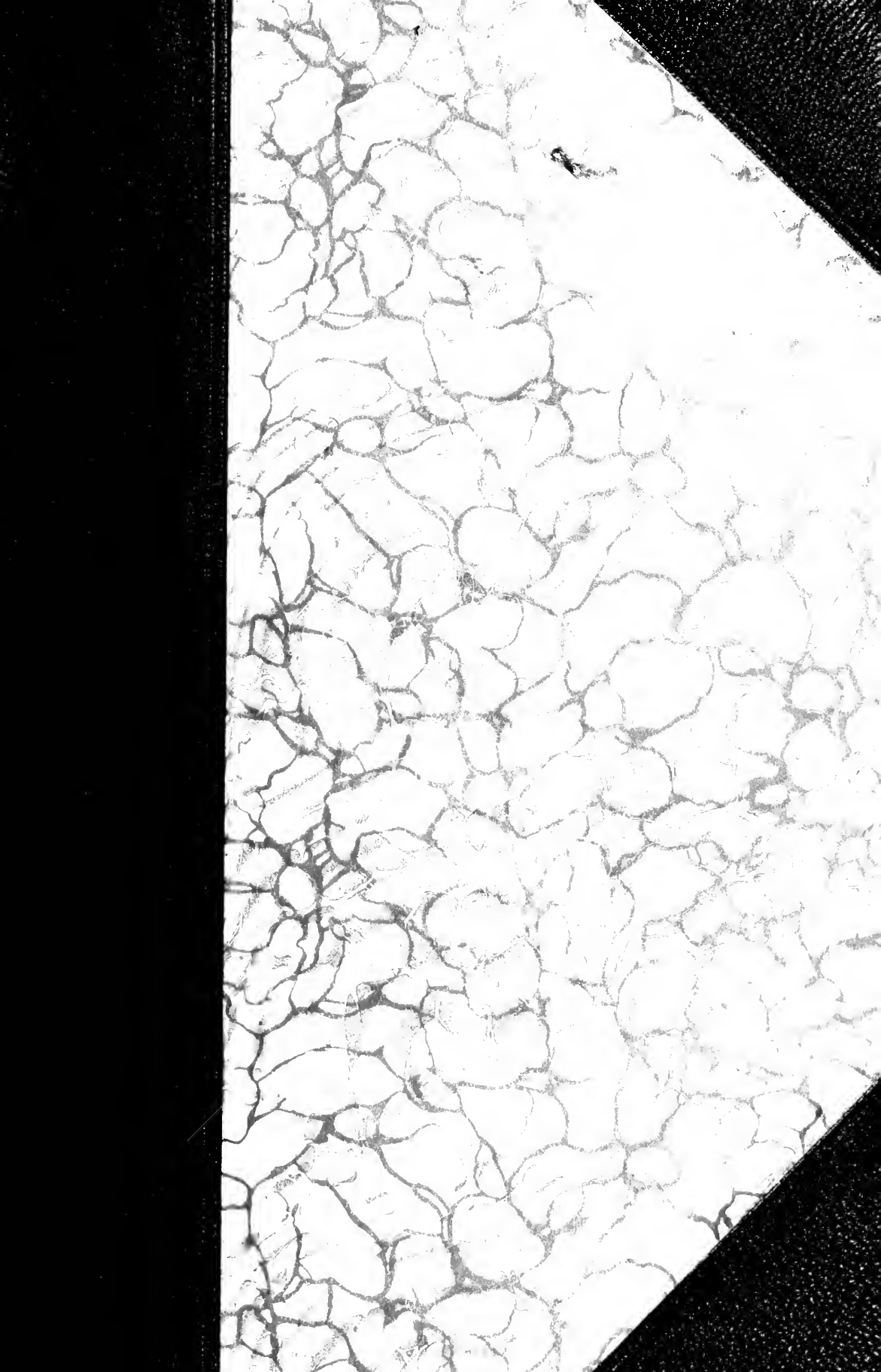

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No. 1.— *Studies on the Cranial Anatomy of Ascaphus truei Stejneger, the American "Liopelmid"*

By C. G. S. de Villiers

[Professor of Zoölogy, University of Stellenbosch, South Africa.]

The main difficulty in utilising the results obtained from a comparative study of the skulls of living Amphibia in arriving at a conception of the structure of the skull in the first land vertebrates, lies in the unfortunate coincidence, that the affinities of Urodela are obscured by neoteny, and those of the other two living groups by specialisation in the adult condition, coupled in the Anura with a markedly caenogenetic type of development. The Gymnophiona must probably still be considered as having secondarily acquired the stegokrotraphy, which renders their skull superficially similar to that of the Stegocephalia. The recent discovery by Prof. Marcus of the continuity of origin of the auditory skeleton and the hyoid is of course chiefly considered important by those who believe that these two entities stand in morphogenetic relationship, a theory which can by no means be considered as proven, so that the continuity referred to above may possibly be a caenogenetic phenomenon.

If therefore one is forced to discard the Urodela and the Gymnophiona as objects of study leading to an elucidation of the problem of the Amphibian skull, one is equally forced to concentrate attention upon the Anura as a non-neotenic group and one less specialised than the Gymnophiona. Unfortunately very little work has been done on the skull of the more primitive Anura. Gaupp's work is concerned with the genus Rana, and the author has mainly confined his attention to so-called "Brevicipitidae," although a recent paper (1932) directs attention to the aglossal forms, which are generally considered to be primitive. But the minute anatomy, based on microtomised series, is unknown for the Discoglossidae and the Liopelmidae. This latter family was instituted by Noble for the reception of the American genus Ascaphus and the New Zealand frog Liopelma. I have never yet been successful in procuring a specimen of the latter genus, the only New Zealand Amphibian, and am therefore particularly grateful to Mr. Loveridge of the Harvard Museum of Comparative Zoölogy for sending me a male and a female of Ascaphus.

The genus was originally instituted by Stejneger (1899), who placed it under the Discoglossidae, as a constituent family of the "Costata," possessing ribs and transverse processes on the urostyle. Under the definition of the genus (p. 899) the following interesting features are

mentioned: the invisibility and probable absence of the tympanum and Eustachian tubes, and the presence of vomerine teeth in two small rows between the choanae. An additional feature enumerated under the species characters is the presence of teeth in the upper jaw (p. 900). Under the general remarks, the uncertainty regarding the extent of the degeneration of the auditory tract and the uniqueness of the interchoanal position of the vomerine teeth for a Discoglossid are considered worthy of mention.

In Noble's work of 1922 Ascaphus is still classified as a Discoglossid (cf. pp. 12, 13 and 26), and is being constantly compared with Bombina, the Unke, and with the Aglossa. The so-called "tail" and the m. caudalifemoralis and m. puboischiotibialis are discussed on pp. 33–35. On p. 33 Noble states: "We have seen some reason above to consider this genus (possibly with Bombina) the most primitive of existing Salientia." In the discussion of the Australian-Papuan fauna, Noble (p. 74) remarks upon the similarity of Ascaphus and Liopelma, the genera he was afterwards (1924) to separate off as "Liopelmidae"; in this paper, however, no cranial features are discussed. In his work published May–June, 1925 Noble still (p. 266) classifies Liopelma and Ascaphus under the Discoglossidae, but probably this work was actually written before the one published in 1924. The paper published April 16, 1925 again refers to the Liopelmidae as a separate family (p. 16) and the author considers them ancestral to the Discoglossidae and the Pelobatidae. The continuation of the above "Novitas," published in the same month of 1925 contains on p. 7 the following remarkable statement: "If we compare the adult liopelmids with the branchiosaurs we must admit that they approach nearer to the latter in skull structure and pectoral girdle than do the Urodeles." The hatching process of Liopelma as described by Archey (1922), Noble considers "more urodele than frog-like" (1926, p. 6). Considerable attention is devoted to the ontogeny of the Liopelmidae in Noble's larger work published in 1927. It is however not surprising, that he finds it hard to prove that similarity of developmental type can be demonstrated for Liopelma and Ascaphus, since both these two genera have strongly caenogenetic types of ontogeny.

Apparently Noble published no fresh researches relating to Ascaphus or the Liopelmidae in general in the four years intervening between the appearance of his work of 1927 and the publication of "The Biology of the Amphibia" (1931), which contains very valuable references to both Liopelmid genera. Those referring to the cranial

anatomy are the following: p. 87, reduction of auditory apparatus as adaptation to a life in cold mountain streams; p. 218, absence of the quadratomaxillary, still called the quadratojugal by Noble; p. 220, the presence of separate mentomeckelian ossifications; p. 221, the absence of the stapes, by which the plectrum is meant. Judging from the very useful figure of the ventral view of the skull given on p. 218, the following additional cranial features may be mentioned: (a) there is no palatine investing the ventral surface of the processus antorbitalis; (b) the anterior tip of the parasphenoid is surrounded by a bone, which also extends along its sides, but is not designated in the figure. It is probably what Noble on p. 215 calls the sphenethmoid, by which is obviously not meant an ethmoid extending backwards into the sphenoid region; compare "in some species, especially in burrowing types, the ethmoid may also ossify and fuse with the sphenethmoid" (p. 215). A third interesting point inferred from Fig. 81A is the presence of a quadrate bone. It should be added that Noble prefers squamosal and quadratojugal to paraquadrate and quadratomaxillary (Gaupp, 1894) and accepts Broom's nomenclature of prevomer for vomer, although the teeth borne on these bones are sometimes called prevomerine, sometimes vomerine teeth. Apparently, however, Noble rejects Broom's suggestion of homologising the parasphenoid with the mammalian vomer, as he consistently uses the term parasphenoid. In general the family Liopelmidae, p. 485, is upheld, and its relations to other primitive Anura are graphically represented on p. 486.

Boulenger (1910) classifies Ascaphus with Discoglossidae (p. 150), as does also Gadow (1920, p. 153). Fejérváry (1923, p. 178) creates a special family, the Ascaphidae for the reception of the genus, but Stejneger, the discoverer, refers it to the Discoglossidae in his "check list" compiled with Barbour (1923, p. 22). Nieden (1923, p. 35) obviously obtains his information from published American sources and considers Ascaphus a Discoglossid, as does also Perrier in his Traité (1925, p. 2877). The latest reference to Ascaphus is in Miss Cochran's article (1932, p. 629) in the National Geographic Magazine; there is no doubt that the authoress, who is assistant to Dr. Stejneger, considers Ascaphus as a Discoglossid, so that it may be inferred, that Stejneger himself does not accept the family Liopelmidae instituted by Noble in 1924. Through the courtesy of the California Academy of Sciences and the intermediation of Miss Cochran I was enabled to consult Van Denburgh's paper which was not procurable in South Africa. The skull is briefly discussed on p. 262 and the hyoid on p. 264.

The more interesting features noted are (a) the presence of the fontanelle between the frontoparietals, (b) the contiguity of prefrontals (=nasals of modern nomenclature) and the fronto-parietals, (c) the meeting of pterygoid and palatine (the latter bone is in reality absent), and (d) the presence of chalky material in the membrane covering the fenestra ovalis. On the whole the information offered is surprisingly inaccurate. For purposes of the elucidation of the cranial anatomy the only work containing really useful information is that of Noble (1931). Fejérváry's paper (1923), important as it undoubtedly is for the taxonomy, and for the morphology of the pelvic girdle, mentions no cranial features. Parker (1881) gives figures of the skulls of the Discoglossidae: Alytes on plate 24, *Bombina igneus* on plate 25 and Discoglossus on plate 20. In my copy, which is a presentation one given to the late Oldfield Thomas by Parker, the name *Discoglossus pictus* on plate 20 (legend) is crossed out and *Rana esculenta* substituted in pencil in Parker's own handwriting. We may therefore assume that the only Discoglossids whose skulls were investigated by Parker were the midwife toad and the "Unke." The former is discussed on p. 131, the latter on p. 136 of the text. The text to Discoglossus has again the pencil correction in Parker's handwriting: "a mistake *Rana esculenta*". In his monograph on the European Anura (1897) Boulenger figures the skull of Discoglossus on pages 34 and 133, that of Bombina on p. 147 and of Alytes on p. 167. But such information is of questionable comparative value if Ascaphus is not a Discoglossid. The same applies to the meagre anatomical information it was possible to offer regarding the single specimen of the Philippine Discoglossid genus Barbourula (Taylor and Noble, 1924).

Microtechnique

The eviscerated animal was skinned and the lenses were removed. The anterior portion of the body comprising the skull and breast-shoulder apparatus was imbedded separately from the hinder portion containing the "epipubis," pelvic girdle and Nobelian cartilages. The skin was left intact round the anterior nares and in the region in which vestiges of the middle ear might possibly be expected to be found. Decalcification of a fortnight's duration in Ebner's mixture. Bulk staining consecutively in haemalum and an aqueous solution of Bismarck Brown. Double staining with Eosin dissolved in 100% alcohol. The fixation left nothing to be desired and fine, unbroken series were obtained.

