat on sides of ridge, near distal end, close together; ventral face with two rather short bristles, each with a double row of short, rather widely spaced cilia, proximal inserted on transverse plane of dorso-proximal, distal one inserted its own length from distal end of segment. Coxa with a long, ciliate, curved bristle.

Legs II similar to legs I but tarsus much shorter, with dorso-distal half more abrupt; ventral bristles quite long, second and third very closely spaced; dorsal face with bristles subequal and medium long, as seen in profile: proximost barbed, inserted slightly mediad, diameter of segment from proximal end, second smooth, inserted near proximal, third barbed, inserted slightly laterad, these three subequally spaced, fourth more closely spaced (from third), smooth, inserted at center of segment, fifth slightly nearer fourth than to distal end of segment, slightly barbed, a similar one at its side (forming a colateral pair), another colateral pair still more distad. Tibiae very similar, area distad of major bristle lower (narrower) than in legs I, the two ventral bristles short ciliate, inserted almost on same transverse plane as major bristle; median and lateral bristles ciliate, inserted slightly proximad of major. Genuals with a slender trian-

gular spur (!) projecting distad (!) from ventro-distal rim, a medium short, slightly barbed bristle inserted at its base; three other similar bristles inserted more proximally but none more than diameter of segment from distal end. Femora very similar but pedicel still less distinct (a mere constriction); dorso-proximal bristle inserted *distad* of center of segment; flange deeper (wider) at distal end, ventro-distal bristle stouter, ventro-proximal inserted more proximad of ventral angle.

Legs IV (Pl. 19, fig. *j*) much longer than legs I. Tarsi slender cuneate; dorsal face with a fairly long bristle inserted at center of segment, two fine ones inserted close to distal end and two on distal end; ventral face with three ciliate bristles; proximal short, stout, inserted slightly distad of proximal third, middle one quite long, a pair (!), inserted slightly proximad of distal third; distal one near distal end. Tibiae cuneate, dorsal face irregular; major bristle extending nearly to distal end of its tarsus, inserted less than diameter of segment from distal end; ventral face with two medium long, short ciliate bristles: the proximal inserted greatest diameter of segment from distal end, the distal one on distal end; a very fine, quite long, lateral bristle, inserted on transverse plane slightly proximad of distal end. Genuals very curved, slightly shorter than genuals I; dorsal face with a fine bristle inserted near distal end; lateral bristle longer, more distally inserted. Femora oblong, only slightly and symmetrically rounded at distal end; flange well developed, extending up the side of each end; dorsal bristle stout, barbed, inserted slightly distad of center of segment; ventral bristle fine, short, inserted at distal third. Coxae as usual for the tribe but distal face with three transverse (?) wrinkles; flange broad (equal to half height of body of segment), extending proximad of body to overlap coxa III (!) and distad so as to overlap flange of femur; two lateral bristles: a fine, fairly short bristle inserted on flange, shortly below middle of pedicel of femur, another, slightly longer, inserted fairly close to distal margin, slightly dorsad of femoral insertion area. Plate 19, figure *k*, a cross section of coxa, shows flange curved on lateral face, flat on median side.

Legs III, similar but less highly specialized, all bristles more or less barbed. Tarsi with ventral face bristles more spaced out, so that the four are subequally spaced, all ciliate; dorsal face

bristles two and three each a colateral pair; a long lateral bristle inserted greatest diameter of segment from proximal end; a median bristle inserted slightly dorso-proximad of fourth ventral bristle. Tibiae with dorsal outline more smooth; major bristle very long, extending to unguis without straightening out; lateral bristle inserted on transverse plane of major; dorsal bristle inserted slightly more proximad; median bristle inserted still more proximad, still not quite diameter of segment from distal end, shortest of three, ventral bristle longest of these three. Genuals with dorsal bristle quite stout, gracefully curved; lateral bristle stout, double ciliate. Femora with flange narrower, especially at proximal end, not extending along ends; dorsal bristle inserted proximad of center, extending to center of genuals thus considerably longer; a shorter, more slender bristle inserted close to dorsal; ventral bristle very similar to median of gential. Coxae only faintly wrinkled on distal face; flange much narrower and less extensive; the bristles longer, stouter.

The color varies with locality and degree of chitinization but in general is quite dark amber with some reddishness. The surface of the chitin is smooth but specimens from some localities have a granular coating, especially on notogaster, which is probably caducous.

Degree of specialization.—Due to the complete lack of bristles on notogaster, the great expanse of pteromorphae, the high development of the tectopodia, the development of lamello-rostral ridges, the well-developed areae porosae, and the specialized arrangement of the leg bristles, especially of leg I, this species is one of the more highly specialized among the Ceratozetini. I know of no closely related species. It is interesting to note that legs III which are most covered by the pteromorphae have much longer and stouter bristles than legs IV. Compare especially the ventral bristle of the femora. Conversely, the flanges of femore IV and coxae IV are highly developed, while those of legs III, covered by the pteromorphae, are poorly developed.

Dimensions.—Thirty-one specimens from Breda, Holand, have a total body length of 800 (850), 925 and a total breadth of 545 (605) 655. By contrast, the detailed dimensions of twenty-five specimens from the town of Monroe, Connecticut, follow. In the first three columns are the dimensions (smallest, average of

ten, largest) of the males, in the next three columns the dimensions of the females (average of fifteen). In the last two columns the measurements of a male and a female from California.

Total length of body.....	545	600	640	645	670	705	690	770
L. of notogastral plate.....	470	485	525	520	540	570	555	635
Breadth of same.....	375	410	440	425	460	495	475	565
Interlamellar bristle span.....	75	80	85	75	90	100	100	110
L. of vent. plate (mid.).....	400	445	470	485	500	535	520	600
Camerostome to gen. apert.....	100	102	105	100	103	105	100	110
L. of genital aperture.....	70	73	80	80	83	90	80	93
Breadth of same.....	78	82	85	85	93	100	85	110
Gen. apert. to anal apert.....	115	131	150	145	161	175	170	220
L. of anal aperture.....	100	109	115	110	119	125	125	135
Breadth of same.....	105	114	120	125	130	145		150

It should be noted that length of ventral plate is actual length on median line and not measured to overlapping edge of notogastral plate. All these measurements are as made in mounted specimens by micrometer eye piece and do not take curvature into consideration. Apparent length of cephaloprothorax varies with angle at which the body is tilted. The same is true of the abdomen.

The majority of specimens measured were from one locality (near Stevenson, Conn.) and these specimens cover the range of size here recorded. Specimens from Sea Cliff, Long Island, N. Y., and from Hamden, Conn., are included by this range. Specimens from Maine *average* larger but do not exceed the Connecticut specimens. The much shattered Georgia material includes females with genital covers 94 micra long. Thus there seems to be a rather definite size limit along the eastern states especially the northeastern. Most striking however, is that there is a difference of a hundred micra between the largest Connecticut and the smallest European specimens.

From the table it will be evident (1) that breadth of genital and of anal apertures as well as distance between them is quite variable, (2) that there is marked sexual dimensurism, (3) that breadth of genital aperture and interlamellar bristle span are practically equal, (4) that the ventral plate apertures are broader than long, (5) that the *anal* aperture of the females seems relatively broader than that of the males.

Aberations.—One specimen has three bristles on one anal cover

and two on the other (as has been noticed in two other genera). One of two specimens (slide no. 26B33a) have notogastral plate so broadly overlapping sides of ventral plate as to resemble the condition found in *Hypochthonius rufulus*. This, therefore, is clearly a reversion. The condition of three bristles on anal covers is likewise a reversion to the more primitive condition.

Propagation.—Females seem more numerous than males. The eggs are packed two or three deep along postero-lateral walls of abdomen to the number of ten though more usually six or eight. Eggs appear as early as April 23 and continue at least until July 5. My August specimens are eggless.

Identity.—Although difficult to identify the original figure (Herman 1804, p. 92, pl. 4, fig. 5, *B*), a comparison with the present figure *a*, especially as to the anterior horns (tectopodia I), a development which seems to be a unique occurrence in mid-European species, will serve to relate the type figure with the present genus. The shape of the body as to rotundity or ovalness varies with the angle at which it is viewed. Similarly as to shape of pteromorphae, as seen from above, a comparison of the accompanying figures 1 and 3 will show extremes of position due to appression and extension of these parchmentlike elastic expansions. The pteromorphae are well described as 'trigonal, anteriorly truncated' (see Pl. 19, fig. *b*). All specific characters in the original description fit the present genus and species. The drawing is crude. No major bristles are shown on the legs (!) though adequately figured in *B*.

The Regensberg figure (Koch 1835-44, fasc. 30/18) is unconvincing, not only by comparison with *O. facula*, but by the possession of two bristles on posterior edge of abdomen. The Italian description (Berlese 1882-1900, fasc. 3/4) differs in two important respects: the pseudostigmatic organ is clavate (not pedicelate) and the surface of the notogaster is minutely granulose.

O. orbicularis (Koch 1835-44, fasc. 3/6), type of *Sphaerobates*, resembles this species considerably.

It is surprising that, out of the 162 species recorded from the British Islands, none should belong to this genus. *O. lapidaria* (Michael 1884, p. 230-233, pl. 5, fig. 1-5, pl. 23, fig. 6, pl. D, etc.) is nearest. Between the distal ends of the lamellae (Pl. 5, fig. 1)

are figured two slender, white lines which look like bristles but might have been intended for the rostral ridges, but on Plate 23, figure 6, they are now shown, or are covered by the lamellar bristles, nor does the rostrum much resemble that of a *Humerobates*. On the other hand one reads (p. 231) 'rostrum terminating in a small rounded point, ends of the genae showing anteriorly as small cusps.' This fits *Humerobates* exactly. Under color, mention is made of a translucent spot at anterior edge of notogaster, and of the areae porosae as 'some smaller, more clearly defined spots nearer the edge, much lighter, and semitransparent.' Two species thus seem to have been mixed, as elsewhere. Furthermore (p. 231) one reads, as at various other places, 'English specimens are variable.' Finally on page 233, penultimate line, there appears, 'nymphs in great quantities on the bark of a dead *Cedrus deodara*' which is a Himalayan evergreen!

The type habitat of *A. arborea* (Banks 1895, p. 7) is 'common on cedar and peach trees.' Dr. Philip Garman of the Connecticut Agricultural Experiment Station, under date of October 23, and concerning specimens sent me, writes:

'It seems that they are frequently found on dead and dying cedars and there is some question as to their importance in producing this condition . . . on the ornamental cedars on which they were found. Cedars in the open are also frequently infested and the mite can nearly always be found on dead branches in the locality where collected.'

Thus it would seem that the British do have the genus but masquerading under a different name and the halucination: 'variable species of wide distribution.'

In Germany (Sellnick 1929, p. 11) *H. humeralis* is reported on Ericaceae.

Oudemans (1926, p. 354) thinks *Acarus fungorum* (Linné 1758, p. 618; see also Linné 1746, p. 349) is the nymph of this species. In this connection see Michael (1884, pl. 5, fig. 2). To me it looks probable but I would prefer more evidence before making a decision.

American data.—I have examined the following material:

Maine, coll. by Gilbert Van Ingen, fifty specimens, slides no. 26B28a, b, c. Wellfleet, Mass., in moss, 27-33, August, 1918, four specimens, slide no. 26B111.

- Hamden, Conn., from black knot galls on cherry, taken April 23, 1915, by G. C. Graham, fifteen specimens, slide no. 27G9.
- Sandy Hook, Conn., oak leaves from hemlock gorge, taken June 21, 1926, by Jacot, one female, slide no. 2612.
- Stevenson, Conn., one mile south of, from ground or bush, Juniper, old pasture, taken May 20, 1920 by Jacot, eighteen specimens, slide no. 2012o; and from red cedar (*Juniperus virginiana*), same place and time, twenty-five specimens, slide no. 2013o1.
- East Village, Conn., one mile west of, beaten from leaves of Hop Hornbeam (*Ostrya virginiana*), pasture, taken July 5, 1920 by Jacot, one female, slide no. 2020o.
- Long Island, N. Y., on cedar, taken August 20, 1927, by J. A. G. Davey, three specimens, slide no. 29G1.
- Sea Cliff, Long Island, N. Y., from cedar and peach trees, taken by Nathan Banks, forty-eight specimens on slides 26B33a and b; and thirteen specimens on slides no. 26B107b, c, d.
- Queen's Woods, Long Island, N. Y., from crevices of bark on white ash (*Fraxinus americana*), taken May 3, 1919, by Jacot, five specimens, slide no. 1929o.
- Georgia, coll. by (J. C.?) Bradley, five specimens, slide no. 26B109.
- Niles, California, November 1, 'C. J. Pierson from Essig,' six specimens, slide no. 26B110.

A comparison of this material with the thirty-one specimens kindly sent me by Dr. Oudemans and two from Silkeborg, Denmark (slide no. 26B112) leads me to the conclusion that the American material differs enough to warrant the use of a trinomial and its recognition as a geographic race. It would therefore be known as

Humerobates humeralis arborea, subsp. nov.

Characters.—Size smaller than European species (see above, under dimensions); pseudostigmatic organs bent mediad at juncture of pedicel and head so as to make this organ (as seen from above) quite curved (figures 12-14), the head seems shorter and more oblique than the most extreme European specimen. Anal aperture with anterior margin much less sloping, sides also less converging. In Plate 19, figure *a*, the condition found in the European race is depicted by a broken line, in the American by the solid line. The bristles of the ventral plate seem to be identical. At least any subspecific

difference is masked by the small degree of individual variation. The leg bristles are more modest, less robust.

From the above occurrence records it may be regarded as a typically arboreal species, especially of the *Juniperus-Andropogon* community. The larvae and nymphs are found chiefly on the ground. Such minute species may readily have been introduced from Europe on Dutch bulbs and nursery stock, the larvae on the roots and mossy packing, the adults in crevices of bark, or roots and packing. To what extent this has occurred, in the early colonial days is a matter for conjecture. Whether *H. h. arborea* has become differentiated since these early days or from what earlier time, is likewise not at present known. However, it is conceivable that more recently introduced European material (with straight pseudostigmatic organs) may be found spotted here and there among the *H. h. arborea*, especially near human habitations, in arboretums and botanical gardens.