Cranial Anatomy

Nasal region. There is nothing very unusual in the organs encountered in this region, and particularly nothing that can be considered as strikingly primitive. Very prominent in sections of the tip of the snout are the glandulae intermaxillares, to which Noble (1931, p. 201) ascribes the function of secreting a sticky secretion for making

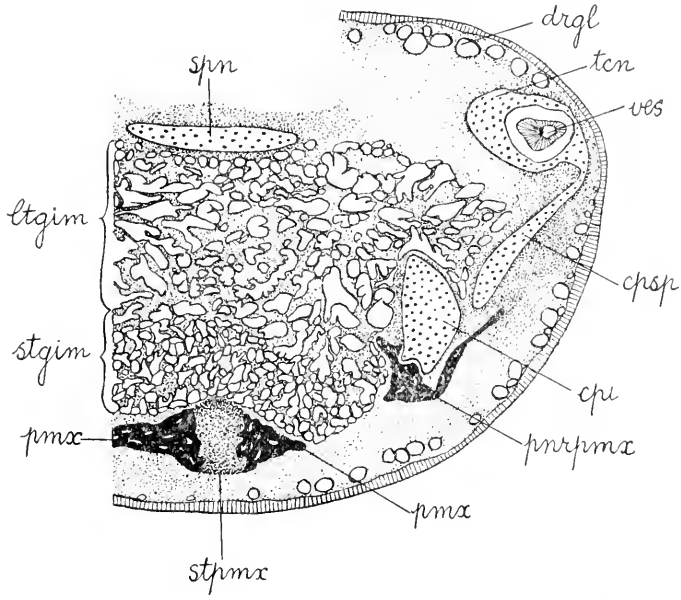


FIG. 1. Transverse section through the tip of the snout of Ascaphus to show the glandula intermaxillaris in situ. (The central lumen of the gland mass has not yet appeared in section.) epi = cartilago praenasalis inferior; epsp = cartilago praenasalis superior; drgl = dermal glands; ltgim = region of larger tubules of glandula intermaxillaris; pmx = premaxilla; pnrpmx = prenasal ramus of premaxilla; spn = septum nasi; stgim = region of smaller tubules of the glandula intermaxillaris; stpmx = symphysial tissue between the two premaxillae; tcn = tectum nasi; ves = vestibule.

the tongue adhesive. The physiology of these glands was first investigated by Wiedersheim 1876, later information on the subject is contained in Gaupp (1904, p. 24), Krause (1923 pp. 498 and 547) and Müller (1932). If the usually accepted theory of the function of these glands is correct, Ascaphus must be an active insect hunter. In Fig. 1

the gland mass is seen occupying the centre of the tip of the snout and is bounded dorsally by the very broad, anteriorly projecting septal cartilage and ventrally by the two premaxillae, joined by dense fibrous, symphysial tissue. Latero-dorsally the vestibulum begins to make its appearance and is surrounded by a cartilaginous capsule, the roof of which is the tectum nasi, while its floor and ventro-lateral por-

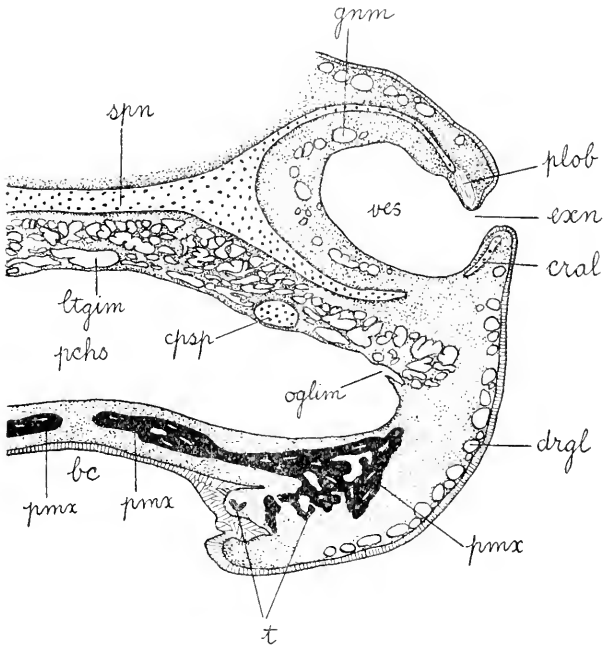


Fig. 2. Transverse section through the head of Ascaphus in the region of the external naris. bc = buccal cavity; cral = cartilago alaris; exn = external naris; gnm = glandula nasalis medialis; oglim = opening of the glandula intermaxillaris into the corner of the prechoanal sac; pchs = prechoanal sac; plob = plica obliqua; t = teeth. Other abbreviations as for Figure 1.

tion represent the alary cartilage, with which the downwardly directed superior prenasal is in synchondrotic continuity. This latter cartilage and the alary are therefore firmly incorporated into the nasal skeleton and do not show the independence sometimes encountered in higher Anura. The inferior prenasal cartilage has also made its appearance and assists the superior prenasal in supporting the premaxilla. Fig. 2

is cut through the region of the anterior nares, of which the right one appears in the illustration. Posterior to Fig. 1 the intermaxillary gland mass develops a central cavity, dorsal to which the tubules are wide, while those ventral to it are smaller and more or less circular in section. These latter soon disappear and the dorsal, larger ones may be observed occasionally to open into the central cavity. A favourite place for the location of these openings is the lateral corner of the cavity, as in Fig. 2. The floor of the cavity referred to above is strengthened by the palatal squame of the premaxilla. It will be clear that the "cavity" is homologous in every respect with the upper prechoanal sac in du Toit's description of the skull of Heleophryne (1930), since the anatomical relations are identical. The ventral prechoanal sac described by du Toit (see loc. cit., Fig. 5, p. 430) is merely a short preoral diverticulum of the buccal cavity and is not developed in Ascaphus, so that the floor of the "dorsal" sac in this genus is actually the roof of the mouth. But the conditions in these two Arciferans are essentially the same. The prechoanal sac is filled with slime and disintegrated cells and is in wide communication with the buccal cavity behind the tips of the palatal squames of the premaxilla. The floor of the prechoanal sac does not end as a ridge, but possesses a short tongue-like posterior prolongation. The emptying of the prechoanal sac can of course be effected passively, by mere overfilling, but it is more probable that it is initiated by pressure of the tongue against the floor of the sac. The premaxillae would then undergo rotation upon the prenasal cartilages — especially the inferior one — as fulcrum. Probably a good deal of movement of these cartilages themselves is possible as they are slender, elastic and style-like and may thus be instrumental in effecting the recovery of the normal shape of the prechoanal sac after ejaculation of the slime.

The vestibule (Fig. 2) is more glandular than is usually the case; the glands are not those of Bowman, but the glandula nasalis medialis occupies a more rostral position than is usually the case. The plica obliqua is suspended from the tectum nasi. The two Gauppian "Wülste" are weakly represented: the larger one is entirely absent and the smaller is merely indicated in the posterior corner of the anterior naris. Gaupp (1904) admits that the function of the smaller "Wülst" is not known. It is very urgent that some revision of the nasal anatomy of *Rana esculenta* and *R. fusca* on which Gaupp's researches are based should be undertaken, since *all* the information given on pp. 621–640 (op. cit.) cannot be correct. There is every possibility e.g. of the anatomical relations of the recessus sacciformis

as explained on p. 625 (op. cit.) being faulty, for Gaupp gives us to understand, that "der Recessus sacciformis hinten in die Vestibularnische über-geht, medial- und ventralwärts mit dem Infundibulum und dem Cavum medium zusammenhängt." Further down the same page he states, as if to make assurance doubly sure, that "die Luft kann dann auch von dem hinteren Theil des Vestibulums aus durch den Recessus sacciformis in das Infundibulum einströmen." There is therefore no doubt that Gaupp believed that there was a sort of tubular communication between the vestibule and the joint region of the infundibulum and the cavum medium. Not having investigated European Ranids, I would not like to say positively that this information is wrong *for these Anurans;* but it certainly does not hold for any South African Anura investigated by me (including the Ranids Cacosternum, Anhydrophryne, Arthroleptella and Hermisus!) nor is it true for Ascaphus. There is moreover no such sharp topographical distinction between the vestibule and the cavum principale as Gaupp would have us believe, but the former passes imperceptibly into the latter, and for no genus is this more true than for Ascaphus. It will be noted that Gaupp's *figures* on p. 626 (op. cit.) refer to a *Rana esculenta* 5 cm. in length, so that the difference cannot be due to his material being not quite adult.

A case in point, regarding the difficulties encountered in an attempt at making Gaupp's descriptions fit with results obtained for Ascaphus, is the section drawn in Fig. 3A, which passes through the septomaxillary (sometimes also called the intranasal in Gaupp's work). It will be noticed that the section is quite Ranid, but that the cavum medium is small, so that the two laminae of the crista intermedia are less prominent than usual. The infundibulum leads from the cavum medium and possesses a lateral diverticulum encased by the septomaxillary. This cannot possibly be the recessus sacciformis: on p. 648 the relations of the septomaxillary to the recess in the frog are described in such a way as to leave no doubt about the matter. The septomaxillary should lie external to the lamina superior and "an der medialen Wand des Recessus sacciformis" (op. cit., p. 648). We may therefore conclude, that neither that portion of the recess appertaining to the vestibule (op. cit., Fig. 141), nor that appertaining to the cavum medium (op. cit., Fig. 140), is represented in Ascaphus. The diverticulum seen in Fig. 3A together with the lateral portion of the cavum medium is constricted off as in Fig. 3B, this triangular chamber then becomes rounded and is in fact the nasal end of the ductus nasolacrimalis, lying external and closely applied to the cartilago obliqua

and the lamina inferior of the crista intermedia. The ductus nasolacrimalis therefore opens equally into the diverticulum of the infundibulum and into the lateral portion of the cavum medium. The situation of the main duct is more or less as described and figured by Gaupp (op. cit., 1904) on pp. 880 and 881, but the openings on the optic side

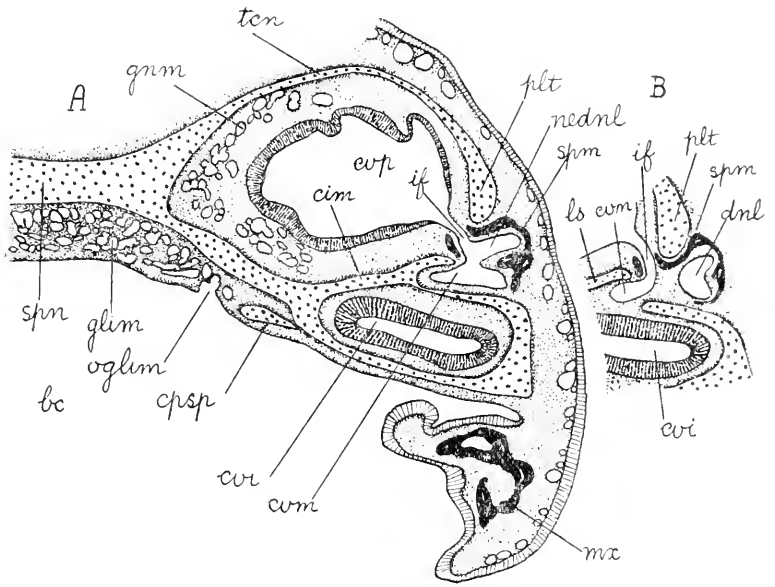


FIG. 3, A and B. Transverse sections through the nasal cava of Ascaphus. cim = crista intermedia; cvi = cavum inferius (mainly recessus medialis); cvm = cavum medium; cvp = cavum principale; dnl = ductus nasolacrimalis; glim = glandula intermaxillaris; if = infundibulum; ls = lamina superior cristae intermediae; nednl = nasal end of ductus nasolacrimalis; plt = planum terminale; spm = septomaxillary. Other abbreviations as for previous figures.

are different. Caudally the duct splits into two ductlets (Fig. 4A), a dorsal and a ventral, as in Rana; these ductlets lie in the ventral eyelid and dorsal to the transitional cartilage between the processus maxillaris posterior and the arcus subocularis. The dorsal, slightly smaller ductlet is the first to effect an opening, which is situated in a groove *on top of* the lower eyelid (Fig. 4B), instead of "an der tiefsten Stelle desselben," as in Rana. The end of the lower ductlet is bent slightly

forwards, so that its opening, likewise preceded by, and situated in a groove *on top of* the lower eyelid, is actually encountered in the same sections as the ductlet itself. I have examined a few of the large collection of microtomised skulls of South African Anura with a view to ascertaining the anatomical relations of the optic end of the nasolacrimal duct. But since all these genera are highly specialised forms,

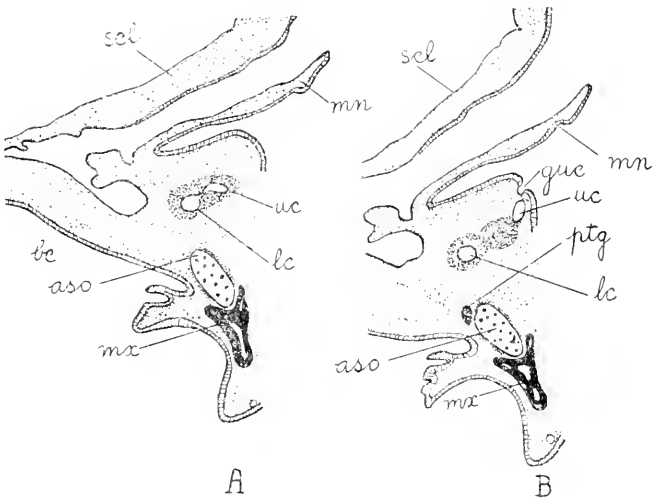


FIG. 4, A and B. Transverse sections through the optic division of the ductus nasolacrimalis. aso = arcus subocularis; guc = groove into which upper canalicule opens; lc = lower canalicule; mn = membrana nictitans; ptg = pterygoid; uc = upper canalicule. Other abbreviations as for previous figures.

it need surprise no one that the condition in them is more Ranid. The position of the optic openings in Ascaphus appears to me to be unique, and may possibly be primitive. The evolution of the nasolacrimal duct is still very insufficiently understood, and the embryological data are difficult to interpret in terms of phylogeny. But if the duct first arose (Allis 1932) in land vertebrates, its development in Ascaphus must repay intensive study.

The remarkable dorso-ventral flattening of the nasal region already referred to above is also very marked in the more posteriorly situated portions of the capsule and seems to indicate that Ascaphus must have the habit of frequenting cracks and crevices in rocks. A similar feature

is observed in the South African Gecko Oedura, the scorpion Hadogenes and the South African Ranid Cacosternum namaquense, whose habits are however unknown. In Ascaphus the septum nasi is broad and flat instead of narrow and high, as in most Anura. The glandula nasalis medialis is particularly large and consists of intensely coiled tubules on the septal side of the cavum principale and recessus medialis cavi inferioris, into which latter the gland opens. The cavum inferius is large when compared with the diminutive cavum medium. In conformance with the large medial nasal gland, the recessus medialis, or so-called Organ of Jacobson is larger than in most Anura. The glands open into the pocket-like posterior diverticulum of the recess, and their tubules undergo a considerable amount of anastomosis, so that large irregular chambers filled with mucus are formed. In Hyperolius, where the g.n. medialis is likewise very large, such chambers apparently coalesce to form a yolk reservoir underneath the recessus lateralis (see G. du Toit and de Villiers, 1932). The glandula nasalis lateralis is smaller than the medial glands in Anurans investigated by me, and also differs histologically from the latter. In Ascaphus the lateral gland is absent, but the glands of Bowman are extremely plentifully developed.

In the dorsal part of the thick plica isthmi (Fig. 5A) a peculiar system of simple tubules is encountered; the wall of the individual tubule may be slightly folded, but the tubule itself is apparently not branched. Each tubule is surrounded, on the dorsal side more particularly, by a mass of dense connective tissue cells, which persist after the tubule has opened into the cavum principale but disappears before the more posteriorly situated set of tubules appears. The histology of the tubule is as follows: the nuclei are aggregated chiefly toward the basement membrane side and that part of the tubule lining its lumen is devoid of nuclei, appears to be fibrous, and greedily takes up the eosin stain. The structure is strongly reminiscent of that of the tubule system of the nasal plug of Hemisus (author 1931, pp. 312 and 313). The organ does not seem to be homologous with the one on the floor of the recessus lateralis described for Hyperolius by du Toit and the author (op. cit.), but neither is it homologous with the lateral nasal gland, which has a different histological structure and has different topographical relations, as it is situated *dorsal* to the nasolacrimal duct and much farther forwards: in the vestibular region or immediately behind it.

The arrangement is in two sets, of which the anterior one has few, the posterior numerous, but still very short tubules lacking, however,

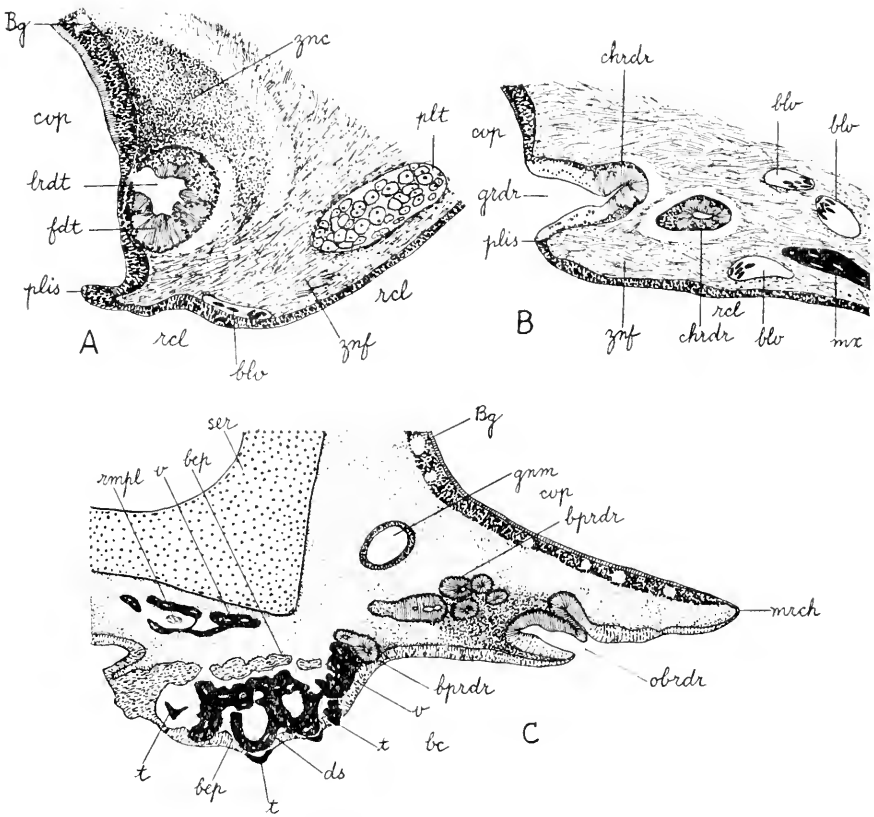


FIG. 5. The position and structure of the "Rachendrüse" (palatal gland) in Ascaphus. Figs. 5, A and B: transverse sections through the region of the plica isthmi, showing the choanal portion of the gland. Fig. 5C: transverse section through the vomer and surrounding structures, including the buccal portion of the "Rachendrüse." bep = buccal epithelium; Bg = Bowman's glands; blv = blood vessel; bprdr = buccal portion of Rachendrüse; chrdr = choanal portion of "Rachendrüse"; ds = dental socket; fdt = fibrillised division of epithelium of the choanal "Rachendrüse"; grdr = groove into which tubules of the choanal portion of the "Rachendrüse" open; lrdt = lumen of the gland tubule; mrch = median rim of the choanal opening; obrdr = openings of buccal "Rachendrüse"; plis = plica isthmi; rmpl = ramus palatinus VII; ser = spheneth-moid region; v = vomer; znc = zone of densely packed connective tissue cells; znf = zone of fibrous connective tissue. Other abbreviations as for previous figures.

the accompanying tissue of the more anteriorly situated set. Moreover, these tubules open into a groove in the plica isthmi, which therefore presents a very remarkable appearance (Fig. 5B). Of very great interest is the presence of tubules of a similar histological structure on the side of, and between the vomers (Fig. 5C), and therefore fringing the choanae. Judging by the topography of these tubules they form part of the "Rachendrüse" (palatal gland) described by Gaupp (1904) on pp. 27 and 28 and Krause (1923) on p. 547. Müller, in his recent work on the glands of the oral cavity of the Anura (1932) also reviews the "Rachendrüse" (particularly p. 154). The two most interesting points made by the author are (1) the occasional presence of grooves into which the tubules open (Leptodactylus and Microhyla), and (2) the fusion of the oral and choanal divisions of the gland. It will be seen that the groove is also present in Ascaphus, in which, moreover, the two regions of the gland can easily be demonstrated. Gaupp was always of opinion the "Rachendrüse" was of double origin, and based his conclusions on the original researches of Born and on his own upon the innervation of the glands. Oeder (1906) who studied the ontogenesis of the intermaxillary and palatal glands in Bufo and Rana, fully corroborated Gaupp's views. He distinguishes two kinds of "Rachendrüse": (a) those opening into the buccal cavity and (b) those opening into the cavum principale; on p. 522 (op. cit.) he states that this latter opening is into the choana and differs from that of the buccal gland in not being ciliated. Of the two genera investigated by Oeder, Bufo is the more primitive, and it is therefore of considerable interest that the dual nature of the Rachendrüse is very clearly indicated, whereas in Rana "zeigt die Drüse eine einheitliche Anlage" (op. cit., p. 522). In Müller's genera the separation of the two groups was no longer to be seen. I cannot agree with Oeder, when he states that the tubules of the glandula nasalis medialis and those of the "Rachendrüse are difficult to distinguish in postmetamorphic Ranae. Modern selective staining brings out the difference between the two kinds of tubules very clearly (Fig. 5C): the epithelium of g.n. medialis is much lower and there is no fibrilisation of the cells towards the side of the lumen as in the case of the "Rachendrüse" tubules. In Ascaphus some of the latter have separate openings on the lateral aspect of the vomer (Fig. 5C), and there are even a few tubules between the vomers, in the roof of the buccal cavity. It is very probable that the "Rachendrüse" was originally scattered over a large area of the buccal chamber roof and that it is in process of reduction: the Arciferans Bufo and Ascaphus have a better developed gland than the Firmisternid: Rana. I wish to

disassociate myself from Krause (op. cit.), when on p. 547 he says of the "Rachendrüse," "in ihrem histologischen Aufbau gleicht sie der Intermaxillardrüse"; the tubules of the latter are however somewhat smaller and the fibres stain less intensely.

Membrane bones associated with the nasal region. The septomaxillary has more or less the same anatomical relations as in Rana and encapsules the infundibular diverticulum and the nasal end of the ductus nasolacrimalis (Fig. 3A and B). The vomers, like the bones of the secondary upper jaw, are toothed (Fig. 5C), but their rostral portion is edentulous, as Noble (1931, p. 218) correctly figures. As in Rana (Gaupp, 1899, p. 144), the ramus palatinus VII penetrates the vomer, within which it splits into the two rostrally diverging branches. Only in the more anteriorly situated parts does the vomer actually *surround* the nerve: more posteriorly the latter lies in a dorsal groove of the vomer. That portion of the bone bearing the teeth is in the form of a stout ventral boss to the part investing the base of the nasal capsule, and is posteriorly produced into a shelf, so that in Fig. 5C the vomer appears as two separate pieces. It should be finally noted that the "Rachendrüse" is not developed between the vomer and the base of the nasal capsule, as is supposed to be the case in Rana. The nasals first appear in section as thin bones on the tectum nasi and as the septum is very broad, they are widely separated, and nowhere do they invest the septum, which therefore remains exposed dorsally as a wide tract of cartilage between the bones. Neither do the nasals extend lateroventrally so far as in the frog, although they also develop the handle-like posterior part as in Rana (Gaupp 1904, p. 645); there is, however, no contiguity of nasal and maxilla as in Rana (Gaupp 1904, p. 645). The anterior tips of the fronto-parietals leave between them a fontanelle, covered over with tough, fibrous connective tissue and bounded anteriorly by the unossified septal cartilage. *There is no ethmoidal ossification whatsoever,* and the processus antorbitalis ventrally *lacks any vestige of a palatine.* The parasphenoid is produced into the nasal region and is not bifid; it is accompanied for some considerable distance by a posterior splint-like prolongation of the vomer, traceable on the left side right into the optic region. The olfactory eminence is hardly indicated: ample proof to my mind that Ascaphus does not show terrestrial specialisation.

The orbital division of the skull. Up to the niveau of the anterior tip of the pterygoid, the sides of the skull show weak "orbitosphenoidal" ossification in the form of a very thin bony lamella on the outer face of the wall of the skull, but not reaching down to the parasphenoid.

An additional internal perichondrial lamella is then almost immediately followed by intense enchondral ossification, but still the orbitosphenoid remains separated from the parasphenoid by a cartilaginous tract, continuous with the permanently cartilaginous base of the skull which is invested by the parasphenoid. The condition is sketched in Fig. 6, which shows that the mutual relations of the bones as figured by

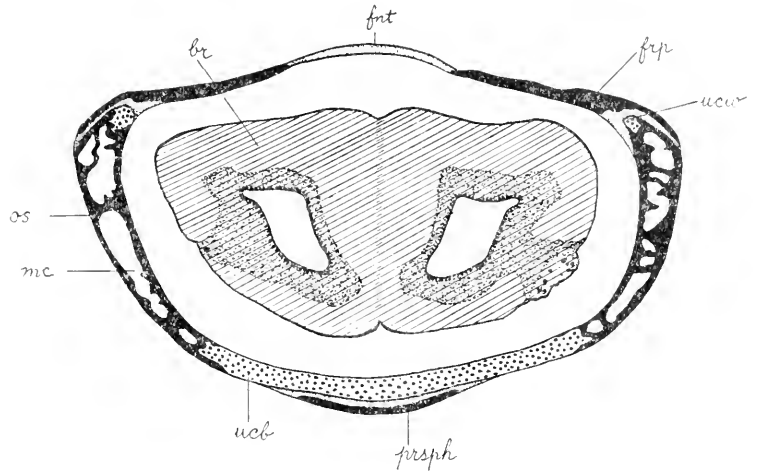


FIG. 6. Transverse section the orbital region of the Ascaphus skull. br = brain; fnt = fontanellar tissue; frp = frontoparietal; mc = marrow cavity; os = orbitosphenoid; prsph = parasphenoid; ucb = unossified cranial base; ucw = unossified cranial wall. Other abbreviations as for previous figures.