One specimen was noticed with fungus spores within its abdomen. As it is an arboreal species its connection with the death of junipers (and other related genera) and with black knot of cherry should be investigated.

Acknowledgements.—Slides of which the number includes the letter B, were kindly loaned me by Nathan Banks, and are deposited at the Museum of Comparative Zoölogy; slides bearing the initial G were kindly furnished me by Philip Garman and are deposited at the Connecticut Agricultural Experiment Station; those bearing no capital letter are being deposited at the Boston Society of Natural History.

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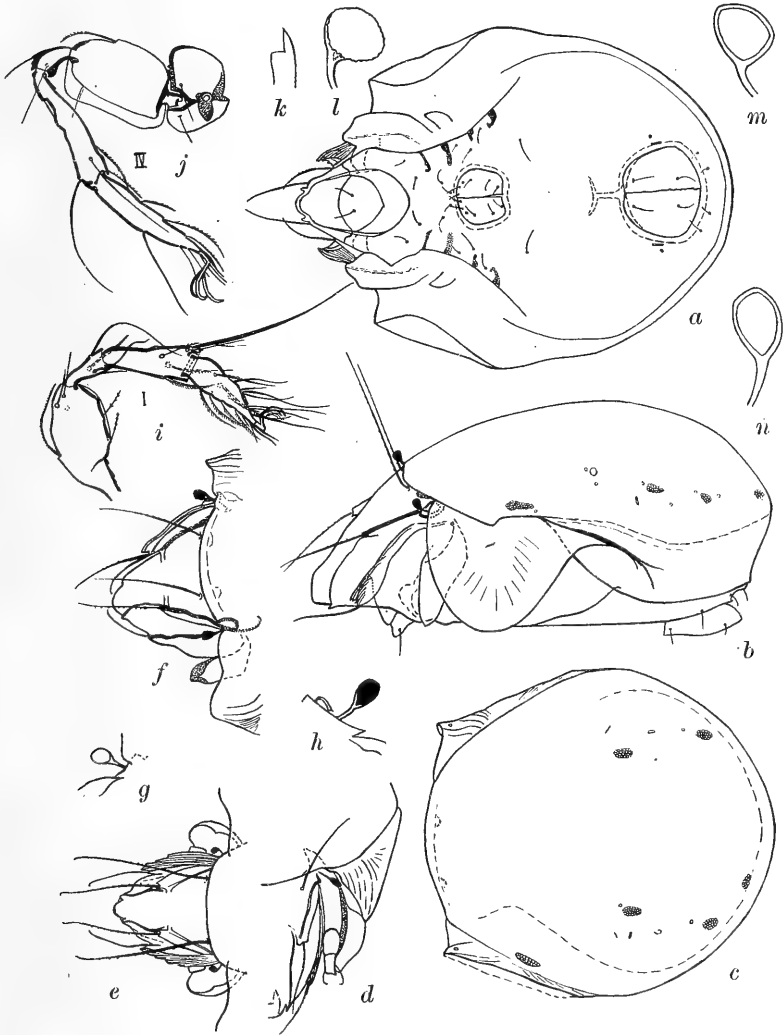
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EXPLANATION OF PLATE 19.

Humerobates humeralis arborea, adult.

- FIG. *a*. Ventral aspect, legs and mouth parts omitted.
FIG. *b*. Lateral aspect, legs and mouth parts omitted.
FIG. *c*. Notogaster, seen somewhat from behind and the left side, with pteromorphae considerably appressed.
FIG. *d*. Cephaloprothoracic aspect seen somewhat from above, showing leg I housed between tectopodia I and II.
FIG. *e*. Cephaloprothorax, legs omitted, seen directly from above.
FIG. *f*. Cephaloprothorax, legs omitted, seen somewhat from left side, *i. e.*, looking down on to rim of left tectopodia I.
FIG. *g*. Pseudostigmatic organ (not *H. h. arborea*), edge of lamella lowermost.
FIG. *h*. Pseudostigmatic organ, lamella to right.
FIG. *i*. Legs I, median (inner) aspect.
FIG. *j*. Legs IV, median aspect.
FIG. *k*. Transverse section of coxa through flange (free hand).
FIG. *l*. Pseudostigmatic organ, looking down on the end of the upturned tip.
FIG. *m*. Pseudostigmatic organ, extremely short-headed one.
FIG. *n*. Pseudostigmatic organ, extremely long-headed one.



Occasional Papers
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THE TANGANYIKAN FORM OF *ANTHREPTES*
ORIENTALIS.

BY HERBERT FRIEDMANN.¹

IN his account of the range of the Violet-backed Sunbird, Sclater (1930, p. 710) writes that it occurs from the ' . . . Upper White Nile, east through northern Uganda, the greater part of Kenya Colony, and southern Abyssinia to Somaliland.' He does not mention Tanganyika Territory at all, but the species occurs south as far as Dodoma on the central railway line. The Dodoma birds are, however, very different from typical *orientalis* or from *neumanni* (which is only doubtfully distinct from the nominate form). The Tanganyika birds are without a name and may be known as

Anthreptes orientalis barbouri, subsp. nov.

Type.—Mus. Comp. Zoöl. no. 134345; adult female, collected at Dodoma, Tanganyika Territory, December 7, 1918, by Arthur Loveridge.

Subspecific characters.—Similar to *orientalis* but the female much larger, the male slightly larger (but matched in wing and tail length by large examples of *orientalis*); both sexes with longer, stouter bills than the nominate form.

Measurements.—Type (female): culmen 21 mm. (as against 17 mm. in *orientalis*), wing 65 mm., tail 51 mm.; male: culmen 20.5 mm., wing 70 mm., tail 54 mm.

Range.—Known only from the type locality.

Remarks.—Grote (1921, p. 133) records *orientalis* from the Usambara Mountains, but I assume his birds are *A. longuemarei neglectus* since he states that they are not pure white below but are washed with grayish or creamy on the underparts. The adults of *barbouri* (no young birds seen) are pure white below.

I agree with van Someren (1922, p. 201) that *orientalis* and *longuemarei* are specifically distinct, although closely related.

¹ Published by permission of the Secretary of the Smithsonian Institution.

The Tanganyikan race described in this paper is named in honor of Dr. Thomas Barbour in appreciation of his active interest in, and support of, the ornithological exploration of Tanganyika Territory.

The material studied comprises 26 specimens of *orientalis* (including *neumanni*) and 2 of *barbouri*. In spite of the paucity of material of the latter, I have no hesitation in separating it as the characters are so obvious at first sight.

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Occasional Papers
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NEW FROGS FROM PANAMA AND COSTA RICA.¹

BY EMMETT R. DUNN.

DURING the course of various excursions into Central America under the auspices of the Museum of Comparative Zoölogy, and of a tour of European museums under the auspices of the John Simon Guggenheim Memorial Fellowship, I have gradually become aware of certain frogs from that region as yet undescribed. I hereinafter offer descriptions of them, together with a few remarks as to their nearest relatives. The material is largely in my own collections, or in those of the Museum of Comparative Zoölogy (in the main collected by myself), or the United States National Museum. Any types now in my own collection will be deposited in the Museum of Comparative Zoölogy, as a return for the many favors I have enjoyed from the hands of its Director, Dr. Thomas Barbour.

***Eleutherodactylus talamancae*, sp. nov.**

Type.—M. C. Z. no. 9879, collected by E. R. Dunn and Chester Duryea in 1923.

Type locality.—Almirante, Bocas del Toro, Panama.

Range.—Known from Monteverde, Zent, and Suretka, Costa Rica; Almirante and La Loma, western Panama.

Diagnosis.—An *Eleutherodactylus* of the *fitzingeri-longirostris* group, with smooth belly, webbed toes, slightly developed disks except on outer two fingers, very long snout, uniform thigh color, slight web on toes, large disks on outer fingers, no light throat stripe, very long legs, young with white upper lip and oblique lateral bars.

Description.—Type: head a pointed oval, flat above; snout flat and broad; eye about equal to its distance from nostril; upper eyelid less than interorbital width; distance from nostril to snout $2\frac{1}{2}$ times in distance from nostril to eye; canthus rostralis well marked, rounded; loreal region sloping, concave; tympanum $\frac{1}{2}$ eye; heel well beyond snout; very large disks on two outer fingers, other digital disks medium; toes webbed at base, web extending to

¹ Contributions from the Department of Biology, Haverford College no. 5.

inner phalangeal tubercle on all toes (less web than in *fitzingeri*, much less than in *longirostris*); first and second fingers equal; inner metatarsal tubercle well developed; a small outer one; skin finely granular above; a fold over tympanum; a slight dorso-lateral fold; smooth below; vomerine teeth in two transverse groups, well behind choanae and extending as far as their inner edges; brown, a darker brown dorsal marking, beginning as an interorbital bar (snout lighter) and extending to rump as an hourglass-shaped marking; faint barring on upper lip, and on anterior face of thigh and on tibia; belly white; under side of throat and limbs dusky; length 47 mm.

Variation.—Young specimens show a white line on upper lip and a black mark from snout through tympanum over arm to middle of side and on to the white of the belly.

Remarks.—This is close to *longirostris* but differs in longer snout, less web on toes, absence of light throat stripe, larger disks on outer fingers, and color of young. It occurs with *longirostris* at Suretka, Almirante, and La Loma. From *fitzingeri* with which it occurs at Suretka, Almirante, and Monteverde it differs in longer snout, less web on toes, longer legs, larger finger disks, absence of throat stripe, absence of light spotting on hind side of thighs, and color of young.

No other species can be confused with this one, which has a rather restricted range (*fitzingeri* and *longirostris* are widely-ranging forms).

It has previously been called by me *E. diastema* and specimens from collections have been distributed under that name to various museums. I have noted B. M. N. H. no. 1925-3-10-5, from Almirante; Berlin no. 28608 from Almirante, and U. S. N. M. no. 73222 from Suretka.

It has some similarity to *nubilus* (Escazu, Costa Rica; type, B. M. N. H. no. 1902-5-13-29) in color and shortness of webs, but *nubilus* is really much closer to *fitzingeri*, and, if anything, is merely a short-webbed race of that form from upper Costa Rica. Specimens from Escazu, La Palma, and Guapiles may represent it, although I should hesitate to give a final opinion. The type of *nubilus* agrees with *fitzingeri* in every character save shortness of webs, and dorsal color. The dorsal marking of *nubilus* is not that of *talamancae*. It has the throat mark, the wartiness, the spotting on the hind side of the thigh, the shorter legs, the shorter snout, the smaller finger disks, all *fitzingeri* characters.

The present series, kindly loaned me by Dr. Barbour, and all collected by myself, includes: M. C. Z. no. 7949, 7951-2 from Monteverde, M. C. Z. no. 8040 from Zent, M. C. Z. no. 9785-7 from Suretka, M. C. Z. no. 9879, 9882-4 from Almirante, and M. C. Z. no. 9971-5 from La Loma, in all 16 specimens, and the four distributed specimens from the original lot have been sent out in exchange, so that I have seen at least 22 of this quite distinct species.

I took the type with me to various European Museums so that it has been compared directly with the types of *nubilus*, *fitzingeri*, *longirostris*, *conspicillatus*, *raniformis*, etc., and it agrees with none of them.

Lithodytes gaigei, sp. nov.

Type.—M. C. Z. no. 10011.

Type locality.—Fort Randolph, Panama Canal Zone.

Range.—Known only from Fort Randolph and Barro Colorado Island, Panama Canal Zone, and from Talamanca Valley, Costa Rica.

Diagnosis.—Close to *Lithodytes lineatus* of South America, but differing in having head wider than body; no flash markings on thigh or in groin; vomerine teeth oblique rather than transverse.

Description.—M. C. Z. no. 10011: head a rather pointed oval; snout flat above, pointed; canthus rostralis angular; lores sloping steeply; upper eyelid less than interorbital diameter; eye equal to its distance from nostril; tympanum $\frac{1}{2}$ eye; heel to between snout and eye; head wider than body; disks of fingers and toes equal, about half again diameter of digit, much smaller than tympanum; fingers and toes free; a large inner and small outer metatarsal tubercle; a tarsal fold; finger I about equal to finger II; toe III equal to toe IV; smooth below, uniformly and finely rugose above; vomerine teeth in two oblique groups, equally in and back from choanae, separated by diameter of choanae and distant from choanae by same distance; dark brown, lighter below; a light line from eye to sacrum, snout to vent 38 mm.

Variation.—A specimen from Barro Colorado Island, Univ. Michigan field no. 77, is much lighter below, and the dorso-lateral lines are hard to make out. Also the tarsal fold is invisible (the animal is soft); the first finger on one side is longer than the second and is shorter on the other; the third toe is longer than the fifth; snout to vent 39 mm. Two small specimens from Talamanca, M. C. Z. no. 9901, 9904, are 21 and 18 mm. in length. They are black above, slightly lighter below, and the dorso-lateral light lines begin on the snout where they meet. The vomerine teeth cannot be made out. In one the first and

second fingers are equal and the third toe is shorter than the fifth, in the other the first finger is the shorter and the third toe is equal to the fifth. The shagreening shows better in these two which are neither hard, like the type, nor soft like the Barro Colorado Island specimen.

Remarks.—A specimen of *lineatus* from Bolivia, kindly loaned me by Mrs. Gaige, shows transverse vomerine teeth; a narrower head, and a thicker body; flash markings in groin and on thigh; a protruding or overhanging snout; snout not so pointed; canthus not so marked; third toe longer than fifth.

The specimens had all been identified by me with *lineatus*, until Mrs. Gaige pointed out to me the differences between the Barro Colorado Island specimen and South American ones. These differences are more exaggerated in the Barro Colorado Island specimen than in the three others, but enough remains to show a distinguishable form, with which I take the liberty of associating her name.

As Ruthven remarked to Noble (Noble 1917, *Bull. Amer. Mus. Nat. Hist.* 37, p. 794) that a specimen he secured in British Guiana resembled a *Dendrobates* in life, so also the two which I took in Talamanca were so like *Phyllobates* that for some years they were identified as the very similarly colored *P. lugubris* with which they were associated in life.