Noble (1931, p. 218) are considerably different from those of the skull microtomised. Noble draws the skull, as if (a) parasphenoid and orbitosphenoid were contiguous laterally and anteriorly, (b) the parasphenoid were surrounded by the orbitosphenoid anteriorly and (c) the posterior portion of the vomer invested the orbitosphenoid. Of these, (a) only is conditionally true, for in the region of the optic foramen, the orbitosphenoid and parasphenoid actually abut on each other, so that the whole brain case appears osseous externally, except for the tract of fibrous connective tissue separating the two frontoparietals dorsally. In sections showing the optic nerve actually lying in the optic foramen, the side of the skull is cartilaginous dorsal, and very weakly perichondrially ossified ventral to it. But also this ven-

tral division of the orbitosphenoid disappears before closure of the foramen. The foramen for the fourth cranial nerve lies in the cartilage dorsal to the optic foramen, from which it is separated by a thin cartilage arcade; the foramen for No. 3 lies in the cartilage immediately adjoining the lateral margin of the parasphenoid.

The 7th, 8th, 9th and 10th cranial nerves and associated blood vessels. For the anatomical relations of the suspensorial region, a knowledge of the detailed anatomy of the internal jugular vein and the seventh cranial nerve, as described by Strong (1895), Gaupp (1899 particularly pp. 143 et seq. and 388 et seq.) and the author (1932) is necessary. In the Anuran genera thus far investigated, there is surprisingly little variation in this region, but Ascaphus is strikingly different. It will perhaps be best to describe the anatomical relations in detail, as they appear in sections.

As usual there is a large ganglion situated in the foramen prooticum (=foramen ossis prootici, Gaupp 1899, p. 137), through which should pass the n. trigeminus, n. abducens and the n. facialis. But in Ascaphus (Fig. 7A) the foramen prooticum is divided by a bony bridge into two portions (a) a dorsal foramen letting through the trigeminal and (b) a ventral one through which normally passes the facial nerve. In the case of Ascaphus, however, the facial foramen is encountered more posteriorly, so that the genus agrees with the Urodela and Gymnophiona in having a separate facial foramen. (One is inclined to consider this condition primitive, but it is equally possible that it may be case of partial neoteny, as the separation of the facial from the trigeminal foramen is recapitulated in Anuran ontogeny.) The internal jugular vein (v. capitis lateralis) leaves the skull by the ventral portion of the trigeminal foramen, receives a large branch from the buccal region and two small branches arising in the tissue between the auditory capsule and the processus basalis. The main stem of the vein has the same situation as in the other Anura, but is very large in Ascaphus (cp. Aglossa, author op. cit.), and is accompanied by a plexus of lymph vessels. It should however be noted, that although a small nerve leaves the skull through the "ventral" foramen (Fig. 7A), it is not the ramus hyomandibularis VII, and does not run in a dorsal direction to accompany the v. capitis lateralis, but its course is almost vertical. In Fig. 7B the ganglion prooticum is represented by an intracranial posterior prolongation, the f. trigemini and f. faciale have disappeared, and the processus basalis palatoquadrati, which was at

first broadly applied to the ventral surface of the auditory capsule is about to take on a more laterodorsal position and is supported ventrally by a ventral cartilage ledge of the auditory capsule. At about the junction of this latter ledge with the capsule, a ventral groove now makes its appearance (Fig. 7C), and soon effects communication with the labyrinth chamber. The foramen thus situated is occupied by a ganglion from which a nerve proceeds in an anteroventral direction. It is seen in Fig. 7A, B & C, and is unquestionably the ramus palatinus VII, which is joined by the vertical nerve referred to above. The ganglion can therefore only be the facial, or geniculate portion of the ganglion prooticum, which latter therefore does not merit that designation in Ascaphus, but is in reality a ganglion trigemini. The identity of the ganglion in Fig. 7C is proved by the fact that, in addition to the r. palatinus, the r. hyomandibularis also takes its origin in it.

We have now reached the niveau of the foramen acusticum anterius, as in Fig. 7D, in which, what is apparently the nervus acusticus (VIII) occupies the said foramen. It will be noticed, however, that the nerve has two branches: a dorsal innervating the perceptive cells of the inner ear and a ventral *joining on to the ganglion geniculatum!* The ganglion acusticum anterius begins to appear in section in the posterior division of the foramen acusticum anterius. It will be seen therefore, that this latter ganglion is bridged to the g. geniculatum by a commissural cord lying on the floor of the labyrinth cavity, so that the root of the facial, instead of lying external to the auditory capsule, lies within it. One can understand how this condition may have arisen ontogenetically, but only embryological research can clear the matter up, and may throw important light on the evolution of the Amphibian skull.

These conditions certainly differ very widely from those of other Anura; but also the ramifications of the r. hyomandibularis VII are extremely remarkable. In Fig. 7D the foramen through which the commissural cord referred to above passes to the g. geniculatum has closed, and the facial lies ventral to the v. capitis lateralis, as it does in other Anura. But this nerve then gives off on the right two dorsal branchlets (on the left only one), which become associated with the v. capitis lateralis. The thick main stem lies upon the hyale and eventually splits into four rami, as follows: (1) lying behind the pars quadrata, apparently the r. mandibularis internus, (2) lying in front

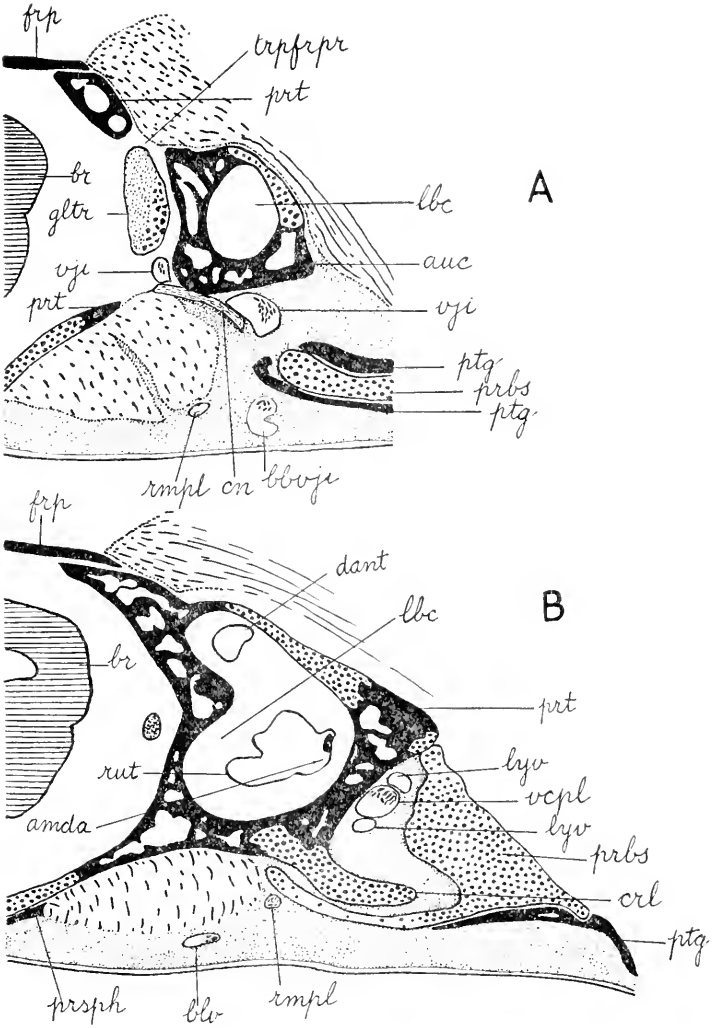
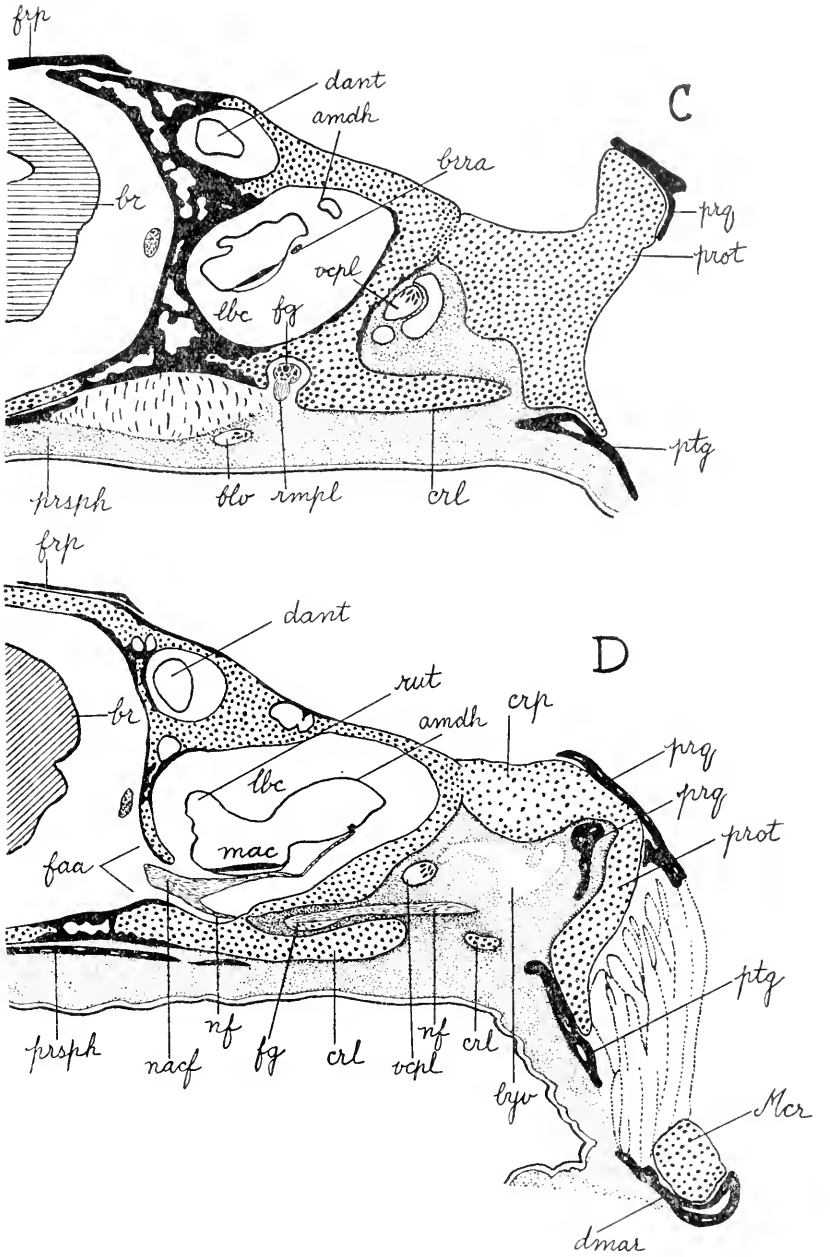


FIG. 7, A, B, C, and D. Transverse sections through the anterior region of the auditory capsule and associated structures of Ascaphus. amda = ampulla of the ductus anterior; amdh = ampulla of the ductus horizontalis; auc = auditory capsule; bbvji = buccal branch of vena jugularis interna; brra = branchlet of ramus anterior Nv. VIII; cn = commissural nerve between ganglion trigemini and ramus palatinus VII; crp = crista parotica; dant = ductus anterior; dmar = dermarticulare (goniale); faa = foramen acusticum anterius; fg = facial ganglion; gltr = ganglion trigemini; lbc = labyrinth cavity; lyv = lymph vessel; mac = macula acustica of recessus utriculi; Mcr = Meckel's cartilage; nacf = nervus acustico-facialis; nf = facial nerve; prbs = processus basalis; prot = processus oticus; prq = paraquadrate; prt = prootic; rut = re-



cessus utriculi; trfrpr = dorsal trigeminal portion of foramen prooticum; vcpl = vena capitis lateralis; vji = vena jugularis interna. Other abbreviations as for previous figures.

of the pars quadrata and apparently representing the r. hyoideus, (3) and (4) two dorsally directed branchlets passing to the muscles of that region. The two small branches referred to above as becoming associated with the v. capitis lateralis, maintain a ventral position with respect to the latter, but eventually fuse, in the region of the anterior margin of the operculum, dorsal to which they lie and are then joined by one coming from the angle of the buccal cavity. I have traced this latter nerve forwards very carefully, and find that, at about the region of the optic foramen it splits into two branches lying in the lateral portion of the tongue and separated from the main lingual stem of No. IX by a short space occupied by two arteries. Somewhat farther forward, first the inner branchlet, then the outer fuses with the main stem of No. IX, and the composite nerve then innervates the tongue.

The ramifications of No. VII and No. IX are given very schematically in Fig. 8, in which the two rami of No. VII associated with the vena capitis lateralis are designated as p 1 and p 2, and the product of their fusion p. The nerve which is very closely associated with p, and

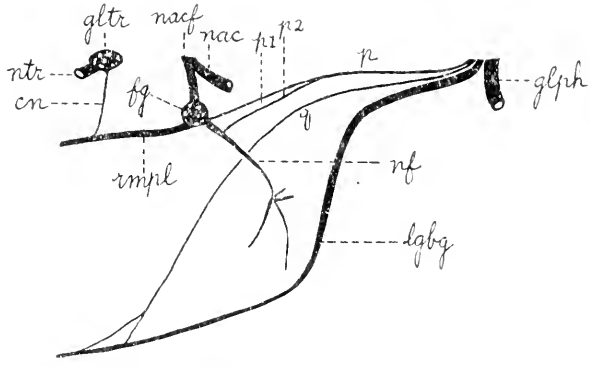


FIG. 8. Schematic representation of the ramifications of the seventh and ninth cranial nerves in Ascaphus. glph = nervus glossopharyngeus; lgbg = lingual branch of glossopharyngeus; nac = nervus acusticus; ntr = nervus trigeminus; p, p 1, p 2 and q are explained in the text. Other abbreviations as for previous figures.

fuses with No. IX in the tongue, is labelled q. The p and q elements are practically fused in Fig. 9C although their boundaries can still be made out; in Fig. 9A and B they are merely opposed. Fig. 9B marks the shifting of No. IX to lie dorsal to p + q, and already No. X is beginning to appear. In Fig. 9C the roots of nerves IX and X together with p + q may be seen on the inside of the opercular muscle,

and the main stem of X then occupies a position ventral to the v. capitis lateralis. The boundary between p and q can still be faintly made out, and upon approaching the jugular ganglion, the p and q

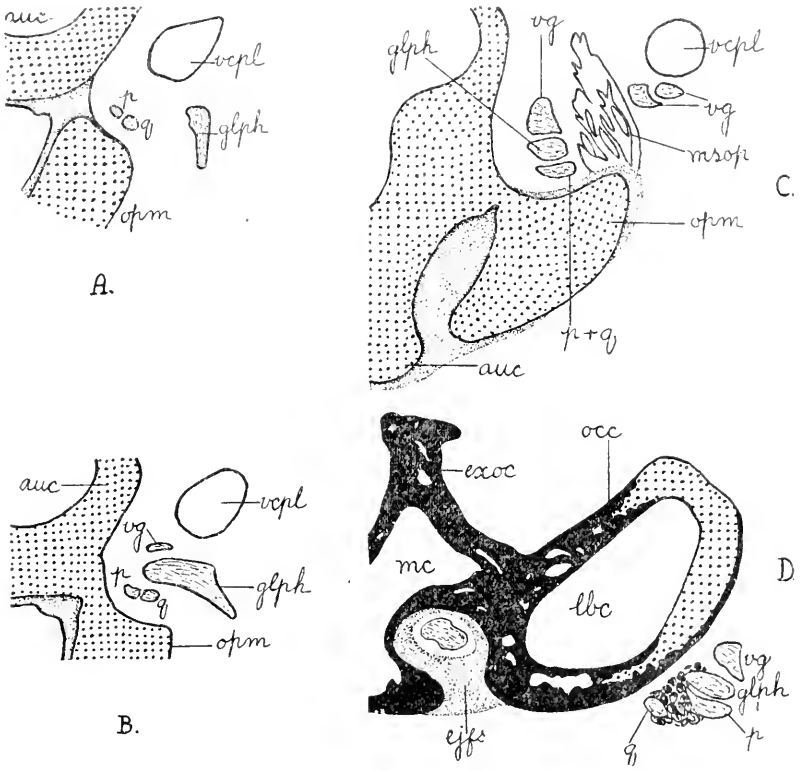


FIG. 9. Transverse sections through the opercular region of Ascaphus. ejfs = external opening of jugular fissure; exoc = exoccipital; msop = musculus opercularis; occ = occipital condyle; opm = operculum; vg = nervus vagus. Other abbreviations as for previous figures.

elements again separate, so that in Fig. 9D four nerve trunks may be traced as arising from the jugular ganglion.

Since the ramifications of VII and IX are extremely important for the general theory of the transformation of the suspensorial region, it is necessary to discuss the p and q nerves described above. They can

both be traced to the jugular ganglion, so they are doubtlessly to be considered as branches of IX. The p element, double on the right, single on the left side, is the nerve lying in close ventral association with the v. capitis lateralis and must be considered as a ramus communicans nervi glossopharyngei effecting connection with VII immediately after this latter leaves the skull and not, as usual, in the region of the operculum. Furthermore, those rami of VII going to the region of the lower jaw and hyoid must be considered as exclusively facial and lacking any glossopharyngeal fibres. The nerve p is therefore a ramus communicans IX, and q is an extra lingual branch of IX not traceable in other frogs. Practically all our knowledge of the ramifications of the seventh and ninth cranial nerves is confined to the genus Rana; it would therefore be rash to attempt any general statement regarding the primitiveness or not of the condition in Ascaphus, until more is known of the comparative anatomy of these nerves in the Discoglossidae and the Aglossa.

Skeletal anatomy of the suspensorial region. Several of the more important features have already been discussed above, such as the separation of the trigeminal and facial foramina (Fig. 7A & C), the presence of a basal ledge to the auditory capsule (Fig. 7B and C), the foramen for r. palatinus VII (Fig. 7C) and for the r. hyomandibularis VII (Fig. 7D). The crista parotica is raised above the level of the auditory capsule (Fig. 7C) and invested by the paraquadrate. The crista parotica preserves its identity as palatoquadrate derivative much more clearly than in any other Anuran known to me and is, moreover, histologically easily distinguishable from the capsule, so that it appears to be lightly pressed against the latter, instead of being in striking synchondrosis with it (Fig. 7D). The ventral capsular ledge has a posterior hook, just about disappearing in Fig. 7D, its place being immediately occupied by the cranial tip of the hyale, overlain by the r. hyomandibularis VII as described above. The space between the crista and the hyale is taken up by the relatively enormous thymus. The pars quadrata palatoquadrate shows that rare condition of autochthonous ossification; at one spot the connective tissue between the paraquadrate and the cartilage disappears, but never in the case of the pterygoid. In other words, a true os quadratum is represented in Ascaphus. In spite of the bone developing an enormous marrow cavity, there is much persisting cartilage. The pterygoid and paraquadrate do not fuse, as they sometimes do in other cases of absence of the quadratomaxillary.

The auditory apparatus. The absence of a middle ear, annulus

tympanicus, plectrum and Eustachian tubes has been frequently remarked upon. The operculum appears in section behind the thymus gland and is embedded in the tissue filling the fenestra ovalis. There is a high, shallow accompanying fossa fenestrae ovalis. The operculum is very intensely calcified,— more so even than the neighbouring parts of the capsule — but nowhere does it show any excavations; it is overlain by enormously thick layers of muscle, as in Hemisus. Where the main stem of nerve No. IX begins to take on a dorsal position with respect to the other two branches (Fig. 9B), the operculum acquires synchondrotic continuity with the dorsal margin of the fenestra ovalis. It is interesting to note, that the operculum and the ductus fenestrae vestibuli persist in section for a good distance after the fenestra ovalis has closed. As indicated in Fig. 9C, there is a strong opercularised portion of the m. levator scapulae superior, as in Hemisus (author 1931, p. 323), and although the operculum is not covered by the scapular portion of the pectoral girdle to such an extent as in Hemisus, the anterior portion of the suprascapula is already present in the section drawn in Fig. 9C and in those lying posterior to it. When the operculum disappears from the sections,—approximately where the jugular ganglion begins to appear — its place is taken by a tough band of tendinous tissue to which the m. levator scapulae, as posterior continuation of the "m. opercularis," is attached.

I have on several previous occasions discussed what I termed the Kingsbury-Reed-Vershuys hypothesis regarding the evolution of the auditory skeleton, as apparently accepted by Noble (1931 pp. 334 and 335), who says of Ascaphus (op. cit. p. 335): "the rudimentary ear ossicles and the absence of Eustachian tubes in Ascaphus would seem to be correlated with a mountain brook life, where acoustic conditions are obviously bad." But is this true? One cannot imagine an Anuran more perfectly adapted to mountain brook life than Heleophryne, which has a complete auditory apparatus, similar to that of Rana. Shouldn't the large operculum, strongly opercularised m. levator scapulae superior and absence of plectral apparatus rather be explained as indicating terrestrial adaptation in Ascaphus?

It is by no means certain what the auditory skeleton of ancestral Anura was like, nor is the comparative anatomy thereof in the most primitive living Anura an infallible guide. Among the Discoglossidae, Bombina (=Bombinator Merrem) possesses the operculum only, whereas Alytes, Discoglossus and apparently Barbourula (Taylor and Noble, 1924) have a complete apparatus. Among the Liopelmidae Ascaphus possesses the operculum only, and apparently the same

holds true for Liopelma according to Nieden (1923, p. 519), who classes Liopelma as a Cystignathid. For the Aglossa the reader is referred to the author's work cited above, from which it will be seen that Noble (op. cit. 1931, p. 335) is wrong, when he states that the operculum and columella are fused in Pipa. Among the Aglossa only Xenopus has a small operculum, in Pipa and Hymenochirus it is absent. Versluys (1924 p. 377) thinks that the Stegocephalian ancestor of Urodeles and Anura must have acquired an operculum, a structure which was useful in terrestrial, and not in the way in aquatic life. The Urodela have an operculum and plectrum of which the former develops after the latter, whereas in Anura, which may also possess both, the operculum is the first to develop. One can hardly evade the conclusion that the ancestors of Urodela and Anura possessed an operculum as well as a plectrum and associated middle ear. This last is absent in Urodela, but its loss can easily be explained by the well-known fact that the whole order is tainted with neoteny, so that modern Urodeles are no guide as to the appearance of their ancestors. All we may safely maintain is, that modern Urodeles arose from a group of Amphibia whose ontogeny was arrested at that stage in which plectrum and operculum had developed but the middle ear had not yet been established. This conclusion is rendered the more probable by the well-known fact, that in Anura the middle ear develops some time after completion of the metamorphosis. My own work on Arthroleptella, and that of my student G. du Toit on Hyperolius bear out this contention. The recent work of Gazagnaire (1932) further stresses the lateness of the development of the middle ear. (Unfortunately Gazagnaire's work is apparently a résumé; it is a great pity that an illustration is not provided as proof of the derivation of the plectrum from the hyoid.) I cannot agree with Goodrich (1930, p. 481), when he considers the auditory apparatus of Urodeles degenerate; its condition must be considered as a case of partial neoteny, bearing a sort of superficial resemblance to degenerateness, although it is phylogenetically something very different. The loss of a middle ear in Anura should not be compared with its absence in Urodela: even in frogs which are unquestionably neotenic in a phylogenetic sense, like the South African Arthroleptella, Microbatrachella and Cacosternum, the middle ear does develop, although, as I can testify for Arthroleptella (1929), it does so after the metamorphosis. The earlier development of Hemisus has never been studied, but a postmetamorphic stage I sectioned (1931) lacked middle ear, plectrum and annulus. It would therefore appear that Urodeles lack a middle ear, because their

development is arrested, whereas in forms like Ascaphus, Liopelma, Bombina and Hemisus the structure has been secondarily lost.

The main difficulty is of course in connection with the Aglossa. It is generally assumed that they were once as terrestrial as other frogs and became secondarily readapted to an aquatic existence. But the recent work of Escher (1925) casts very grave doubt on this hypothesis. The following quotation on p. 326 (op. cit.) is particularly interesting: "Da sich Hymenochirus und Pipa in der Anordnung der Sinneslinien den Urodelen nähern, so sind sie, was dieses Merkmal anbetrifft, die ursprünglichsten Anuren. Sie liefern das bisher fehlende Bindeglied zwischen dem Sinneslinientypus der Urodelen und dem der Larven der phaneroglossen Anuren." On pp. 378 and 379 (op. cit.) Escher tries to explain the presence of lateral line organs in Aglossa, much in the same way as Broman (1926) explains atavisms, but his explanation on the lines of postulating potential but not actually developed lateral line organs in the frog-like ancestors of the Aglossa impresses one as being decidedly baroque. We cannot evade the conclusion that the Aglossa must be either neotenic, or the lateral line sense organs must have been independently developed in them (disproved by comparative anatomy and histology), or the Aglossa must be truly primitive Anura. In spite of many undoubted signs of specialisation in the Aglossa, I believe them to be essentially neotenic: the evidence of the lateral line sense organs and the virtual absence of the operculum cannot be interpreted in any other way. If this is the case, Ascaphus as representative of Noble's family "Liopelmidae" might still be considered "ancestral" to the Aglossa in a purely comparative anatomical sense of the term, as Noble expresses the relationship in the family tree on p. 486 of his handbook. However this may be, Ascaphus and Liopelma cannot be considered primitive with regard to the auditory apparatus: if they are to retain the taxonomic position assigned to them by Noble, they do so in spite of the anatomy of the auditory region.