I use *Lithodytes* advisedly. The shoulder girdle of both Fort Randolph and the Barro Colorado Island specimens is *Leptodactylus*-like, although the ossification of the sternum is not complete in the Barro Colorado Island specimen. The terminal phalanges are distinctly T-shaped in both. Noble (*loc. cit.*) on a series of five Guiana specimens ranging in length from 22.5 to 45.5 mm., has maintained that while young specimens have a T-shaped terminal phalanx, adults have a simple pointed phalanx and has referred the species to *Leptodactylus*. His figures are not convincing to me, and I have assured myself that M. C. Z. no. 6033 from Trinidad, 48 mm. long, has the terminal phalanx of toe IV extremely T-shaped. Neither *lineatus* nor *gaigei* is reminiscent in habit of any *Eleutherodactylus* or *Leptodactylus* known to me, and under the circumstances I prefer to recognize the genus *Lithodytes* Fitzinger, type *lineatus*, only other known species *gaigei*.

Phyllobates flotator, sp. nov.

Type.—Adult male, in my own collection, taken July, 1930.

Type locality.—Barro Colorado Island, Panama Canal Zone.

Range.—Costa Rica to Darien.

Diagnosis.—A *Phyllobates* with black and white coloration; a lateral streak starting from middle of black lateral band in groin and reaching eye; male with white throat; male with swollen third finger; tadpole with no labial teeth and much produced lower lip.

Description.—Type: adult male; snout slightly longer than orbit; loreal region vertical, slightly concave; interorbital space broader than upper eyelid; tympanum indistinct, $\frac{1}{2}$ size of eye; disks well developed, smaller than tympanum; third finger swollen, as wide as disk; disk of toe I half size of toe II; disk of toe V half size of disk of toe IV; top of toe I misses penultimate phalanx of toe II; tip of toe II reaches antepenultimate phalanx of toe III; tip of toe III reaches antepenultimate phalanx of toe IV; toe IV $2\frac{1}{2}$ phalanges beyond toe V; tip of toe V just past penultimate phalanx of toe III; two metatarsal tubercles; one tarsal tubercle; heel barely to eye; skin finely granular; gray above; white below; sides black; light line from groin to eye obliquely through black; upper lip white; dark line on anterior edge of thigh; dark line on dorsal surface of thigh running into another dark line on posterior edge of thigh at knee, 'anvil-shaped marking'; dark anal triangle; legs not barred; head to snout 17 mm.

Variation.—A female from the same locality is similar save for the third finger not being swollen. A specimen from Cana in Darien has slightly longer third and fifth toes.

Remarks.—The *Phyllobates* from Panama, Costa Rica, and Nicaragua that I have seen fall into three groups; typical *Phyllobates*, without specialized tadpoles, or modified male third finger (these apparently stem from *Hyloxalus*, which has webbed toes), *Phyllobates* which have specialized tadpoles and modified male third finger (*flotator* and *nubicola*); and *Phyllobates* which have markings black and yellow instead of black and white, and ventral light markings. (These are close to *Dendrobates*.)

There are still many problems in the group of three genera, even in the restricted region, but I feel reasonably sure about the species I have actually seen and these remarks must be taken as an arrangement of the material seen, and an attempt to allocate names based on unseen material.

I have myself added to the confusion, for what I called *talamancae* in 1921 was based on one specimen of *talamancae* and one of *latinus*, and while I properly segregated *latinus* in 1924, I included the present *flotator* under *talamancae*.

None of the three genera are known from north of Nicaragua.

Key to the Phyllobates of lower Central America.

- A. Markings white; no linear markings below.
- B. Tadpole with normal mouthparts; male with normal third finger; no complete light streak from groin to above eye.
- C. A light streak from groin to below eye; a dorso-lateral light streak from sacrum to above eye, above lateral black band; male with black throat; disk of toe I equals $\frac{1}{2}$ disk of toe II; disk of toe V equals disk of toe IV; toe V reaching penultimate joint of toe IV.....*talamancae*.
- CC. No marked light streak from sacrum; at least a trace of a light streak from groin in lateral black band.
- D. Large (30 mm.); mottled below with gray in both sexes; a trace of groin streak; disk of toe I about equal to disk of toe II.
kingsburyi.
- DD. Smaller (21 mm.); white below in both sexes; groin streak prominent to middle of side; disk of toe I equals $\frac{1}{2}$ disk of toe II; disk of toe V about equal to disk of toe IV.....*laticrus*.
- BB. Tadpole with umbrella mouthparts (much produced lower lip and reduced labial teeth); male with much swollen third finger; a light streak from groin to above eye, cutting diagonally across black lateral band; disk of toe I equals $\frac{1}{2}$ disk of toe II, disk of toe V equals $\frac{1}{2}$ disk of toe IV.
- C. Larger (21 mm.); black line on thigh; throat and chest of male dark; thigh red in life; toe V reaching penultimate phalanx of toe IV.....*nubicola*.
- CC. Smaller (17 mm.); hooked mark on thigh; thigh not red in life; male white below; toe V not reaching penultimate phalanx of toe IV.....*flotator*.
- AA. Markings yellow; linear markings below.
- B. Finger disks equals $\frac{1}{2}$ diameter of tympanum and twice width of phalanx; finger I longer than finger II; light lateral streak to below eye; maxillary teeth definitely present.....*lugubris*.
- BB. Finger disks about equal to tympanum and three times the width of phalanx; finger I much shorter than finger II; light lateral streak to snout; toe I much reduced; no maxillary teeth.....*truncatus*.

NOTES ON THE *Phyllobates* OF LOWER CENTRAL AMERICA.*Phyllobates talamancae* (Cope).

1875, Jour. Acad. Nat. Sci. Philadelphia (2) 8, p. 102, pl. 23, fig. 6.

Type.—The type is from Old Harbour, Costa Rica (not in existence).

It has been seen from Gatun, Panama (Univ. Michigan no. 52932), Suretka, Costa Rica (M. C. Z. no. 9813-18, 20-21), and Santa Cecilia, Costa Rica (M. C. Z. no. 7858).

I feel quite sure about the arrangement of this form and the proper allocation of the name.

***Phyllobates kingsburyi* Boulenger.**

1918, Ann. Mag. Nat. Hist. (9), 2, p. 427.

Type.—B. M. N. H. no. 1912-11-1-46-49 from El Topo, Rio Pastaza, Eastern Ecuador, 4200 feet.

This has been seen from the types; Cana, Panama (U. S. N. M. no. 50197-200); and Rio Calobre, Panama (U. S. N. M. no. 53737-8). These specimens I have not seen recently. I am not wholly convinced that comparison of specimens would not show the Panamanian specimens to be different from the Ecuadorian.

***Phyllobates latinasus* Cope.**

1863, Proc. Acad. Nat. Sci. Philadelphia, p. 48.

Type.—This is from Truando River, Colombia; probably not in existence.

It has been seen from Rio Esnape, Panama (M. C. Z. no. 9207-9215); Cana, Panama (U. S. N. M. no. 54231, 63005, 66318); Cerro Azul, Panama (U. S. N. M. no. 54174-5); Almirante, Panama (M. C. Z. no. 9867-72); La Loma, Panama (M. C. Z. no. 10251-6); Santa Cecilia, Costa Rica (M. C. Z. no. 7859).

The specimens seen are all the same species, and different from any other seen, but close to *kingsburyi*. Whether they are Cope's species is perhaps questionable. *Latinasus* was described as 30 mm. long, which agrees with *kingsburyi*, but not with what I am calling *latinasus*, of which I have seen none over 21 mm. Otherwise the description agrees better with what I am calling *latinasus* than with what I am calling *kingsburyi*.

***Phyllobates nubicola* Dunn.**

1924, Occas. Papers Mus. Zool. Univ. Michigan 151, p. 7.

Type.—Univ. Michigan no. 58292 from above Boquete on trail to Chiriqui Grande, Panama, 4500 feet.

It has been seen from the type and others from the same trail on both sides of the divide. There is no doubt about this one.

Phyllobates flotator Dunn.

This has been seen from Suretka, Costa Rica (M. C. Z. no. 9819); La Loma, Panama (M. C. Z. no. 10257-62) Las Cascadas (M. C. Z. no. 9989), Rio Chenillo, Balboa, Empire, Barro Colorado Island (M. C. Z. no. 15289-92, 10728; Univ. Michigan no. 61620, 63587-93); Punta Bruja, Pacific side (M. C. Z. no. 16007); Cana, Panama (U. S. N. M. no. 50177). This is the common Barro Colorado species.

Phyllobates lugubris (Schmidt).

1858, Denkschr. Acad. Wien. **14**, 1. 250, pl. 2, fig. 14.

Type.—Krakau no. 1016 from cloud forest on Boquete trail, 5000-7000 feet.

It has been seen from Talamanca Valley, Costa Rica (M. C. Z. no. 9902-3); Zent, Costa Rica (M. C. Z. no. 8022, type of *Phyllobates beatriciae* Barbour and Dunn 1921, *Proc. Biol. Soc. Washington* **24**, p. 159); Almirante, Panama (M. C. Z. no. 9873-7).

The Krakau types, five in number, are completely faded, are 26 mm. long, and seem to have no maxillary teeth. They came, apparently, from much higher than any of the others. The largest of the recent specimens (and some were adult, tadpole-carrying males) was 20 mm. The description gives the coloration pretty exactly, except for an inverted horseshoe mark on the throat, which is not present in the recent specimens (but is present in recent specimens of the next form).

I am inclined to think *Dendrobates tinctorius vittatus* Cope 1893 (*Proc. Amer. Phil. Soc.*, p. 340) from Buenos Ayres, Costa Rica, the type of which is non-existent may come in here.

Phyllobates truncatus Cope.

1860, *Proc. Acad. Nat. Sci. Philadelphia*, p. 372.

Type.—The type, perhaps from New Grenada, is not in existence.

I have seen it from Barro Colorado Island, Panama, and from Nicuesa, San Blas, Panama. Both localities are represented in the Museum of Comparative Zoölogy.

The specimens seen differ as given in the key from *lugubris*. They are all tiny, about 14 mm. long. No maxillary teeth can

be made out. Cope says that the finger disks equals $\frac{1}{4}$ the tympanum, and that finger I equals finger II. In my specimens the finger disks equals the tympanum, and finger I is much shorter than finger II. But the coloration of mine agrees very well with Cope's description, and nothing else from Panama does, and no other name at all fits them. I feel rather that I have seen only young specimens, and with both this and *lugubris* I am not certain as to their allocation in *Phyllobates*. The two are very much alike. Perhaps adults would have maxillary teeth, as my specimens of *beatriciae-lugubris* unquestionably do. Also, as I hope to make clear, they fit into no known *Dendrobates* species from the region. I am simply doing what I can with the material seen.

NOTE ON *Hyloxalus* AND *Dendrobates* FROM NICARAGUA AND PANAMA.

One species of what might be called webbed-toed *Phyllobates* has been seen from the region (U. S. N. M. no. 50227, 66319-20 from Cána, Panama). Of the five species whose descriptions I know from Ecuador, Colombia, and Venezuela it agrees well enough with the very brief account of *Hyloxalus fuliginosus* Espada (1870, Jour. Soc. Lisboa 3, p. 59, San Jose de Moti, Ecuador). The five species have been described on a minimum of material, and I do not wish to add a name. In *Dendrobates* three forms are known to me from the region: a rather large species, black, spotted with green, usually called *tinctorius*, and quite widespread; a small red, black-spotted form, usually called *typographus*, from Nicaragua to western Panama; and a rather large, uniform red beast, from high altitudes in western Panama for which the name *speciosus* Schmidt 1858 (type, Krakau no. 1017) is applicable. The *typographus* form is Kesterstein 1867, and is definitely preoccupied by *pumilio* Schmidt 1858 (type Krakau no. 1018). True *tinctorius* has dorso-lateral light lines, and the Central American form had best be known as *Dendrobates auratus* Girard (1854, Proc. Acad. Nat. Sci. Philadelphia 7, p. 226; type not in existence, from Taboga Island, Panama).

To *auratus* belongs *maculatus* Peters (1873, MB Ak. Berlin, p. 617) from Chiriqui, and *amoenus* Werner (1901, Verh. Ges. Wien 51 from Costa Rica; type Vienna 1904, 3, p. 95). Possibly

histrionica Berthold (1846, *Nach. Göttingen*, p. 15, pl. 1, fig. 8) from Popayan, Colombia may preoccupy *auratus*.

To *pumilio* belongs *ignitus* Cope (1874, *Proc. Acad. Nat. Sci. Philadelphia*, p. 68) from Nicaragua the type of which is not in existence.

Much confusion exists concerning the Central American species or races of *Atelopus* (type *A. flavescens* from Cayenne). I have seen many or most of the types, and the original descriptions of all. I have also seen a good many modern specimens from the region, and am sure of at least one race as yet unnamed. I therefore proceed to name this race, and to give an analysis of the situation which will, I trust, clear up some of the confusion.

Stannius (1856, *Handb. Zool.* 2, p. 16) mentions an *Atelopus varius* seen in the Berlin Museum as exhibiting some vertebral fusion. The name is quite unidentifiable and is a *nomen nudum* pure and simple.

In the privately published and distributed *Nomenclator Rept. Amph. Mus. Berol.* of 1856, signed by Lichtenstein and compiled by Lichtenstein and Martens we find on page 40 *Phyrnidium*, gen. nov., type *varium* sp. nov. followed on page 40 by var. a *maculatum*, var. b *adpersum*, and var. c *crucigerum*. The specimens, 13 in number, were all from 'Veragoa.' One of the varieties is obviously a synonym of the typical form. Since *crucigerum* has been used otherwise, and since the description of *adpersum* conforms to what Keferstein in 1867 (*Nach. Göttingen*, p. 350) described as *Atelopus varius* from Costa Rica and which has always gone by that name, and since the types of *adpersum* (Berlin no. 3377-8 from Veragua) also agree with Costa Rican specimens, the name *adpersum* may be taken as a synonym of the typical form, as is *Hylaemorphus Pluto* Schmidt 1858 (*Denkschr. Ak. Wien*, p. 255) from Costa Rica.

True *Atelopus varius varius* is a small form (40 mm.), black (sometimes bluish gray) above, much marked with red and yellow above. I have taken numbers of them near San Jose, Costa Rica, and have seen many specimens from upper Costa Rica. There are no specimens from Panama except the types of *adpersum* and Berlin 3380. There were four in the original series of *adpersum*.

The type of *maculatum* is a larger form with fewer and larger

spots, and regularly barred legs. It is Berlin no. 3379 from Veragua and is two inches long. A specimen from Cameron, Chiriqui is Berlin no. 7743. These agree with specimens from the trail between the Chiriqui Lagoon and Boquete which I took myself, and with the types (Krakau no. 1014, four specimens, 53 mm. long), and the description of *Hylaemorphus Dumerilii* Schmidt (*loc. cit.*, p. 255, pl. 3, figs. 23-24) from the same region at 8000 feet, collected by von Warszewicz. It is highly probable that this gentleman collected both the Berlin type and the Krakau series.

The type of *crucigerum* (Berlin no. 3381) from Veragua has a yellow lateral band around snout and body. It is thus like the description and the type (Krakau no. 1015) of *Hylaemorphus Bibronii* Schmidt from 'near Panama 2000-3000 feet.' I have seen six modern (four in the Mus. Comp. Zoöl.) specimens from the Val de Anton (780 m.) in Coclé province which I feel sure are this form. The Krakau type is 36 mm. long. The description gives *crucigerum* as $1\frac{1}{4}$ inches. The modern ones I have seen are all large. Two are immaculate yellow, two are slightly spotted with black, and one, 52 mm. long, has several black spots on the legs, and several on the body, including a very definite X-mark on the head. In all probability von Warszewicz collected the types of both. I believe the black pigment disappears as the animal grows older.

The situation is complicated by three specimens in Berlin, Puerto Cabello, no. 3382, and Caracas, no. 3383-4, all labeled types of *crucigerum*. I was unable to convince myself in Berlin that they were the same species or race as the Veragua type, no. 3377. They reminded me then of the type of *certus* from Darien, and the figure of *cruciger* in Günther 1858 is now decidedly reminiscent of these Venezuela specimens. But the figure of *cruciger* in Günther certainly does not represent Panama material, being warty instead of smooth and having the toes half webbed instead of entirely webbed. Furthermore Lichtenstein and Martens mention 5 specimens of *crucigerum* from Veragua, and three smaller ones which they thought the same. Only one of these is now to be found.

I cannot completely solve this problem, but I think it clear that *Atelopus varius cruciger* must be used for Panama animals.

In the region east of the Canal Zone two or possibly three races are to be found. All are modern specimens. They come from Cerro Azul near the Canal Zone (U. S. N. M. no. 54183-4, 54186-96, all young); Rio Jappe, Darien (U. S. N. M. no. 53964-5, young); Pirri Range, Darien (U. S. N. M. no. 50230-48, all adult); Cana, Darien (U. S. N. M. no. 50168-75, 50226, 54230, and 66316. The last is very young); Porto Obaldia, Darien (U. S. N. M. no. 48594-5, adult); Mt. Sapo, Darien (M. C. Z. no. 8538, type of *Atelopus spurrelli certus* Barbour and many paratypes).

Of these, the specimens from Cerro Azul, Rio Jappe, Pirri Range, and Cana, if due regard be paid to age changes, are the same. The young have light bellies with a few small spots; dorsally they are brown with the legs barred with light and a couple of linear yellow marks or bands in the shape of inverted U's or V's. The adult has an immaculate light belly, and either a uniform brown dorsum, or with tiny light dots, circles or semi-circles.

For this race I propose the name *Atelopus varius glyphus*, the type of which is U. S. N. M. no. 50320 from Pirri Range, Darien.

The Porto Obaldia specimens have the same markings as the small young from Cana, but they are as large as Cana adults. Possibly they should be considered a separate race, but since only two specimens are known, I prefer to consider them *glyphus* for the time being.

The Mt. Sapo specimens, of which Barbour and Brooks took nearly fifty, were brick red in life, with considerable spotting below in males (females almost immaculate). Above the light color was reduced to fine lines which surround rounded black spots (larger in males than in females).

Barbour says they have 'no marked structural differences from *varius*' with which I agree entirely, having just carefully compared some San Jose *varius* with a paratype of *certus*, but he says 'it lacks the inherent quality of *varius*, which is variability.' I cannot agree that *varius* at San Jose, or even over a wide range in Costa Rica is any more variable than is *certus* on Mt. Sapo. I have seen true *varius* from some nineteen localities, and all were alike, save for the occasional bluish gray ground color, which seemed to crop up in several localities. Also, the specimens and figures of *maculatum* and *dumerilii* collected over

80 years ago can be matched spot for spot with recent specimens from the same trail.

We have then in Costa Rica and Panama the species *Atelopus varius*, smooth, with slim form, fully webbed toes. It is divided into the following races:

Atelopus varius varius (Lichtenstein and Martens) from upper Costa Rica and into Panama. It is small and heavily spotted above with irregular red and yellow marks.

Atelopus varius maculatus (Lichtenstein and Martens) from high western Panama. This is large and sparsely spotted with rounded yellow spots.

Atelopus varius cruciger (Lichtenstein and Martens) from mountains near Panama City to the west. This race is large with the black much reduced or entirely gone, or occasionally persisting as an X-mark on head.

Atelopus varius glyphus Dunn from the mountains of Darien. It is brown marked with lighter, the brown predominating, and sometimes uniform; a large race.

Atelopus varius certus Barbour from the mountains of Garachine peninsula. A small race with dark predominating in close-set, rounded spots. The light markings are red in life.

I might add that Noble (*Proc. Biol. Soc. Washington* 37, p. 66, 1924) has stated that the National Museum possesses *Atelopus varius* from Miraflores, but no such specimens are now in the collection, nor anything from Miraflores which could possibly be confused with *Atelopus*. Also there is no record in Washington of any such specimens having been there. Noble says they were collected by Goldman. Error has certainly crept in here.

I might also add that the types of Günther's *Phryniscus laevis* 1858 (*Cat. Batr. Grad. Brit. Mus.*, p. 43, pl. 3, fig. 1) were said to come from Panama (two), Quito, and Chile. I have seen no modern Panamanian specimens. I am inclined to think that *Phirix pachydermus* Schmidt 1858 (*loc. cit.*, p. 256, pl. 3, fig. 26) from near Bonaventura, 5,000 feet, is the same and antedates it.

***Centrolene valerioi*, sp. nov.**

Type.—M. C. Z. no. 16003.

Type locality.—La Palma, Costa Rica, 4,500 feet.

Range.—Known only from type locality.

Diagnosis.—Centrolene without humeral hooks, no vomerine teeth; tympanum almost aborted; nostrils raised, prominently; bones white; color in life white with a dorsal green network.

Description.—Tongue circular; head broader than long, semicircular as seen from above save for projection made by nostrils; eyes directed forward, their diameter greater than their distance from tip of snout; canthus rostralis rounded but distinct; lores concave; nostrils protuberant, causing snout to overhang; interorbital space twice as wide as upper eyelid; tympanum barely visible, directed upward, $\frac{1}{6}$ the diameter of eye; fingers with disks wider than tympanum, truncate; first finger longer than second; web on about $\frac{1}{2}$ of outer fingers, to penultimate phalanx of 3 and 4; inner fingers webbed at base; toes webbed to just short of disks of 3 and 5, not quite to penultimate phalanx of 4; a single weak inner metatarsal tubercle; heel reaches to beyond snout; smooth above, belly and thighs rugose; in life white, a narrow green dorsal stripe, green vermiculations on dorsal surface and on shin, thigh unpigmented, white beneath, iris golden; in preservative white, a few faint dark chromatophores where green was in life; length 21 mm., width of head 8; arm 13, leg 39 mm.

Variation.—A paratype (M. C. Z. no. 16004) from the same locality is practically identical.

Remarks.—Manuel Valerio and I collected these two specimens the nights of Jan. 15–16, 1929.

Its relationships may best be shown by a key to the species of this group known to me from Panama and Costa Rica, four in all, all of which I have seen in the field.

A. Tympanum completely absent; no vomerine teeth; snout very flat; bones white; uniform green in life with white spots above; gular sac white; upper eyelid golden; iris silver with dark lines; no humeral hook; in preservative, white with sparse chromatophores black.

fleischmanni.

AA. Tympanum tiny; no vomerine teeth; nostrils raised, prominent; bones white; green dorsal stripe and chain markings in life above; gular sac white; iris golden; no humeral hook, in preservative white with few dark chromatophores in vermiculations. . . . *valerioi.*

AAA. Tympanum distinct; vomerine teeth present in 6 out of 13; snout normal; bones green; green above in life; gular sac green; a rudimentary humeral hook, not projecting; in preservative uniform purple above; fingers more webbed. . . . *pulveratum.*

AAAA. Tympanum distinct; vomerine teeth present in 32 out of 34; snout normal; bones green; green above in life with black dots; a white line around upper jaw; gular sac green; iris black with gold lines; a well developed humeral hook in males, and in some females; in preservative purple above usually (36 out of 41) with black dots; fingers less webbed. . . . *prosolepon.*

In view of the resemblances between *prosolepon* and *pulveratum* as against *fleischmanni* and *valerioi*, and of the uncertain

nature of the vomerine teeth as even a specific character, and as I have seen only one female of *prosolepon* with a humeral hook, I cannot accept the genus *Centrolenella* (Noble 1920, *Bull. Amer. Mus. Nat. Hist.* 52, p. 441, type *C. antioquiensis*) as distinct from *Centrolene* (based on absence of hook and of vomerine teeth.)

I have seen the following in the field: two *valerioi* from La Palma; ten *prosolepon* from La Palma; two *pulveratum* from Barro Colorado Island; one *fleischmanni* from Suretka, four from San Jose, and six were taken and more seen on Barro Colorado Island. I say this because I might otherwise seem to be dealing harshly with the species of a supposedly rare and little-known group. Besides the 25 of my own collecting I have seen 60 more of these forms in various museums, so my remarks are based on 85 specimens, 78 of which are from Panama and Costa Rica. The results of observations on these specimens are the following ranges and synonymies:

Centrolene fleischmanni. San Jose, La Palma, Turrialba, Surubres, Suretka, Costa Rica; Ft. Davis, Barro Colorado Island, Rio Esnape, Calah Cr., Rio Sucubti, Panama; Salidero, Ecuador 29 specimens. (*Hylella fleischmanni* Boettger, Ber. Senckenberg, Ges. 1893, p. 251, San Jose, Costa Rica, Type, Senck. Mus. no. 1419a; *Hylella chrysops* Cope 1894, Proc. Acad. Nat. Sci. Philadelphia, p. 196, San Jose and Alajuela, Costa Rica; *Centrolenella parambae* Noble 1925, Amer. Mus. Nov. 165 p. 13).

Centrolene valerioi. La Palma, Costa Rica. 2 specimens.

Centrolene pulveratum. Turrialba, Bebedero, Costa Rica; Chiriqui, Barro Colorado Island, Panama; Pueblo Rico, Choco, Colombia (?); Paramba, Salidero, Rio Durango, Rio Japayo, Ecuador. 13 specimens. (*Hyla pulverata* Peters, M. B. Ak. Berlin, 1873, p. 614, Chiriqui, type Berlin no. 7842; *Hylella parambae* Boulenger 1898, Proc. Zool. Soc. London, p. 125, pl. 17, fig. 2 (*parambae* in original desc. but obvious typ. error.) Paramba, Ec. Type, B. M. N. H. no. 98—4—28—163).

Centrolene prosolepon. La Palma, Bebedero, Limon, La Junta, San Isidro, Costa Rica; Bocas del Toro, Bugaba, Progreso, Boquete, Cabima, Las Cascadas, Barro Colorado Island, Panama. 41 specimens. (*Hyla prosolepon* Boettger, Kat. Batr. Mus. Senckenberg, 1892, p. 45, La Junta, Costa Rica, type, Senck. Mus. no. 1400, 1a; *Hylella puncticrus* Boulenger, Ann. Mag. Nat. Hist., 1896, 18, p. 341, La Palma, Costa Rica, type, B. M. N. H. no. 96-10-8-70-71).

Several species of this group have been described from South America, and I have not seen the types, but save for *valerioi*, which is obviously distinct, the Central American names antedate all others, and are certainly applicable.

Hyla colymba, sp. nov.

Hyla albomarginata Dunn 1924, Occas. Papers Univ. Michigan Mus. Zoöl. 151, p. 3.

Type.—M. C. Z. no. 10234, collected by Chester Duryea and E. R. Dunn, 1923.

Type locality.—La Loma (or Buenavista) on trail from Chiriqui Lagoon to Boquete, about 1500 feet altitude.

Diagnosis.—A small *Hyla* of the *albomarginata* group; differing in smaller size; smaller tympanum; no pollicial spur; less web; smaller disks; and in the presence of a fringe on last phalanx of fingers and toes, which is beyond the web, and wider than the disks.

Description.—Tongue circular; head a pointed oval; snout blunt; vomerine teeth in two arcuate groups between the nares; canthus rostralis rounded; lores sloping; interorbital space much wider than upper eyelid; eye less than its distance from snout, greater than its distance from the nostril; tympanum $\frac{1}{3}$ eye, half covered by supratympanic fold which reaches elbow; smooth above, belly and underside of thigh granular; a gular vocal sac; no chest fold; no heel flap; palms granular; fingers III–IV $\frac{1}{2}$ webbed, III–II the web reaches $\frac{1}{3}$ on III and $\frac{1}{2}$ on II, II–I rudimentary; toes a phalanx of IV and disk free, not to disks of III and V, II–III a phalanx and disk free; II–I rudimentary; disks smaller than width of digits, the same size as tympanum; fingers and toes with a fringe wider than disks on last phalanx; heel to snout; heels meeting when appressed; color in life brownish green; in preservative pale, with more or less expanded chromatophores and whitish points; length 32 mm.

Variation.—Another adult varies only in degree of expansion of the chromatophores; a young specimen (22 mm.) has a rudimentary tail and less web. It was, in life, bright green with tiny dark dots, and a white line from the eye over the tympanum. M. C. Z. no. 10232–3, 10235–43, frogs and tadpoles, are paratypes.