The auditory capsule and associated structures. The presence of a foramen acusticum medium in the partition between the brain cavity and the labyrinth cavity is particularly interesting. The foramen was discussed for Japanese frogs by Miyiwaki in 1927, and the older literature is there reviewed. As explained above, the foramen acusticum anterius (Fig. 7D) lets through a nerve consisting of fused n. acusticus and n. facialis. The latter lies on the floor of the labyrinth cavity, pierces the floor of the capsule in its passage to the ganglion faciale, and also the base of the capsule, dorsal to the ledge referred to above. The acustic

element of the nerve leaving by the foramen acusticum anterius is the ramus acusticus anterior, and it innervates the small crista of the anterior ampulla (not drawn), and in Fig. 7D may be seen to innervate the large macula acustica on the floor of the recessus utriculi; it also gives off a lateral branch to supply the ampulla of the ductus horizontalis. The ganglion acusticum anterius is not yet seen in Fig. 7D, but

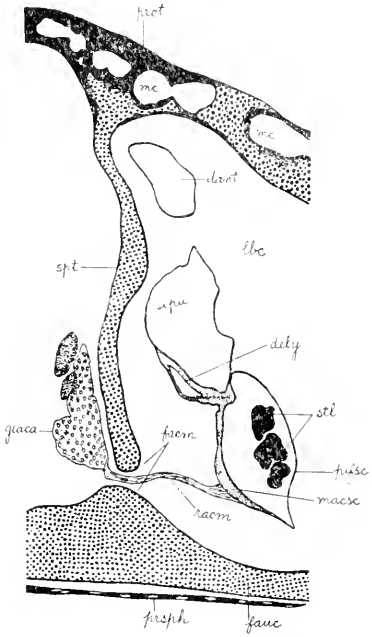


FIG. 10. Transverse section through the labyrinthine region of Ascaphus in the region of the foramen acusticum medium. dely = ductus endolymphaticus; facm = foramen acusticum medium; fauc = floor of auditory capsule; glaca = ganglion acusticum anterius; macsc = macula sacculi; pifsc = pars inferior sacculi; racm = ramus acusticus medius; sipu = sinus posterior utriculi; spt = cartilaginous septum between cranial and labyrinthine cavities; stl = statolith. Other abbreviations as for previous figures.

begins to appear in the hinder portion of the foramen acusticum anterius and on the cerebral side of the partition, after the foramen has disappeared. I have not drawn any sections showing the foramen endolymphaticum, which as usual is situated in cartilage. (Cp. also Miyiwaki, 1927.) The foramen acusticum medium is sectioned in Fig. 10, the nerve issuing through it, nervus acusticus medius, arises in

the ganglion acusticum anterius and proceeds to the large macula sacculi of the pars inferior sacculi. (It may be stated here en passant, that the pars superior is absent in Ascaphus!) In Rana the nerve for the macula sacculi is a branch of the anterior ramus of VIII, so that the conditions in Ascaphus are quite in accord with comparative

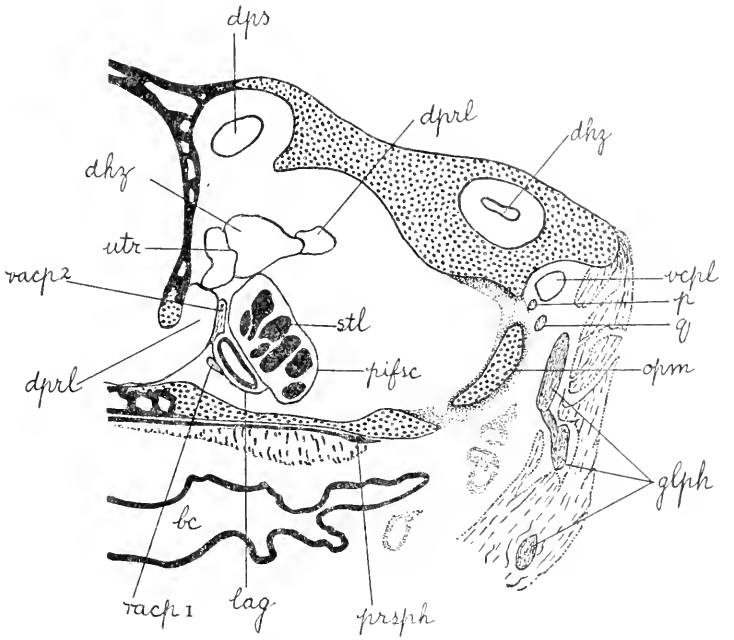


FIG. 11. Transverse section through the head of Ascaphus to show the details of the posterior portion of the inner ear. (This figure represents a section situated not far posterior to Fig. 7D.) dhz = ductus horizontalis; dprl = ductus perilymphaticus; dps = ductus posterior; lag = lagena; racp 1 and racp 2 = branches of the ramus acusticus posterior; utr = utriculus. Other abbreviations as for previous figures.

anatomy. The ganglion acusticum posterius is situated on the labyrinth side of the foramen acusticum posterius and appears in section at the niveau of the sinus superior utriculi. In the frog the ganglion gives origin to a nerve supplying the lagena and another supplying the pars basilaris and the posterior ampulla. In Ascaphus the ramus acusticus posterior also has two branches (Fig. 11), one of which sup-

plies the lagena; the other branch runs in the roof of the pars neglecta or the floor of the ductus perilymphaticus, and upon the latter ceasing to occupy the place between the utricular and saccular portions, the nerve runs below the sinus posterior utriculi and eventually supplies the crista of the posterior ampulla.

It is extremely interesting to note that the pars basilaris and its nerve are absent. This, one would feel inclined to interpret as proof of the inability of Ascaphus to hear. It is, however, safest to assert merely that the frog cannot hear well, as inferences regarding the ability of fish to hear air-borne sounds are looked upon askance nowadays. Noble maintains that Ascaphus has no voice (1931, p. 408); this feature is easily explained by the absence of the pars basilaris and probable total deafness. Noble ascribes the loss of voice to the exigencies of mountain brook habit, but although the internal ear of Heleophryne has never been investigated, it will probably turn out to be of the Ranid type, as the middle ear and associated structures are normally developed. Heleophryne is much more of a true mountain brook frog than is usually assumed. I have on several occasions captured specimens, which were calmly resting on the bottom of clear mountain pools. It may be that Ascaphus is actually more aquatic than Heleophryne, which is sometimes caught in rock crevices in the neighbourhood of mountain streams and not actually in the water. Its suckered toes prove that it is a climber and not entirely aquatic. The absence in Ascaphus of the pars superior sacculi, of which the pars basilaris is a posterior prolongation, is probably associated with the absence of the pars basilaris. There is no reason, however, for assuming that other genera lacking a middle ear plectrum and annulus must have an inner ear modified as in Ascaphus. Very little comparative data are available, and genera like Liopelma, Pelobates, Bombina and Hemisus will have to be investigated, before it can be stated, that degeneration of the middle ear always calls forth the same degeneration of the inner ear as in Ascaphus. Theoretically, moreover, it is most unlikely, because Ascaphus seems to be aquatic, whereas forms like Hemisus and Pelobates, particularly the former, are essentially terrestrial.

Of the sound-conducting skeleton, the operculum is the only element represented. It is large and saucer-shaped instead of bowl-shaped and is calcified for its greater extent. Anteriorly the operculum does not quite fill out the fenestra ovalis but posteriorly it does, and may therefore be seen in section after the fenestra has closed, as in Fig. 9C. The ductus fenestrae vestibuli is at first high and narrow, then becomes wider and more tubular in sections corresponding approximately to

Fig. 9A and B. The fossa fenestrae ovalis is quite small. It will be noticed that in Fig. 9B the operculum is in cartilaginous continuity with the dorsal margin of the fenestra ovalis. The ductus fenestrae vestibuli persists in section after the fenestra ovalis has closed and occupies the space between the auditory capsule and the hind end of the operculum shown in Fig. 9C, from which, however, the ductus has already disappeared. Attached to the dorsal ridge of the postfenestral portion of the operculum is a strong opercular muscle (opercularised part of the m. levator scapulae superior) seen in Fig. 9C. Operculum, opercular muscle and fenestra ovalis are covered with three thick layers of muscles, and as in Hemisus (author, op cit.), the scapular portion of the shoulder girdle also covers the austico-auditory region of the skull. Posteriorly the opercular muscle insensibly passes into the m. levator scapulae superior, which attaches to the inner surface of the suprascapula; this cartilage is not, however, ossified as in Hemisus.

The cranial roof. The basioccipital and supraoccipital are absent, and the exoccipitals are separated by a fairly wide strip of persistent cartilaginous tectum. The cranial roof is weakly developed, as in most South African frogs, the transverse and median taeniae being absent; the tectum synoticum therefore bounds the large dorsal fronto-parietal fenestra posteriorly. The fronto-parietals do not fuse or touch in the middle line, but are separated by connective tissue filling up the fontanella.

The lower jaw. The symphysial tissue consists of procartilage fairly sharply demarcated from Meckel's cartilages. The mentomandibulars are represented not only by perichondrial ossification, but by enchondral as well, and are synostosed to the dentaries. The dermarticular or gonial is a strong bone possessing large marrow cavities. In the suspensorial region Meckel's cartilage is intensely chondrified, and for some distance the connective tissue separating it from the investing dermarticular disappears, and the thin perichondrial bony lamella of Meckel's cartilage then effects fusion with the dermarticular. This is quite a common histogenetic phenomenon in Anuran skulls, existing notably in connection with the quadratomaxillary and pars quadrata palatoquadrati. But the occurrence of ossification in the suspensorial region, be it ever so incipient, is remarkable enough to merit special mention. Morphologically the incipient ossification represents an articular; but I suppose Prof. H. Fuchs would say, the ossification originated from the dermarticular and is not strictly of autochthonous Meckelian origin. The lower jaw is edentulous. *The hyoid apparatus*

resembles that of Rana in its anterior portion: the processus anterior is very broad and relatively large, in comparison with the slender manubrium. The antero-laterals or alaries are entirely absent and the corpus is comparatively small and has a ventral investing bone, called by Fuchs an os parahyoideum (Fuchs 1929). This bone is approximately transversely hourglass-shaped and is separated from the invested corpus by a very thin lamina of connective tissue. According to Fuchs (op. cit.) there is no doubt about the parahyoid being a true membrane bone. It is absent in all South African Anura investigated by me. The postero-laterals in Ascaphus are long slender cartilages, terminating posteriorly dorsal to the carotis gland. The thyroid gland is located in the angle between the corpus and the posterolaterals and is not particularly associated with the thyreoid process of the corpus as in other frogs. These latter processes are ossified anteriorly, but posteriorly they are cartilaginous and embrace the larynx as in Rana. But there are peculiar features to be noted in connection with them in Ascaphus: at about the level of the first vertebra the cartilaginous thyreoid gives off an anteriorly directed process, which ends at the corner of the pharynx, and is thus brought into close vicinity with the operculum (Fig. 12). This feature may have no morphological significance, but it is just possible that the embryology may reveal that it has. The thyreoid does not effect fusion with the laryngeal skeleton. The relation of the hyale to the auditory capsule has been discussed in connection with the general cranial anatomy. Van Denburgh (1912) apparently bases his description of the hyoid, which he also figures, on a dissection. According to the drawing, the apparatus lacks the anterior and anterolateral processes, but in my sections the anterior processes are broad and short, but definitely present.

The Ascaphus skull compared with that of the Discoglossidae. There can be no point in discussing the relations of Ascaphus and Liopelma in this paper, since the latter genus was not available for comparison, and such meagre details of the cranial anatomy of Liopelma as are available, can hardly be utilised for a discussion of the autonomy of the "Liopelmidae."

But the primitiveness of Ascaphus can also be discussed upon its own merits and as revealed by the anatomy of the skull and associated nerves. The information contained in Parker (1881) and Boulenger (1897) regarding the skulls of the Discoglossidae may be used for comparative purposes.