Remarks.—There is no doubt that this form is distinct from either Barro Colorado Island or Brazilian *albomarginata*, with both of which I have compared it. The differences are not obvious at first sight, and my recognition of this form as distinct has arisen from the striking color differences observed in Barro Colorado specimens (webs red, red on concealed surfaces of thigh); on the differences in the calls of the two (a metallic 'cheep' in the new form, an explosive 'bop' in Barro Colorado Island); a note from Dr. Adolpho Lutz, suggesting that the Brazilian *albomarginata* has very different tadpoles from the La Loma form as described by me in 1924.

The differences mentioned in the diagnosis hold for both

Barro Colorado specimens and for Brazilian ones. I am not sure that the *albomarginata* from Central America do not deserve racial recognition. The glandular dorso-lateral fold is much less developed in the northern specimens (seen from Barro Colorado Island, Trinidad River, Panama; San Carlos, Costa Rica; Machuco, Maselina Cr., Nicaragua). Nor do I know whether the Brazilian specimens have the red on webs and thighs.

At any rate, the general type is represented in Central America by a beast differing but slightly from the Brazilian, and by a smaller beast, which has gone into the mountain brook habitat and has very specialized tadpoles, as described by me in 1924.

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THE AMPHIBIANS OF BARRO COLORADO ISLAND.¹

BY EMMETT R. DUNN.

THANKS to the kindness of Dr. Thomas Barbour, and to the administrators of the John Simon Guggenheim Memorial Fellowship, I have been enabled to make a considerable study of the herpetological fauna of lower Central America, both in the field, and in museums at home and abroad.

The present paper is an attempt to put some of my notes into an immediately useful form. It is primarily a guide to the species of amphibians found on Barro Colorado Island, their habits and habitats. I have added those species known from the Panama Canal Zone, and those known from the provinces of Panama and Colon, which surround the Zone.

I shall not attempt to repeat what has been so often and so well done, a general description of Barro Colorado Island. I shall merely indicate here the dates of the extremely pleasant occasions when I sojourned on the island: Nov. 12-Dec. 24, 1928; Feb. 8-16, 1929; July 15-Aug. 2, 1930. In order to give meaning to dates mentioned in the accounts of the species, I give the rainfall data for the time I spent on the island. During February, 1929, rain fell twice, 0.05 inches, and 0.02 inches.

<i>Date</i>	<i>Inches</i>	<i>Date</i>	<i>Inches</i>	<i>Date</i>	<i>Inches</i>
Nov. 11	0.13	Nov. 21	0.04	Dec. 1	0.01
12	0.83	22	0.36	2	0.01
13	0.40	23	0.11	3	0.00
14	2.84	24	0.14	4	0.05
15	0.20	25	0.20	5	0.04
16	0.00	26	0.34	6	0.50
17	0.20	27	1.49	7	0.69
18	0.64	28	0.10	8	0.24
19	3.64	29	0.04	9	3.79
20	2.34	30	0.01	10	0.45

¹ Contributions from the Department of Biology, Haverford College, no. 6.

<i>Date</i>	<i>Inches</i>	<i>Date</i>	<i>Inches</i>	<i>Date</i>	<i>Inches</i>
Dec. 11	0.77	July 10	0.00	July 20	0.02
12	0.01	11	0.74	21	0.00
13	0.00	12	0.91	22	0.00
14	0.00	13	0.15	23	0.47
15	0.00	14	0.08	24	0.50
16	0.00	15	1.03	25	0.11
17	0.00	16	0.00	26	0.11
18	0.00	17	0.30	27	0.01
19	0.42	18	0.46	28	0.04
20	0.04	19	0.41	29	0.00
21	0.12			30	0.00
				31	0.00
				Aug. 1	0.01

November, 1928, had an excess of 2.5 inches, December, 1928, had an excess of 2.99 inches, and July, 1930, had a deficiency of 4.32 inches on a five year average.

The amphibian fauna of Barro Colorado Island, at the time of writing, consists of one caecilian, two salamanders, and 30 frogs, a total of 33 species. Twelve additional frogs are known to occur in the limits of the Canal Zone. The Provinces of Panama and Colon, which surround the Zone, harbor an additional salamander and nine more frogs, and bring the total count up to 55 species.

Our knowledge of the amphibian fauna is by no means complete, but it is fairly clear that, as far as the Canal Zone and Barro Colorado Island are concerned, no very material increment is to be expected. This statement calls for further elucidation, and indeed no guide to the amphibians of Barro Colorado and the Canal Zone would be complete without some consideration of the faunistic and ecological relations of the region.

Amphibian distribution in the tropics is largely a matter of rainfall (total and seasonal) and altitude. Except for very high altitudes (which do not enter our consideration) temperature plays little part, and the effect of mountains of low altitude is largely their effect on rainfall.

The whole region of the Zone is one in which there are two marked seasons, a rainy season from May to November, and a dry from December to April. This distribution of rainfall holds true for Balboa, Barro Colorado, Colon, Chiriqui, and Garachine

in Darien. It does not hold true for Bocas in western Panama or for Cartago in Costa Rica, where for various reasons there is no marked dry season at all, but two periods of maximum rains and two periods of somewhat drier weather. Thus a year's record for Bocas shows no month in which the fall was less than 5 inches, July and August had ten or more inches and so did November, December and January. This is for a year in which Bocas had a total of 104 inches. Colon, with a three year average of 150 inches, had a marked dry season from January to April, the average fall for these months being 2.08 inches.

Within the region of the Zone there are marked differences between the Pacific side and the Atlantic, with Barro Colorado occupying an intermediate position, although it is on the Atlantic slope and nearer Colon. Three yearly averages for Balboa, Barro Colorado, and Colon give 77, 112, and 150 inches respectively. A five year average for Barro Colorado gives 100 inches yearly rainfall.

By and large, as I shall show later, the amphibian distribution reflects these differences in rainfall.

There is a region of very elevated mountains in Costa Rica, which extends into western Panama. This has its appropriate effect on the fauna, and many species are known only from that region. The Canal Zone lies in a region of especially low altitude, the so-called 'Panama fault.' No very elevated mountains are to be found in Eastern Panama.

Barro Colorado Island, then, is a locality of low elevation, of medium rainfall with marked seasonal change. It thus lacks species which need altitude, either more or less total rain, and those which cannot stand a marked dry season.

Several species seem confined to the immediate Atlantic coast in the Canal Zone region, and a fair proportion of these seem extensions from the Costa Rican region where the rains are not so seasonal. Others again seem restricted to the Pacific side, while a few seem to prefer the higher regions to the east and west of the Zone. It is difficult to produce a list of these, since our knowledge is so imperfect, but there are enough such cases to justify the statement, and I would be rather surprised if any of these forms were to be found on Barro Colorado.

There are, however, forms found on both sides of the region,

but not yet found in it, and doubtless some or all of these are to be expected eventually. Such are: *Oedipus platydactylus*, *Gastrotheca*, *Hyla leucophyllata*, *Phyllomedusa*, *Hypopachus*, and *Gastrophryne*, known from Costa Rica and from South America, *Bufo simus*, *Bufo veraguensis*, *Pleurodema*, *Hyla crepitans*, from western Panama and from South America, and *Leptodactylus melanonotus* from western Panama and from Darien.

Some 23 species are known definitely from western Panama which have never been taken in our region. From eastern Panama only two such species are known, *Hyla rosenbergi* and *Hyaloxalus fuliginosus*. Panama therefore may be divided into two regions of amphibian distribution, the extreme west, and all the rest, including the Canal Zone, to the Colombian border. Nothing approaching a boundary can be set to these regions, and none is to be expected, yet the difference between the amphibian faunas of Almirante and of Barro Colorado Island is quite marked.

Within the region, *Centrolene pulveratum*, *Agalychnis calcarifer*, *Hyla underwoodi*, and *Rana zeteki* have been taken only on the island.

The island itself was, of course, originally a hill. The northern side is quite steep, the middle and the eastern end are rather flat, and the south and west sides are gently sloping. The streams are all rather rapid, except the upper courses of some in the center of the island, where rather large permanent pools may be found, and swampy places in the rainy season. Such still water is found between Zetek 3 and Armour 9 (habitat of *Hyla albomarginata*), and near the junction of Van Tyne-Chapman (habitat of *Agalychnis callidryas*). Both these places also shelter quite large caymans.

The only other still water habitats are the inlets. Here *Hyla underwoodi* and *Hyla boulengeri* may be found, wherever the water is sufficiently sheltered from waves. Most of the other amphibians seem able to use running water, or are terrestrial in their breeding habits.

I have tried to explain my belief that no great results may be expected from further intensive collecting on the island. This is especially confirmed by my finding the same creatures breeding in July, 1930, that I found breeding in November and December,

1928. Of the 33 species known from the island the breeding habits of over half are completely unknown, and the information concerning most of the others is very meager. For more refined work on individuals the field is almost unlimited. And nowhere on earth can such work be done so easily or under such good conditions. It is with the idea of facilitating such life-history work that this paper has been written.

In the list and key which follow persons acquainted with the literature may notice certain differences from records published by Noble (1924, *Proc. Biol. Soc. Washington* **37**, p. 65-72) based on the collections of the National Museum. These records follow. The record of *Bufo valliceps* from Porto Bello (based on a specimen of *B. coniferus*); *Agalychnis moreletii* from Panama (based on a specimen of this species collected in Guatemala by Van Patten); *Atelopus varius* from Miraflores (no such specimen is in the National Museum); *Eleutherodactylus brocchi* from Cerro Bruja (not seen, but specimens from Pirri Range labeled *brocchi* are what I am calling *ventrimarmorata*).

The only other recent list from the region is that of Barbour (1906, *Bull. Mus. Comp. Zool.* **46**, p. 224-229). This is for islands in the Gulf of Panama, and for the savanna region near Panama City.

Mr. Arthur Loveridge has kindly looked up some of these specimens for me. The following records need to be changed:

Coecilia gracilis (p. 228), M. C. Z. no. 2502, is really *Caecilia ochrocephala*.

Hylodes brocchi (p. 229) from San Miguel Island is a specimen of *Eleutherodactylus fitzingeri*, M. C. Z. no. 8024.

Bufo spinulosus (p. 229) is a specimen of *Bufo marinus*, M. C. Z. no. 2438.

Phryniscus laevis (p. 228) which was M. C. Z. no. 2437, has been 'spoiled and discarded.' In the absence of any other modern specimens, this record may be questioned.

Hyla leucophyllata (p. 229). The 'five' examples from Panama cannot now be found, nor can Mr. Loveridge find any clue as to their whereabouts or identity. The record may well be held in abeyance for the present.

APODA

Caecilia ochrocephala Cope.

I have not taken this myself, but have seen it alive on the Island. A good many have been taken in various digging operations around the laboratory. It apparently goes as far as ten feet underground. *Coecilia sabogae* Barbour from Saboga Island is a synonym.

CAUDATA

Oedipus lignicolor (Peters).

This has been taken on the Rio Tapia, Prov. Panama.

Oedipus complex Dunn.

One young one was taken under debris along the Donato trail, Dec. 13.

Oedipus parvipes (Peters).

I have five records from the Island, pretty well scattered. One taken on the Lutz trail July 18, was crossing the path at night during a drizzle. The others were all found under debris in the daytime.

SALIENTIA

Bufo haematiticus Cope.

This has been taken at Margharetta (Camp Mary Caretta) and at Rio Chillibrillo in the Canal Zone. It is apparently rather rare there, although it is common enough to the east and to the west.

Bufo granulatus Spix.

The most northern record is from the Rio Calobre.

Bufo typhonius (Linné).

I am not sure I should use this name for the common Island and Panama species. It never has crests so developed as the South American type, in spite of the fact that adult breeding males and females have been taken. It was calling the night of December 9 at Zetek 3, and a mated pair were taken there on the 10th. The call is a low purr. I have many records for the island.

Bufo coniferus Cope.

This has been taken at Gatun and on the upper Trinidad river.

Bufo marinus (Linné).

It is rare on the island and three have been seen.

Engystomops pustulosus (Cope).

While no distinction was made in the field between this and the following species, the fact that, outside of two from the Island in the Michigan collection, all from Panama are *pustulosus*, makes it reasonable that the following notes refer to this species rather than to *ruthveni*. It is very common on the Island.

I have heard it calling December 10, July 15–August 2. The note may be transliterated as 'wheenk' or as 'wheu-ak-ak.' The eggs are laid in a mass of froth, which will float, or which may persist for some time in the absence of water. They are laid rather regardless of the amount of water, from a purely temporary rainfall in a post hole to a pool in a permanent stream. The tadpoles hatch in about 72 hours, the eggs being kept in water. There is some indication of males taking stations and mating with a succession of females. Notes for the monkey cage near the laboratory are as follows: July 18, patch of eggs in post hole; July 24, calling at night in cage and in post hole; (5 specimens taken from cage and vicinity night of July 24 and afternoon of July 25); July 25, mated pair in cage at night; July 26, eggs in cage in morning, another set at night; August 2, afternoon, four males calling in cage.

Eggs taken from monkey cage (set of night of July 26) hatched in laboratory July 29. The breeding habits of this species have been reported by Noble (1925, *Amer. Mus. Nov.* 165, p. 2) from notes by Chapin and Breder.

Engystomops ruthveni (Netting).

The only Panamanian specimens seen in the collections of Michigan, Harvard, and the National Museum are two from the Island in the Michigan collection no. 61615.

Leptodactylus labialis (Cope).

This has been taken at Fort Sherman and at Majagual.

Leptodactylus bolivianus Boulenger.

This common Pacific-side species has been taken once on the

Island, an adult female was taken the night of July 22 at the Drayton House. *Leptodactylus insularum* from Saboga and San Miguel is a synonym.

Leptodactylus quadrivittatus Cope.

It has been taken once in the region at the Rio Tocumen.

Leptodactylus pentadactylus (Laurenti).

Rather rare on the Island. I have three records. One was in a burrow at the junction of the Barbour and the Donato trails. K. P. Schmidt and his colleagues of the Crane expedition spent nearly a day in vain, trying to excavate it from what proved to be quite an extensive underground habitation.

Lithodytes gaigei Dunn.

This species has been taken once on the Island by the Gaiges. The Museum of Comparative Zoölogy has it from Fort Randolph.

Eleutherodactylus gollmeri (Peters).

This species has been taken on Cerro Bruja, and the specimen served as the type of *E. goldmani* Noble. It ranges from Honduras to Venezuela, and is quite common in Costa Rica.

Eleutherodactylus polyptychus (Cope).

This common Costa Rican species has been met with only at Gatun and at Rio Chenillo.

Eleutherodactylus bufoniformis (Boulenger).

This large and hideous frog is not uncommon on the Island around rock outcrops in the beds of streams.

Eleutherodactylus biporcatus (Peters).

This widespread species is mostly met with in high and dry localities on the Island. Here as elsewhere adults are very scarce, in fact I have seen only tiny specimens on the Island. The adults of this, the largest *Eleutherodactylus*, are decidedly a problem. Possibly, as their developed bony heads might indicate, they live in burrows.

Eleutherodactylus fitzingeri (Schmidt).

The commonest of its genus on the Island and wherever else

it occurs. It is usually found near water. A male, 51 mm. long, was found on June 6 sitting on 44 eggs under leaves on a hillside by Loomis and Shannon. They were left until June 12, when both frog and eggs were collected. One egg was dissected and the little frog began jumping around as soon as removed. (The collector's field notes are with specimens in the United States National Museum.)

***Eleutherodactylus longirostris* (Boulenger).**

This is much rarer on the Island than is *fitzingeri* and apparently not so restricted to the neighborhood of water. I have about 4 records as against 17 of *fitzingeri*.

***Eleutherodactylus cerasinus* (Cope).**

One specimen from Gatun is in the Michigan collection. It is very common in Costa Rica.

***Eleutherodactylus ventrimarmoratus* (Boulenger).**

This has been seen from the Rio Chenillo. Its status and that of *cerasinus* is somewhat uncertain in the region.

***Eleutherodactylus ockendeni* (Boulenger).**

Not uncommon in drier and higher localities on the Island. There are about 11 records. Closely related to both *cerasinus* and to *ventrimarmoratus*.

***Eleutherodactylus lutosus molinoi* (Barbour).**

This tiny frog is not at all rare on the Island. It ranges in color from almost as dark as typical Costa Rican *lutosus*, to as light as the type of *molinoi*. The absence of the tympanum is amply distinctive.

***Eleutherodactylus diastema* (Cope).**

Probably the commonest frog on the Island and certainly the noisiest. Its clear whistle has been heard from Nov. 12, to Dec. 25, on Feb. 9, and from July 15 to Aug. 2. This is the '*Hyla chica*' of Noble, and the '*Syrrhopus ineptus*' of Barbour, as well as the '*Hylodes gularis*' of Boulenger. It is the only *Eleutherodactylus* of the region to have a well developed gular sac, and is the only vociferous species. It is allied only to *E. hylaeformis* of the Pico Blanco on the Panama-Costa Rica border, and to *E. varleyi* of Cuba.

After a rain on the night of November 17 a calling male was found with a female and a batch of 11 eggs. The eggs were between a leaf and the side of a rock and were stuck to both. The female was still gravid, and the eggs were well developed, and probably laid after the last rain (night of Nov. 13 or 14). This looks like a case of male station and second mating.

Phyllobates truncatus Cope.

What I provisionally identify as this species is a tiny frog which I have seen three times on the south side of the Island.

Phyllobates talamancae (Cope).

I have seen one from Gatun in the Michigan collection.

Phyllobates kingsburyi Boulenger.

I have seen two from the Rio Calobre.

Phyllobates latinasus Cope.

I have seen two from the Cerro Azul.

Phyllobates flotator Dunn.

A very common frog from the stream banks of the Island. It is diurnal and calls in the daytime. The call is a faint 'peep peep.' Two were taken in amplexus 8 feet up on the bank of the stream at Shannon 4, about 3 p. m. on November 14. The male was calling, after a morning rain. I noticed the umbrella mouth tadpoles feeding on the surface film on November 15. Tadpoles were found in a puddle in a hollow rock off the Wheeler trail November 30 well away from any permanent stream. A male was taken carrying tadpoles on December 14, and another carrying three tadpoles on July 31, at Pearson 15, 440 yards away from water. They were calling July 23. I saw one out at night on February 9.

Dendrobates auratus (Girard).

Not common, found in the higher parts of the Island. I have three records.

Atelopus varius cruciger (Lichtenstein and Martens).

I have seen this from Val de Anton.

Atelopus varius glyphus Dunn.

I have seen this from Cerro Azul.

Hemiphractus panamensis (Stejneger).

This is known only from the type from Signal Loma, near Porto Bello.

Hyla microcephala Cope.

This is known from Frijoles (a specimen taken by Donato and brought to the Island in July), Gatun, Juan Diaz, Balboa.

Hyla ceratophrys Stejneger.

This *Hyla* is known only from the type from the upper Pequeni River.

Hyla rubra Daudin.

This species (which includes *Hyla elaeochroa* Cope) has been taken at Gatun, San Pablo, and Trinidad River.

Hyla boulengeri (Cope).

This species I know from four calling males taken from floating grass patches near the Drayton House on November 22. The very catlike note was 'cree.' I think I have heard it at the laboratory dock on December 1, and at the Drayton House on July 22.

Hyla underwoodi Boulenger.

Four, including a mated pair, were taken the night of November 28 in bushes at edge of lake near Armour House. The note was 'ik lik.' On December 2 I caught two males calling near the dock at the laboratory. I heard them at the Drayton House on July 22.

Hyla phaeota Cope.

This is what has commonly been called *baudinii* from Panama and includes *dolomedes* Barbour. Rather common on the Island. I have notes of a good many. A calling male was taken February 10. The note is a loud croak. They were calling July 16.

Hyla gabbii Cope.

This is common near the laboratory. Apparently restricted in its appearance to the dry season or to nights when it does not

rain. The calling station is rock slopes in stream beds. On these places there is a strong flow of water during rains, and they are dry on dry nights or in the dry season. The eggs are apparently laid in small water-holding crevices on such slopes. The calling dates to follow should be compared with the rainfall schedule, and especially note their absence when much rain falls.

They appeared first November 24. The note is a guttural croak. Eggs were laid in the laboratory. They are 2 mm. in diameter, the capsule being 5 mm. in diameter. They stick to the bottom of the dish. Called again November 29 'awk ek ek;' laid again in laboratory; *some* eggs were in a floating film; calling December 2, 3, 5 (they were calling before a rain and stopped when rain began), 11, 12, 13, Feb. 9, 10, 15. None at all were seen or heard in July or August.

***Hyla venulosa* (Laurenti).**

This has been seen from Punta Paitilla.

***Hyla albomarginata* Spix.**

This is found only around the stream at Zetek 3 and from there to Armour 9, in the thicket of *Ananas magdalenae*. The note is a loud explosive 'bop.' They were heard calling on December 3, 9, 21, and August 1.

***Agalychnis dacnicolor* (Cope).**

What I believe to be this species is known only from the hollow in the big tree on the Van Tyne trail. Two lots of large eggs were hanging here December 14 (heavy rains took place December 8 and 9). Large tadpoles (not from these eggs) were taken from the hole on December 17 and by December 23 had developed so far that they were definitely not *callidryas*, *calcarifer*, or *spurrelli*, since the webbing of the fingers was too slight. Under these circumstances I pronounce them *dacnicolor* until adults shall confirm or contradict my diagnosis.

***Agalychnis callidryas* (Cope).**

There is a colony of these in the pond near the junction of Van Tyne-Chapman. Here they were heard calling December 18 and 19, and July 19 and 25. The note is 'tlock.' They call from about six to eight feet up in the trees.

Agalychnis calcarifer Boulenger.

A single specimen of this most beautifully colored of all frogs was taken the night of December 18 near the Van Tyne tree. It is the third known specimen, the two others having come from Ecuador and from Colombia.

Agalychnis spurrelli Boulenger.

This large species has been taken twice on the Island, the night of November 15 near the Laboratory, and the night of July 22 near Drayton 15.

Centrolene pulveratum (Peters).

Two calling males were caught near the Laboratory on a bush above a stream on the night of November 20. The note was 'tsee.' The male has a green vocal sac.

Centrolene prosoblepon (Boettger).

The University of Michigan has two from the island.

Centrolene fleischmanni (Boettger).

This species is quite common on the Island. The breeding habits of this species have been described by Noble under the name of *Centrolenella parabambae* (1923, *Amer. Mus. Nov.* 165, p. 13) from notes by Breder. I can confirm his remarks. The note I cannot distinguish from that of *pulveratum*. The eggs are laid on the under sides of leaves above streams. My first were November 21, twenty feet up on a palm leaf. On the next pinnate piece of the leaf a male was calling. On another pinnate piece was a later batch of eggs. The chances are these two batches were laid the nights of November 19, and 20 respectively. This looks like a case of a male taking a calling station and mating two successive nights and calling for a third mate. They were noticed calling on November 26.

On July 18 they were calling and eggs were noted in the stream valleys on both sides of the laboratory both high up in palms and low down in bushes. Again I noticed two batches of eggs in different stages associated with a single calling male. Calling males might be with or without eggs. I got eggs again on July 21, and they were calling on July 23.

Elachistocleis ovale (Schneider).

A single specimen was found in the collection of the Collegio La Salle in Panama City, and since all their specimens without further data were said to be local, it is here included. It is known from specimens in Vienna to occur at Agua Dulce and Agua Caliente, Panama.

Rana palmipes Spix.

I have seen a specimen from Toro Point.

Rana warschewitschii zeteki (Barbour).

This species is not rare on the Island. I have not heard the note, but eggs were laid in the laboratory November 29 in a mass. I have always found it near water except for one taken July 25 in the morning at Snyder-Molino 5.

Guide to the Identification of Canal Zone Amphibians.

Order Apoda (Caecilians). Family Caeciliidae. A single genus, *Caecilia*.

Order Caudata (Salamanders). Family Plethodontidae. A single genus, *Oedipus*.

Order Salientia (Frogs).

Suborder Procoela. Vertebrae uniformly procoelous.

Family Bufonidae. Shoulder girdle arciferous, coracoids overlapping; digits without an intercalary cartilage; combination of well-developed disks on all digits and webbed toes not occurring in region.

Bufo. Sternum cartilaginous; no vomerine or maxillary teeth; terminal phalanges pointed; toes short, mostly enveloped in web; a parotoid gland; eggs laid in water, in strings.

Engystomops. Sternum with a bony style; no vomerine or maxillary teeth; terminal phalanges pointed; toes long, with merely a trace of web; a parotoid gland; eggs laid in water, in a mass of froth.

Leptodactylus. Sternum with a bony style; vomerine and maxillary teeth present; terminal phalanges pointed; disks not developed; no web; no parotoid gland; eggs in a mass of froth.

Lithodytes. Sternum with a bony style; vomerine and maxillary teeth present; terminal phalanges T-shaped; disks developed, undivided above; no web; no parotoid gland.

Eleutherodactylus?. Sternum cartilaginous, without style; vomerine and maxillary teeth present; terminal phalanges T-shaped; digital disks undivided above, not well developed on all digits; toes often webbed at base; no parotoid gland; eggs laid on land; no tadpole stage.

Family Brachycephalidae. Shoulder girdle firmisternal, coracoids

meeting immovably; digits without intercalary cartilage; the combination of disks and webs does not occur in the region.

Atelopus. No disks; toes mostly enveloped in web; no vomerine or maxillary teeth.

Phyllobates. Digital disks well developed, with two scales above; toes free; no vomerine teeth; maxillary teeth present; eggs laid on land; tadpoles transported to water on back of male.

Dendrobates. Like *Phyllobates* but no maxillary teeth; eggs laid on land; tadpoles transported to water on back of male.

Family Hylidae. Shoulder girdle arciferous; digits with an intercalary cartilage; disks well developed and toes webbed in region.

Hemiphractus. A well-developed bony casque on head; eggs carried on back; no tadpole stage.

Hyla. Eyes lateral; pupil horizontal, terminal phalanges claw-shaped; eggs laid in water.

Agalychnis. Eyes lateral; pupil vertical; terminal phalanges claw-shaped; eggs laid above water; a tadpole stage.

Centrolene. Eyes directed forward; pupil horizontal; terminal phalanges T-shaped; eggs laid above water; a tadpole stage.

Suborder Diplasiocoela. Vertebra 8 biconcave; first seven procoelous.

Family Brevicipitidae. Sacral diapophyses dilated; head extraordinarily minute and pointed in region.

Elechostocleis. Toes with neither disk nor web.

Family Ranidae. Sacral diapophyses cylindrical; head normal.

Rana. Toes webbed; digital disks not well developed; eggs laid in water.

The superficial resemblance between *Bufo* and *Engystomops* is very close. *Lithodytes* is superficially like *Phyllobates*. *Leptodactylus* resembles *Rana*. Many Eleutherodactyli are superficially like species of *Hyla*. The resemblance between *Hyla*, *Agalychnis*, and *Centrolene* is close and they are related.

Keys to genera containing more than one species in the region follow.

Key to Canal Zone *Oedipus*.

- A. Legs well developed; not wormlike; 14 costal grooves.. *lignicolor*.
- AA. Legs minute; wormlike; 17 costal grooves.
 - B. Snout rounded; eyes well developed; usually a light dorsal band..... *complex*.
 - BB. Snout pointed; eyes minute; uniform..... *parvipes*.

Key to Canal Zone *Bufo*.

- A. No head ridges..... *haematiticus*.
- AA. Head ridges present.
 - B. Ridges present only around eye..... *granulosus*.

- BB. All head ridges present (supraocular, supratympanic, occipital).
 C. Parotoid small.
 D. Occipital ridges not prominent; warts not spiny.... *typhonius*.
 DD. Occipital ridges prominent; warts spiny..... *coniferus*.
 CC. Parotoid enormous..... *marinus*.

Key to Canal Zone Engystomops.

- A. Warts circular; belly lightly marbled with gray; toes webbed at base *ruthveni*.
 AA. Warts linear; belly heavily marbled with black; toes free. *pustulosus*.

Key to Canal Zone Leptodactylus.

- A. Small species; short head; short vomerine teeth; heel to eye; dorso-lateral fold; toes not fringed..... *labialis*.
 AA. Very large; short broad head; medium vomerine teeth; heel to tympanum; a dorso-lateral fold; toes not fringed..... *pentadactylus*.
 AAA. Medium sized; long head; long vomerine teeth; heel to eye or to snout; three dorso-lateral folds on a side; not striped; toes fringed..... *bolivianus*.
 AAAA. Medium sized; long head; long vomerine teeth; heel to snout; two dorsal folds in middle of back; striped; toes not fringed. *quadrivittatus*.