For Alytes the following features may be mentioned: (Parker's work consulted, but modern nomenclature used): (1) the os en ceinture is

trough-like in form, and does not extend into the region of the nasal capsule or the antorbital processes; (2) the two fronto-parietals are widely separated by fibrous tissue; (3) a transverse taenia separating frontal and parietal fontanelles is present; (4) there is a superorbital

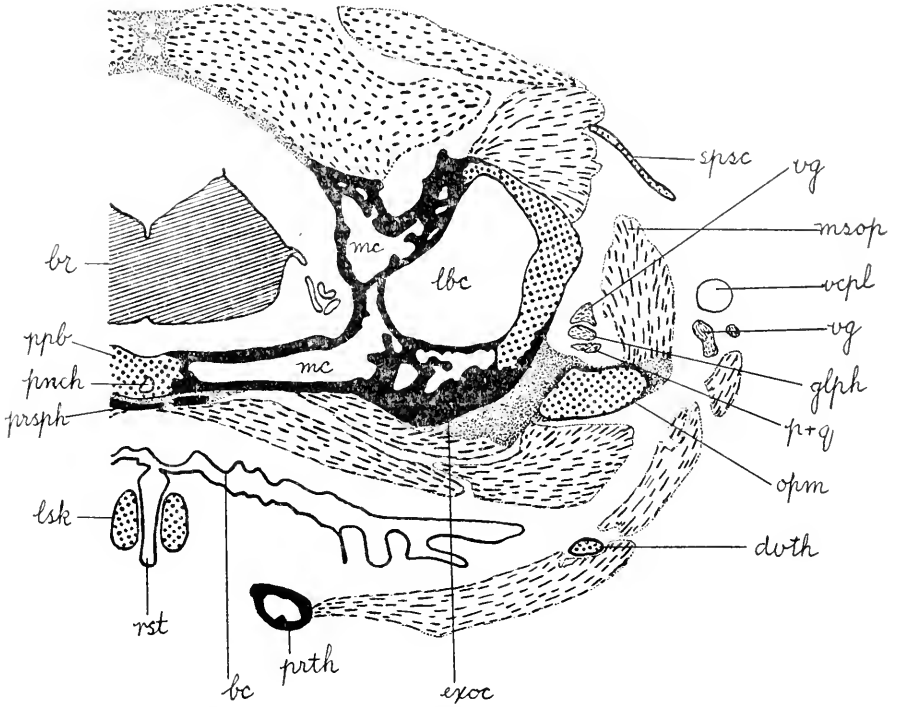


FIG. 12. Transverse section through the head of Ascaphus in the opercular region. dvth = diverticulum of thyreoid process of the hyoid; lsk = laryngeal skeleton; pnch = persistent notochord; ppb = persistent planum basale; prth = processes thyreoideus; rst = respiratory tube; spsc = suprascapula. Other abbreviations as for previous figures.

cartilage; (5) the tectum nasi is small, the solum and inferior prenasals large; (6) the operculum is large and has a boss for the opercular muscle; (7) there is a pars ascendens plectri; (8) there is an articular; (9) there is an os parahyoideum and (10) there is no septomaxillary (probably an error!). These features are not those selected by Parker himself.

The most interesting features of the skull of Bombina are the following (Parker's figures and description used): (1) the os en ceinture is a true girdle, but does not extend into the nasal and antorbital regions; (2) the fronto-parietals are separated by a wide stretch of connective tissue, but apparently a confluence of the fontanelles is caused by the absence of the transverse taenia; (3) the tectum nasi is narrow, the solum broad; (4) the tectum swells into a "cartilaginous bag" anteriorly (Parker's description is not very clear); (5) the palatine is absent; (6) the annulus and plectrum are absent; (7) the operculum has the opercular muscle attached to it; (8) Meckel's cartilage is ossified in the articular region; (9) there is a small os parahyoideum; (10) the septomaxillary is absent (error?). Parker stresses the neotenic appearance of the Bombina skull and its affinities with that of Xenopus.

Figures of the skull of Discoglossus are given by Boulenger (1897) on p. 34. (1) The fronto-parietals appear to be larger than in Bombina and Alytes, and (2) there is a fontanella between their diverging anterior points; (3) the paraquadrate joins the maxilla, thus forming a spurious upper temporal arcade; (4) the vomers are large; (5) there is an autochthonous articular ossification of Meckel's cartilage and (6) there are two slender ossa parahyoidea. Boulenger (1927) maintains that Discoglossids in general are characterised by the weak development of mentomandibular bones, by the broad thyreoid processes and the absence of the anterior processes of the hyoid. Parker (op. cit.), however, figures small anterior processes for Alytes.

Summarising the features common to Alytes, Bombina and Discoglossus the following résumé is arrived at: (1) the fronto-parietals seem to be reduced and separated by connective tissue filling up the single or double dorsal fontanelle; (2) the os en ceinture does not extend into the nasal capsule or antorbital processes; (3) the tectum nasi is small; (4) the septomaxillary is stated by Parker to be absent in Alytes and Bombinator and is not figured for Discoglossus by Boulenger. The probability is however that they are actually present; (5) the opercular muscle is present (also in Discoglossus?); (6) the os parahyoideum is present; (7) there is a separate articular ossification of Meckel's cartilage.

How does the skull of Ascaphus conform to the Discoglossid type characterised by the above seven features? The fronto-parietals are separated by connective tissue filling up an undivided fontanelle as in Bombina. The os en ceinture does not extend into the nasal capsule and antorbital process, but neither is it a ring or a trough, but consists of two portions. The tectum nasi is not particularly narrow,

but in any case the point is totally unimportant. The septomaxillary is normally developed, but this probably holds for *all* Anura, in spite of what Parker maintains. The strong opercular muscle, os parahyoideum and articular ossification are shared with Discoglossids. The reduction of the auditory apparatus is also met with in Bombina, but is of no universal phylogenetic significance, as it is also encountered in the totally unrelated Hemisus. The weak development of the anterior processes of the hyoid Ascaphus shares with the Discoglossidae, to which the feature is not, however, confined.

General résumé

On the whole Ascaphus might reasonably be considered a Discoglossid, if the cranial and visceral skeleton alone are to be relied upon. Some features in its cephalic anatomy, however, merit attention for their own sake. Not many of these can be considered primitive until more comparative data are available, but the relative independence of the crista parotica, the separation of the foramina for the fifth and seventh cranial nerves, the presence of an os parahyoideum and the separation of the "Rachendrüse" into two portions are possibly primitive, although they may be neotenic: a possibility strongly supported by the relatively enormous size of the thymus.

Indications of specialisation in Ascaphus are not wanting. The absence of middle ear, Eustachian tubes, plectrum and annulus can hardly be interpreted in any other way. But it should be borne in mind, that neoteny itself is a caenogenetic phenomenon, so that these features may be neotenic. The peculiar anatomical relations of cranial nerves V to IX are extremely interesting, but cannot yet be interpreted. The clearest proof of specialisation is the absence of the pars basilaris with its nerve and the pars superior sacculi in the internal ear; but even in this case neoteny may be partially responsible.

On the whole there seems to be a good deal of similarity between the cranial anatomy of Ascaphus and of the Discoglossidae: a similarity that may become more marked when the cephalic anatomy of the Discoglossidae is investigated microscopically. As for the autonomy of Noble's "Liopelmidae," only detailed anatomical and embryological comparison of Ascaphus and Liopelma will show, whether these two genera merit the distinction of being two of the most aristocratic land vertebrates in existence.

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I. REVISION OF TYPE SPECIMENS

II. MYCTOPHINAE COLLECTED BY C. O'D. ISELIN IN THE NORTH ATLANTIC IN 1928

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No. 2 — *Studies of Myctophinae in the Museum of Comparative Zoölogy*

By A. E. Parr

I. A revision of the type specimens of *Myctophinae* in the Museum of Comparative Zoölogy

These notes should be considered in a series with the writer's previous revision of the type-specimens of *Myctophinae* in the U. S. National Museum [1] and practically completes the task of attempting to bring the descriptions of the older species based upon material in American collections up to modern requirements in regard to taxonomic detail and technical terminology. The other major collections of this group apart from the material in the Bingham Oceanographic Collection [2] have all been so relatively recently described and illustrated that any revision at this time would be entirely uncalled for.

In regard to the terminology applied to the various luminous organs reference may be made to the previous notes on the types in the United States National Museum above referred to or to the earlier revision of the entire subfamily *Myctophinae* given in the report on the Iniomi obtained during the third Oceanographic Expedition of the Pawnee. [3]

Since the illustrations previously published of various of the types to be reported upon in the following were all prepared before the taxonomic significance of the minor details in the geometric arrangement of the photophores had yet been fully realized, it has been considered desirable to redraw these species in the diagrammatic manner currently used for the figuring of myctophine fishes, in order to show plainly the patterns formed by the luminous organs and to facilitate comparisons with other illustrations in the modern manner. It might be mentioned that the two "maculae operculares" or, more accurately, preopercular organs, inconsistently shown in current illustrations of this group, have been entirely omitted from all figures in this report as being inessential for the identification of the species and normally not as conspicuous in the lateral view as are the rest of the photophores.

[1] A. E. Parr. Notes on the species of Myctophine Fishes represented by type specimens in the United States National Museum. Proc. U. S. Nat. Mus., **76**, Art. 10, Washington, 1929.

[2] Chiefly the collections of the Carnegie Museum in Pittsburg and also the material obtained by Dr. Beebe for the New York Zoölogical Society.

[3] A. E. Parr: Deepsea fishes of the order Iniomi from the waters around the Bahama and Bermuda Islands. Bull. Bingham Oceanogr. Coll., **III**, Art. 3, New Haven, Conn., 1928.

Myctophum laternatum Garman

Myctophum laternatum Garman, Rep. Expl. Albatross 1891. XXVI. The Fishes. Mem. Mus. Comp. Zoöl., **24,** 1899, p. 267, pl. 56, fig. 1.
Type No. 28492 M. C. Z. (7 specimens).

PLO closer to pectoral fin than to the lateral line. 2 PVO, the upper at the lower corner of the pectoral fin base. Lower PVO above the interspace between second and third PO, below and far in advance of the upper PVO, the line through the two PVO passing well above even the first PO. 5 PO in an equally spaced, straight series. VLO about midway between ventral fins and lateral line or slightly closer to the

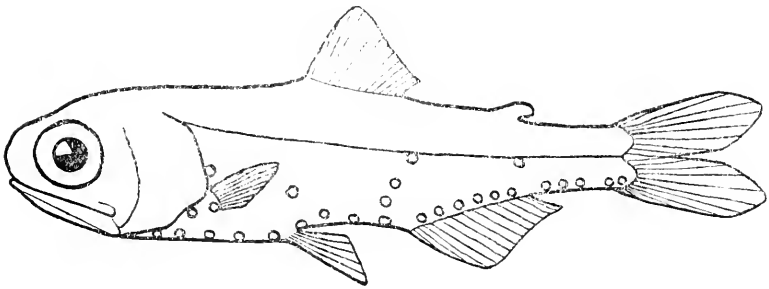

Fig. 1. *Myctophum laternatum* Garman

former. 4 VO, the second VO slightly elevated. 3 SAO, with the centre of the lower SAO very slightly below and behind the line through the centres of the upper two organs so that the three SAO form a slight but distinctly indicated angle with the convexity upward and forward. Lower SAO almost vertically above fourth VO. Second SAO slightly closer to the lower than to the upper SAO. Upper SAO in the lateral line vertically above or anterior to the first AO. AO 6–7 + 2–3 in the following combinations: 6 + 2, 1 count; 6 + 3, 6 counts; 7 + 2, 1 count; 7 + 3, 2 counts. Asymmetry was found in two of the seven specimens. AO equally spaced and all on the same level in both sections of the series. AO posteriores entirely behind the base of anal fin. 1 POL at the ventral edge of the lateral line. 2 PRC arranged horizontally at the lower margin of the caudal fin base, well separated from the AO posteriores.

Two of the specimens gave the following measurements:

Total length without caudal fin in mm.	24	25
Length of head in per cent of length without caudal fin	31	32
Diameter of eye in per cent of length without caudal fin	9.5	10.8
Lower jaw in per cent of length without caudal fin	21	20
Snout to D in per cent of length without caudal fin	50	48
Snout to V in per cent of length without caudal fin	46	44
Snout to A in per cent of length without caudal fin	62	62
Depth of body in per cent of length without caudal fin	25	24

One specimen shows an accessory photophore on one side immediately above the lateral line directly in advance of the normal POL. The phenomenon is accompanied by a slight, pathological looking swelling at this point.