Key to Canal Zone Eleutherodactylus.

- A. Disks of fingers and toes scarcely noticeable, not twice as wide as digit.
 B. Toes webbed at base.
 C. Quite smooth above; a black face patch; eyes red in life... *gollmeri*.
 CC. Extremely rugose above; uniform blackish; large.... *bufoniformis*.
 BB. No web at base of toes.
 C. Rugose above; small; uniform white below..... *polyptychus*.
 CC. A marked)(-shaped wart above; large; marbled below... *biporcatus*.
 AA. Disks of at least some fingers twice as wide as digit, noticeable.
 B. Toes webbed at base; disks only on fingers; belly smooth.
 C. More rugose above; thighs black behind with white spots; snout shorter; web not to more than $\frac{1}{4}$ length of toes. *fitzingeri*.
 CC. Smoother above; thighs uniform brownish red behind; snout longer; web more than $\frac{1}{4}$ of toes..... *longirostris*.
 BB. Toes not webbed at base; disks on fingers and toes.
 C. Belly rugose; no marked vocal sac; feet rather long.
 D. Tympanum visible.
 E. Nearly uniform light gray above; a few black marks on head; sometimes a W-shaped black scapular mark; black in thigh and shin; nearly smooth above; heel to snout; tympanum $\frac{1}{2}$ eye..... *ockendeni*.

- EE. Marbled irregularly with dark above; tympanum less than $\frac{1}{2}$ eye.
- F. Red in thigh and shin; disks smaller; belly light; heel beyond snout; a W-shaped scapular wart; tympanum $\frac{1}{3}$ eye.....*cerasinus*.
- FF. Black in shin and thigh; disks larger; belly marbled; irregularly warty above; tympanum $\frac{1}{5}$ eye.
ventrimarmorata.
- DD. Tympanum absent; small; red in groin; oblique bars on sides.....*lutosus molinoi*.
- CC. Belly smooth; a marked vocal sac in male; feet peculiar, short*diastema*.

Key to Canal Zone Phyllobates.

- A. Markings white; no linear markings below.
- B. Tadpole with normal mouthparts; male with normal third finger; no complete light streak from groin to above eye.
- C. A light streak from groin to below eye; a dorso-lateral light streak from sacrum to above eye, above a lateral black band; male with black throat; disk of toe I equals $\frac{1}{2}$ disk of toe II; disk of toe V equals disk of toe IV; toe V reaching penultimate joint of toe IV.....*talamancae*.
- CC. No marked light streak from sacrum; at least a trace of a light streak from groin in lateral black band.
- D. Large (30 mm.); mottled below with gray in both sexes; a trace of groin streak; disk of toe I about equals disk of toe II.....*kingsburyi*.
- DD. Smaller (21 mm.); white below in both sexes; groin streak prominent to middle of side; disk of toe I equals $\frac{1}{2}$ disk of toe II; disk of toe V about equals disk of toe IV.....*latinus*.
- BB. Tadpole with umbrella mouthparts (much produced lower lip and reduced labial teeth); male with much swollen third finger; a light streak from groin to above eye, cutting diagonally across lateral black band; disk of toe I equals $\frac{1}{2}$ disk of toe II; disk of toe V equals $\frac{1}{2}$ disk of toe IV.....*flotator*.
- AA. Markings yellow; linear markings below.....*truncatus*.

Key to Atelopus of the region.

- A. Almost entirely light yellow, sometimes a dark X-mark on head*cruciger*.
- AA. Nearly uniform dark brown; tiny yellow markings (dots or semicircles)*glyphus*.

Key to Canal Zone Hyla.

- A. Vomerine teeth in two groups forming an arch; fingers $\frac{1}{2}$ webbed; grayish green; webs red; medium sized. *albomarginata*.
- AA. Vomerine teeth in two small groups between choanae.
 - B. Fingers free, or with merely a trace of web.
 - C. A projecting flap on eyelid; large; crossbarred. *ceratophrys*.
 - CC. No projecting flap on eyelid.
 - D. Snout short and blunt; tiny; five stripes; toes half webbed.
 - DD. Snout long and flat; medium sized.
 - E. Smooth above; no black spots on thigh and groin. *rubra*.
 - EE. Rugose above; black spots on thigh and in groin. *boulengeri*.
 - BB. Fingers at least $\frac{1}{4}$ webbed.
 - C. Fingers about $\frac{1}{4}$ webbed.
 - D. Small frogs; toes not webbed to disks of III and V; thighs almost without pigment; a network of dark lines above. *underwoodi*.
 - DD. Medium species; toes webbed to disks of III and IV; thighs pigmented; a black band on sides of face. *phaeota*.
 - CC. Fingers about $\frac{1}{2}$ webbed; medium species.
 - D. Smooth above; brownish, with darker marbling; green dots in groin and on hind side of thigh. *gabbii*.
 - DD. Warty above; very gaudy marbling. *venulosa*.

Key to Canal Zone Agalychnis.

- A. Fingers slightly webbed; toes $\frac{1}{3}$ webbed; large; green, white dots on side. *dacnicolor*.
- AA. Fingers $\frac{1}{2}$ webbed; medium sized.
 - B. Green with white bars on side; concealed surfaces orange.
 - BB. Green with concealed surfaces orange with black bars. *calidryas*.
- AAA. Fingers entirely webbed; green with occasional white warts above; concealed surfaces orange; large. *spurrelli*.

Key to Canal Zone Centrolene.

- A. Tympanum completely absent; no vomerine teeth; snout very flat; bones white; uniform green in life with white spots above; gular sac white; upper eyelid golden; iris silver with dark lines; no humeral hook; in preservative, white with sparse chromatophores black. *fleischmanni*.
- AA. Tympanum distinct; vomerine teeth present in 6 out of 13; snout normal; bones green; green above in life; gular sac green; a rudimentary humeral hook, not projecting; in preservative uniform purple above; fingers more webbed. *pulveratum*.

- AAA. Tympanum distinct; vomerine teeth present in 32 out of 34; snout normal; bones green; green above in life with black dots; a white line around upper jaw; gular sac green; iris black with gold lines; a well-developed humeral hook in all males and in some females; in preservative purple above, usually with black dots; fingers less webbed. *prosoblepon*.

Key to Canal Zone Rana.

- A. Toes fully webbed; rather uniform green in color; snout rounded. *palmipes*.
- AA. Toes not fully webbed; blackish, with red legs, and yellow spots on hind face of thighs; snout long and acute. *zetekei*.

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THREE NEW TERRESTRIAL SNAILS FROM YUCATAN.

BY JOSEPH BEQUAERT AND W. J. CLENCH.

THE snails described below were collected during an expedition to Yucatan in 1929, carried on jointly by the Carnegie Institution of Washington, D. C., and the Department of Tropical Medicine of Harvard Medical School, under the leadership of Dr. George C. Shattuck. The species will be figured in a forthcoming comprehensive account of the non-marine mollusks of Yucatan.

***Spiraxis (Volutaxis) maya*, sp. nov.**

Description of shell.—Small, turrite, imperforate, thin and translucent. Color white, glassy. Whorls $7\frac{1}{2}$, quite convex, regularly increasing in size, the last whorls three-sevenths of the total length of the shell. Spire regularly tapering to the obtuse summit. Aperture oblique, elliptical, short (about two-sevenths of the total length of the shell). Peristome simple, acute, thin, well rounded and slightly arched forward. Columella thin, nearly vertical and non-truncate, weakly but distinctly twisted. Sutures deeply impressed, not margined. Surface shiny, with fine, regularly spaced axial riblets, much narrower than their intervals (each riblet about one-fourth the width of an interval); the interval spaces have exceedingly fine, microscopic growth lines; the last whorl with approximately 40 riblets; the embryonic whorls (first one and a half) smooth.

<i>Length</i>	<i>Width</i>	<i>Length of Aperture</i>	
4.8	1.6	1.2 mm.	Holotype
4.1	1.5	1.0	Paratype

Holotype.—M. C. Z. no. 85799, from Chichen Itzá, Yucatan, collected by J. Bequaert, June, 1929.

Paratype.—A. N. S. Phila.; data as above. The two specimens were found dead.

Remarks.—Dr. Pilsbry has kindly compared this minute snail with the large series of *Spiraxis* at the Academy of Natural Sciences of Philadelphia. Its only close relative appears to be *S. strebeli* Pilsbry (1907, *Man. of Conch.* (2) 19, p. 27, pl. 6, fig. 27-28), from Texolo, Vera Cruz. Comparing it with paratypes

of that species, presented to the Museum of Comparative Zoölogy by Dr. Pilsbry, we find that in *S. maya* the riblets are lower and more spaced, and that the several whorls are longer, narrower, and more convex, making the spire more tapering. In *S. strebeli* the whorls are slightly shouldered below the suture and the last whorl has approximately 45 riblets. To judge from the figures, *S. similaris* (Strebel and Pfeffer) is also nearly allied.

***Drymaeus shattucki*, sp. nov.**

Description of shell.—Medium in size, long ovate-conic, perforate, moderately solid. Color white or white with brownish spiral bands on the later whorls, the tip of the apex pinkish brown. In the holotype the last whorl has four bands, the lower two complete and rather broad, the upper two narrow and almost obsolete, though with occasional darker blotches on the uppermost band; on the penultimate whorl only the uppermost band is visible and on the earlier whorls this band completely fades away. Whorls $6\frac{1}{2}$ (in holotype), slightly convex, regularly increasing in size, the last slightly more than half the total length of the shell. Spire lengthened and conic, apex obtuse. Aperture nearly straight, ovate, relatively short (less than one-third of the total length in holotype), showing the two lower bands inside. Peristome simple, acute, unexpanded and somewhat thickened within. Columella slightly oblique, triangularly reflexed over the umbilicus, impressed at its insertion. Sutures moderately deep, not margined. Surface glassy, appearing smooth, but showing fine, superficial, engraved, spiral lines under a strong lens; embryonic whorls with typical *Drymaeus* grating of microscopic longitudinal and spiral lirae.

<i>Length</i>	<i>Width</i>	<i>Length Ap.</i>	<i>Width Ap.</i>	
21.5	10.0	8.8	5.5 mm.	Holotype, adult
23.5	10.5	9.5	5.5	Paratype, Tabi, adult
17.5	9.0	8.0	4.6	Paratype, Tabi, immature
17.0	9.0	8.0	5.0	Paratype, Chichen Itzá, im- mature
15.5	8.0	7.0	4.2	Paratype, Chichen Itzá, im- mature
13.5	7.5	6.0	4.0	Paratype, Chichen Itzá, im- mature
12.5	7.0	6.0	4.0	Paratype, Chichen Itzá, im- mature
21.0	10.0	9.5	5.5	Paratype, Progreso, adult

Holotype.—M. C. Z. no. 79396, from Chichen Itzá, Yucatan, collected by J. Bequaert, June, 1929.

Paratypes.—M. C. Z. no. 79409; data as above; Univ. of Michigan from Chichen Itzá, collected by F. M. Gaige, January, 1930; A. N. S. Phila. no.

61514, from Tabi, Yucatan, collected by Heilprin, Baker, Stone and Ives, February–March 1890; and M. C. Z. no. 47197, from Progreso, Yucatan, collected by J. L. Cole, 1904.

Remarks.—This species belongs to the group of *D. multilineatus* (Say) and is most closely allied to *D. tropicalis* (Morelet). *D. shattucki* is dextral, while *D. tropicalis* is sinistral; but a comparison of the two species, which we have been able to make through the kindness of Dr. Pilsbry, fails to disclose any other differences. Possibly we have here a case where a species exists in a dextral and a sinistral race, a supposition which could only be proved by experiment. Meanwhile it seems safer to regard *D. shattucki* as specifically distinct, since sinistrality is very exceptional in the genus *Drymaeus*. There is also a remote possibility that *D. shattucki* might not be separable from *D. hondurasanus* (Pfeiffer), which is not known to us.

The specimens from Tabi were sent to us by Dr. Pilsbry who at one time listed them as *Bulimulus dysoni* (Pfeiffer); but he later recognized that they belonged to a different genus. The grated sculpture of the embryonic whorls at once removes *D. shattucki* from *Bulimulus*.

The snails recorded by E. von Martens (1893, *Biol. Centr.-Amer., Moll.*, p. 227) from Yucatan as *Otostomus moricandi* var. *hyalino-albidus* (Fischer and Crosse), may possibly have been *D. shattucki*.

***Choanopoma gaigei*, sp. nov.**

Description of shell.—Medium in size, acuminate, elongate-conic, narrowly umbilicate. Color pale brown, with spiral bands of mahogany red, the bands usually irregularly broken, more strongly developed on the last two whorls. Whorls 6, convex, regularly increasing in size, and often all preserved in adult specimens; sometimes only the embryonic whorls lost. Spire acute, but the apex truncate, the first whorl being depressed. Aperture entire and nearly circular. Peristome duplex: inner rim sharp and circular; outer rim reflected, somewhat wavy, and forming a slight rounded expansion near the parietal angle. Sutures deep, not channeled, strongly but finely and regularly beaded. Sculpture of both axial and spiral threads. Embryonic whorls smooth; third and fourth whorls with strong, axial riblets, regularly spaced. On the remaining whorls the spiral sculpture gradually approaches and eventually equals the axial riblets, which on the last whorl are more crowded. Under the lens the last whorl is finely reticulate. The fine sutural beading is caused by the insertion and slight thickening of the axial riblets. Operculum calcified, paucispiral, circular, composed of three whorls; occasionally the edge

irregularly crenulate; the last whorl rapidly increasing in size, being equal in width to the other two whorls together; the lamella only slightly elevated and not extending over the spiral suture; nucleus strongly eccentric.

<i>Length</i>	<i>Width</i>	<i>Aperture</i> (Inner diameter)	
14.5	8.5	4.0 mm.	Type, incomplete
13.0	7.0	3.5	Paratype, complete
13.5	7.5	4.0	Paratype, incomplete
15.0	8.5	4.0	Paratype, complete
15.5	9.5	4.5	Paratype, incomplete
12.5	7.5	3.5	Paratype, complete

Holotype.—Univ. of Michigan no. 49190, from Chichen Itzá, Yucatan, collected by F. M. Gaige, January, 1930.

Paratypes.—M.C. Z. no. 79390, data as above; and M. C. Z. no. 79783, from Chichen Itzá, collected by J. Bequaert, June, 1929.

Remarks.—This species is allied to *Choanopoma chiapasense* Crosse and Fischer (1877, *Jour. de Conchyl.* **15**, p. 362; 1890, *Miss. Sci. Mexique, Moll. Terr. Fluv.* **2**, p. 182, pl. 41, fig. 8–8a), from the State of Chiapas, Mexico. It differs by being much smaller, the largest complete specimen measuring 15.5 mm., while incomplete *C. chiapasense*, of 4½ whorls, measures 17.5 to 18 mm. The characters of the operculum appear to be quite different: that of *C. gaigei* has a strongly eccentric nucleus and rapidly broadening whorls; whereas in *C. chiapasense* the nucleus is described as 'slightly eccentric, almost central,' and the spiral s figured as composed of very gradually enlarged whorls. The sculpture of *C. gaigei* appears to be much stronger than that of *C. chiapasense*. An interesting feature of the new species, not found in *C. chiapasense*, is the tendency to retain all of the apical whorls to the adult stage.

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THE GEOGRAPHIC FORMS OF THE SOMALI SPARROW,
PASSER CASTANOPTERUS BLYTH.

BY HERBERT FRIEDMANN.¹

THE Somali sparrow is stated by Sclater² to occur in British Somaliland. However, its range is much more extensive than this. Mearns collected a good series at Chaffa on the Shoa-Kenyan border, at Hor and the Indunumara Mountains, in northern Kenya Colony in 1912. Van Someren³ listed 13 specimens from Marsabit in 1923, and Captain Keith Caldwell's collectors obtained 9 specimens at Karoli, also in northern Kenya Colony in 1923. Van Someren's are the only published records for Kenya Colony. In 1903 Hammerton obtained a male at Bera, in southern Italian Somaliland. This record published by Witherby⁴ constituted a considerable extension of range at the time, but was doubted by Zedlitz⁵ who suggested that inasmuch as Hammerton had also collected this species at Upper Sheikh in northern Somaliland in 1904, the Bera specimen probably came from there as well. However, in view of the fact that Mearns, van Someren, and Caldwell obtained this species in northern Kenya Colony, Hammerton's record need no longer be looked upon with doubt and suspicion.

Through the courtesy of the bird department of the Museum of Comparative Zoölogy, I have been able to compare the birds from northern Kenya Colony and extreme southern Shoa, with typical material from British Somaliland and I find the southern birds to be quite distinct. Van Someren noted that this speci-

¹ Published by permission of the Secretary of the Smithsonian Institution.

² Syst. Avium Æthiop., pt. 2, 1930, p. 723.

³ Jour. E. Afr. and Uganda Nat. Hist. Soc., 1930, p. 36.

⁴ Ibis, 1905, p. 518.

⁵ Jour. f. Ornith., 1916, p. 45.

men did not agree very well with the figure given by Shelley¹ but had no typical birds for comparison and so could do no more than suggest that the southern birds might prove to be separable. Inasmuch as no name is available for them, I propose

Passer castanopterus fulgens, subsp. nov.

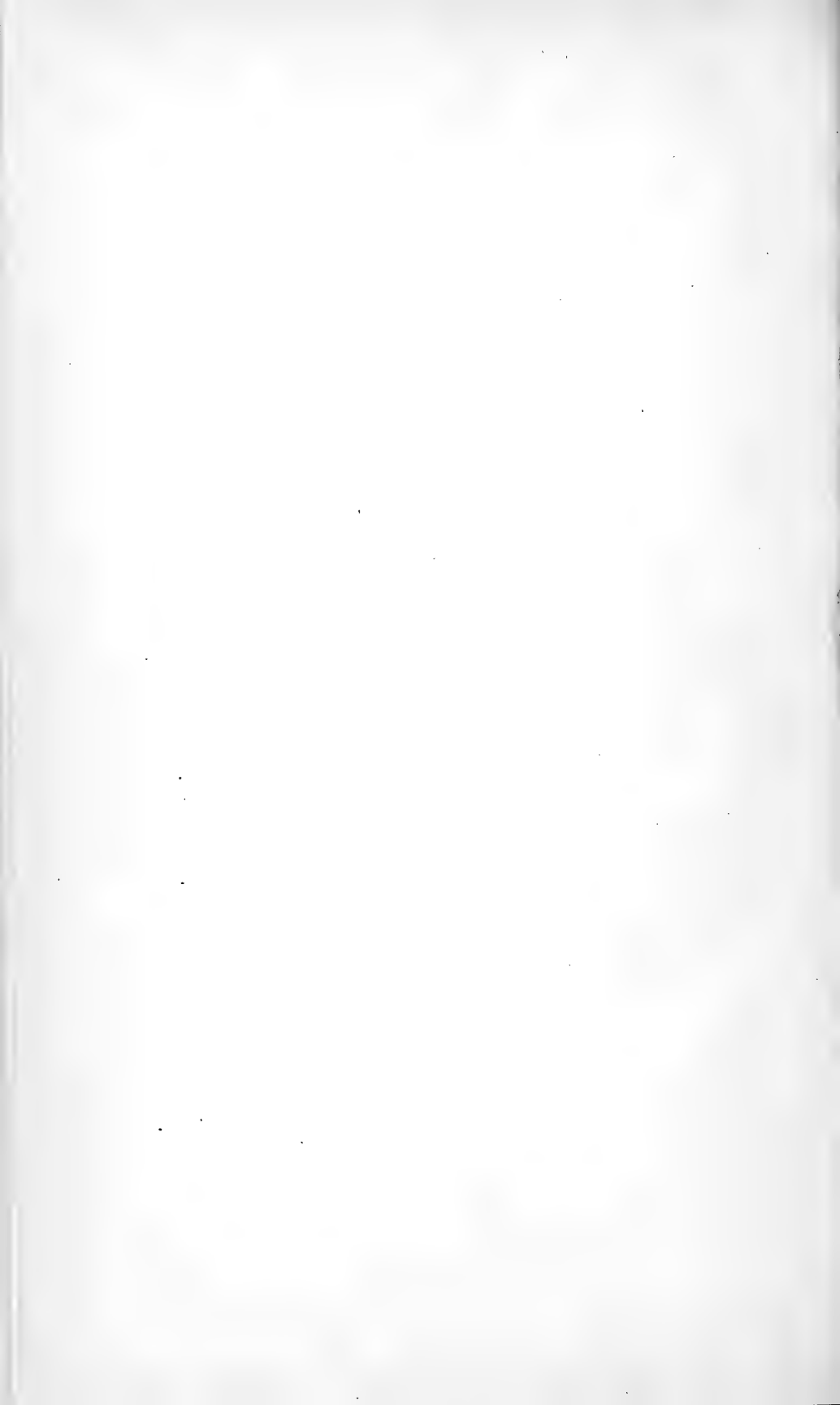
Type.—U. S. Nat. Mus. no. 246602; adult male, collected in the Indunumara Mountains, Kenya Colony, July 15, 1912, by Edgar A. Mearns.

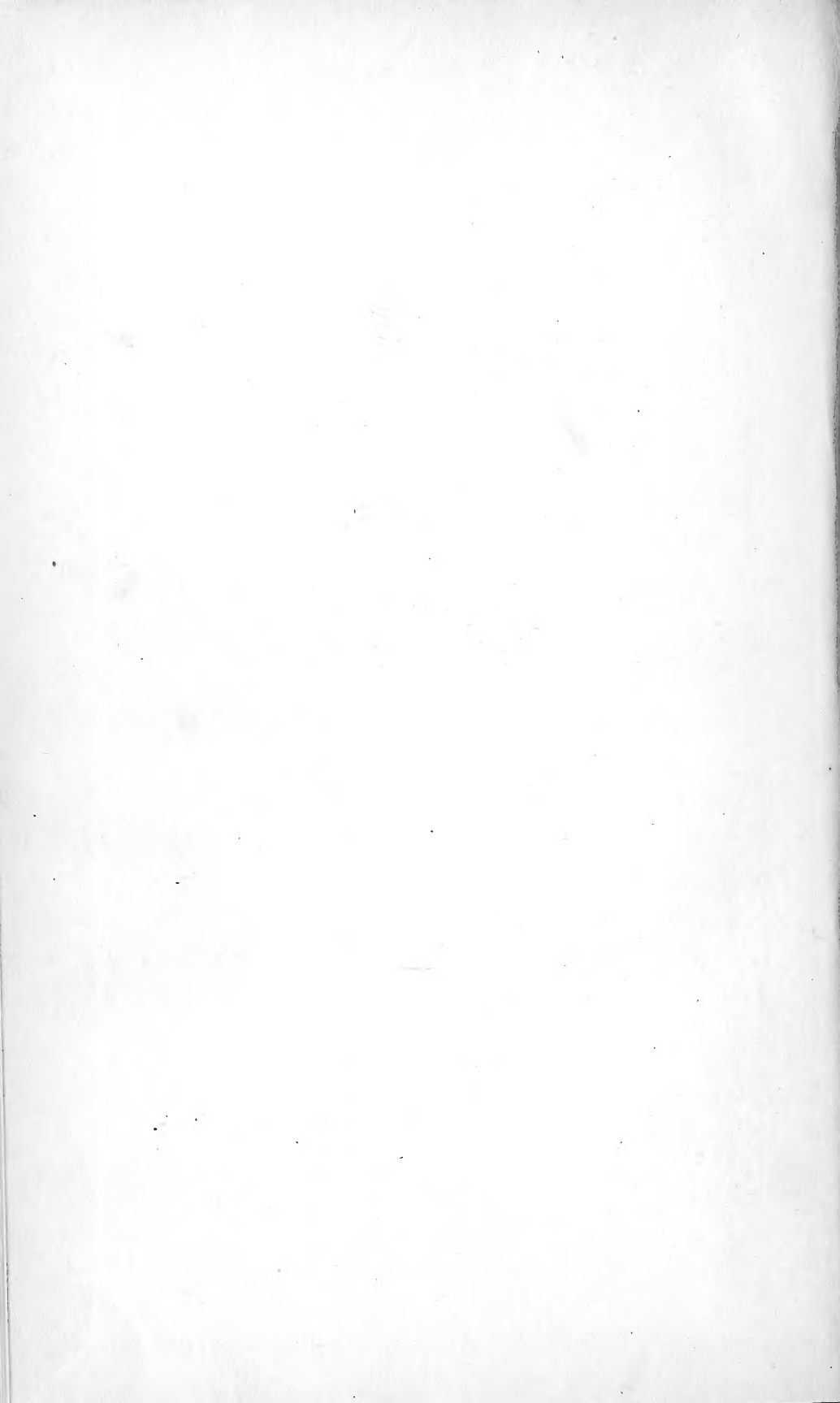
Subspecific characters.—Differs from typical *castanopterus* in being more yellowish on the cheeks and under parts; the males of *fulgens* with top of the head and nape brighter cinnamon-rufous, and the upper back with a slightly more greenish tone.

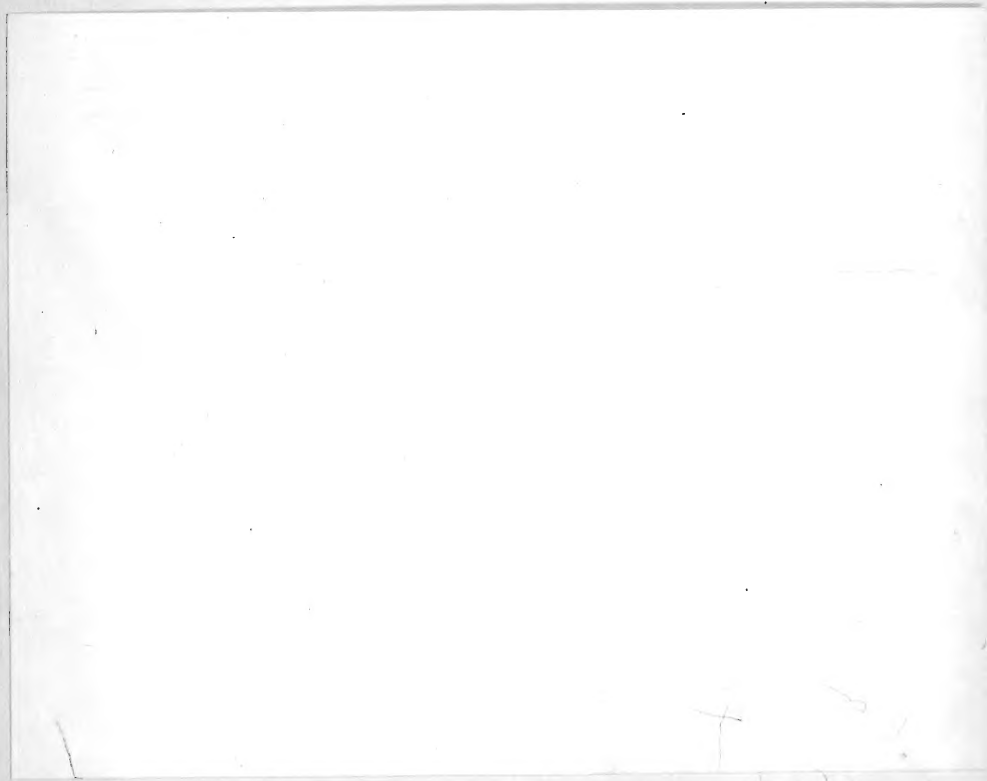
Range.—Northern Kenya Colony from Marsabit and the Indunumara Mountains north to Chaffa on the Shoan border, possibly east to Bera, in southern Somaliland. The subspecific identity of the Bera bird is open to question; it should be examined with good comparative material of both forms.

Of *P. c. fulgens* I have seen 23 specimens of which 14 are in the United States National Museum, and 9 in the American Museum of Natural History. For the loan of the 9 from Karoli I am indebted to Dr. James P. Chapin. Curiously enough, all these 9 are much earth-stained, and therefore look quite unlike the other specimens of *fulgens* on casual inspection.

¹ Birds of Africa, 3, 1902, pl. 27, fig. 1.







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