Myctophum aurolaternatum Garman

Myctophum aurolaternatum Garman, Rep. Expl. Albatross 1891. XXVI. The Fishes. Mem. Mus. Comp. Zoöl., **24,** 1899, p. 264, pl. 55, fig. 3. Type No. 28494 M. C. Z. (4 large specimens).[1]

PLO somewhat closer to the base of pectoral fin than to the lateral line, the distance from the former being only around 2/3–3/4 of the distance from the latter. 2 PVO in a series with the first PO. Upper PVO immediately below and anterior to the pectoral fin base. Lower PVO in an almost straight line between upper PVO and first PO, about equidistant from second PO and upper PVO but farther removed from first PO. 5 PO in a straight, about equally spaced series. Second PO immediately behind the lower PVO. VLO approximately midway between lateral line and ventral fins. 4 VO in a straight, equally spaced series. 3 SAO in a straight, about equally spaced, slightly oblique series. Lower SAO above, very slightly behind the fourth VO and closer to the latter organ than to the second SAO. Fourth VO slightly below and behind the continuation of the line through the three SAO. Upper SAO only about one quarter of a diameter below the lateral line. AO in two equally spaced straight series in which the numbers shown in the accompanying table were counted on the four specimens in the type sample and 21 smaller specimens in sample No. 28495 M. C. Z. 11 of these specimens gave

[1] There is also another sample (No. 28495 M. C. Z.), marked as a type of this species, which contains 21 quite small specimens.

asymmetric counts and the frequency of the totals for both sections of the series of anal organs distribute themselves in the following manner. Total AO 14 in 1 count; 15 in 20 counts; 16 in 18 counts; 17 in 7 counts; 18 in 2 counts. 1 POL situated above the interspace between the ultimate and penultimate AO anterior, about one-quarter of a diameter below the lateral line. First

AO anteriores	posteriores 5	6	7
9	1	2	
10	18	7	3
11	11	4	1
12		1	

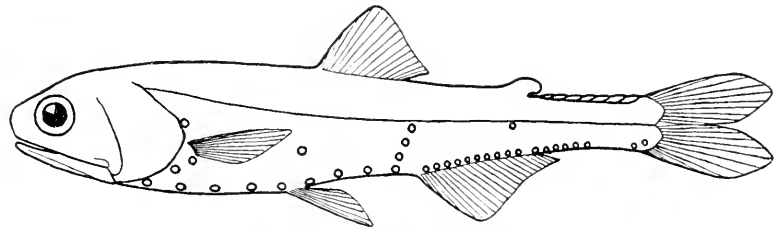

Fig. 2. *Myctophum aurolaternatum* Garman

AO posterior at the base of the last anal fin ray. 2 PRC at the lower margin of the caudal fin base, widely separated from the AO posteriores. The second PRC only slightly higher than the first.

7 supracaudal luminous scales occupy the entire distance between the caudal and the adipose dorsal fin in two of the specimens (males?). 3 minute infracaudal luminous scales between AO posteriores and PRC in a third (female?).

The following proportions were found in three of the specimens in the type sample:

Total lengths without caudal fin in mm.		80	88	90
Length of head	In per cent of length without caudal fin	26	27	27
Diameter of eye	"	7.5	9.0	8.0
Length of lower jaw	"	16	17	17
Depth of body	"	19	18	19
Depth of caudal ped.	"	7.5	7.0	6.5
Snout to D	"	48	49	48
Snout to V	"	43	43	43
Snout to A	"	60	62	62

The general appearance of the species has been well described by Garman in his original account and is also indicated in the accompanying sketch. *M. aurolaternatum* is one of the more elongate and least compressed species of *Myctophum*, with an almost fusiform body in the adults (greater compression in the smaller specimens).

Myctophum coccoi Cocco

Myctophum tenuiculum Garman, Rep. Expl. Albatross 1891. XXVI. The Fishes. Mem. Mus. Comp. Zoöl., **24**, 1899, p. 262, pl. 7, fig. 2.
Type of *Myctophum tenuiculum* No. 58499 M. C. Z. (4 specimens).

An examination of the type of *M. tenuiculum* can only serve to confirm its identity with *M. coccoi*, with which it has already previously been synonymized. AO 6 + 10/6 + 10; 6 + 10/6 + 10; 6 + 10/6 + 11; 6 + 10/7 + 9. In the case of the specimen with AO 6 + 10/7 + 9 there are unmistakably 3 PRC in a horizontal series symmetrically developed on both sides of the tail and well differentiated from the AO posteriores both in regard to size and arrangement. The specimen is otherwise entirely in agreement with the rest of the material.

Myctophum affine Lütken

Myctophum nitidulum Garman, Rep. Expl. Albatross 1891. XXVI. The Fishes. Mem. Mus. Comp. Zoöl., **24**, 1899, p. 266, pl. 56, fig. 3.
Type of *Myctophum nitidulum* No. 28493 M. C. Z,

An examination of the type of *M. nitidulum* confirms its identity with *M. affine*, with which it is currently synonymized.

Myctophum macrochir Günther

Myctophum atratum Garman, Rep. Expl. Albatross 1891. XXVI. The Fishes. Mem. Mus. Comp. Zoöl., **24**, 1899, p. 268.
Type of *Myctophum atratum* No. 28491 M. C. Z.

Myctophum atratum Garman is currently synonymized with *M. reinhardti*, as first tentatively suggested by Brauer and previously accepted by the writer and by other investigators. An examination of the type specimen, however, reveals the fact that its identity is not

with *M. reinhardti* but with the closely related *M. macrochir* Günther, and Garman's species should therefore be transferred from the synonymy of the former to that of the latter name.

The type of *M. atratum* shows the first SAO closer to the third than to the second VO. VLO well above the line through first and second SAO. AO 6 + 6.

Lampanyctus oculeus (Garman)

Myctophum oculeum Garman, Rep. Expl. Albatross 1891. XXVI. The Fishes. Mem. Mus. Comp. Zoöl., **24,** 1899, p. 260, pl. 56, fig. 2.
Type specimen No. 28500 M. C. Z. (8 specimens).

Identical with *L. mexicanus* (Gilbert) with which it should be synonymized. [1]

Lampanyctus leucopsarus (Eigenmann and Eigenmann)

Myctophum leucopsarum Eigenmann and Eigenmann, Proc. Calif. Acad. Sci., 2d ser., **3,** 1890, p. 5.
Type No. 27389 M. C. Z. (2 specimens).

PLO much nearer to the lateral line than to the upper PVO. 2 PVO, the lower slightly in advance of the upper in one of the specimens, slightly behind in the other. 5 PO, the second PO well behind the vertical from the upper PVO. Fourth PO elevated to the level of the interspace between the two PVO. VLO entirely lacking in the types, possibly normally absent in the species. 5 VO, the second VO elevated and advanced so as to become situated about two photophore-diameters vertically above the first VO. 3 SAO in a practically straight line falling immediately behind the last VO. Second SAO closer to the lower than to the upper organ in the same series. Upper SAO about one diameter below the lateral line immediately in advance of the vertical from the first AO. AO 6 + 7. 1 POL above the interspace between the AO anteriores and posteriores and about one-half of a diameter below the lateral line. AO posteriores entirely behind the base of anal fin and well separated from the PRC which are four in

[1] See Parr: Bull. Bingham Oceanographic Coll., **II,** Art. 4, p. 30.

number and arranged in an equally curved series ending with the upper PRC about 1–2 diameters below the end of the lateral line. The interspace between the third PRC and the fourth is somewhat enlarged.

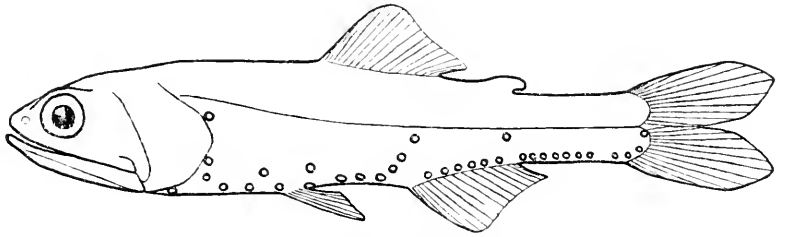

Fig. 3. *Lampanyctus leucopsarus* (Eigenmann and Eigenmann)

Table of measurements of type sample

Total length without caudal fin in mm.		77	72
Length of head	In percent of length without caudal fin	30	28
Diameter of eye	"	6.5	6.3
Length of lower jaw	"	20	21
Depth of body [1]	"	18	17
Snout to D	"	47	47
Snout to V	"	43	43
Snout to A	"	60	58

The question of the presence or absence of the VLO in this and the closely related species *L. nannochir* has already been discussed by the writer in a previous publication[2] in which the suggestion is made that the so-called VLO in the latter species may actually be homologous with the second VO in *L. leucopsarus*, the photophore in question having become still further advanced and elevated than in the last named form. Under this interpretation, both species could be said to have five VO and to have lost their VLO. But for practical purposes it is perhaps advisable to apply the nomenclatural symbols in the conventional manner according to the relative positions of the organs alone, in which case a VLO but only 4 VO could be said to be present

[1] This measurement is hardly very reliable in the type specimens, as they appear to have been artificially compressed in preservation.

[2] A. E. Parr. Notes on the species of Myctophine Fishes. . . . Proc. U. S. National Mus., **76**, Art. 10, p. 18 footnote 18.

in *L. nannochir*, while there can hardly be any question about the nature of the elevated second VO in *L. leucopsarus* so that this species would still be said to have 5 VO but apparently no VLO, at least not in the type specimens.

Lampanyctus crocodilus Risso 1810

Lampanyctus peculiaris Borodin. Some new deep sea fishes. Proc. New Engl. Zoöl. Club, **10**, 1929, p. 3.

Type of *L. peculiaris* No. 31628 M. C. Z.

A closer examination of the type of *L. peculiaris* has revealed the presence of three photophores on each cheek, [1] in exactly the arrangement characteristic of *L. crocodilus*, and leaves no doubt about its identity with the latter species, of which it appears to be a quite typical representative.

There are a couple of luminous scales in the anterior edge of the adipose dorsal fin, 2 supracaudal scales immediately in front of the caudal fin base above, and a luminous scale immediately behind the base of anal fin would seem to indicate that the entire ventral edge of the free caudal peduncle must have been occupied by a series of such scales. Of these, however, only the anterior scale, just mentioned, and the last 3 scales in front of the caudal fin are still to be found in the specimen on hand, the others having obviously been lost by violence, and it is therefore impossible to arrive at the total count for the infracaudal luminous scales in this case. Apparently one of the best preserved specimens of this species is that which served as the type of Goode and Bean's *L. gemmifer* (No. 35604 U. S. N. M.), of which an illustration has already previously been rendered by the writer. [2] In this specimen 9 infracaudal and 4 supracaudal luminous scales were observed, the infracaudal scales occupying the entire space from anal to caudal fin.

Diaphus dumerili Bleeker

Myctophum nocturnum Poey, Mem. Hist. Nat. de Cuba, **2**, 1860, p. 426.

Diaphus nocturnus Gilbert, Bull. Mus. Comp. Zoöl., **46**, No. 14, 1906, p. 255, pl. 1.

Type of *Diaphus nocturnus* (Poey) Gilbert No. 6871 M. C. Z.

A reëxamination of the type specimen of *D. nocturnus* (Poey) can merely serve to confirm the current conception of the characters and identity of this form.

[1] The upper photophore on the left side has been lost, which, however, undoubtedly represents an accidental feature of molestation in the preserved specimen.

[2] Proc. U. S. National Mus., **76**, Art. 10, 1929, fig. 13, p. 27.

Diaphus intermedius Borodin

Diaphus intermedius Borodin. Some More New Deepsea Fishes. Proc. New Engl. Zoöl. Club, **11**, 1930, p. 89.
Type specimen No. 32289 M. C. Z.

Upper antorbital of moderate size, circular, situated entirely above the nostril. Antorbitals of the two sides well apart from each other. No lower antorbital. A single large suborbital, on each side extending from somewhat in advance of the vertical from the anterior margin of the eye to somewhat behind the vertical from its centre, the length of the suborbital organ equalling about two-thirds of the diameter of the eye. Suborbital organ exposed to the side only, without upward extension along the anterior margin of the eye.

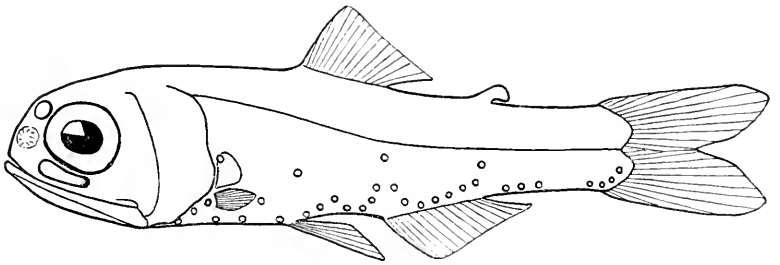

Fig. 4. *Diaphus intermedius* Borodin

Height from pectoral fin base to PLO only about two-thirds of the height from PLO to lateral line. 2 PVO in a straight oblique series with the first PO. 5 PO. Second PO entirely behind vertical form posterior PVO. Fourth PO elevated approximately to the level of the upper PVO. VLO about midway between the lateral line and the base of ventral fin. 5 VO. First to third VO in a straight, obliquely ascending series. Fourth and fifth VO lower, on a horizontal line. 3 SAO in an approximately straight or very faintly angular series, the continuation of which would fall behind the fifth VO. Lower SAO about equidistant from fifth VO and second SAO. Interspace between second and upper SAO much greater than the lower interspace in the same series. Upper SAO about 1½ to 2 diameters below lateral line. AO 7 + 3. First AO anterior elevated approximately to the level of second SAO. Second AO anterior also distinctly elevated. Third AO anterior lowest of the series, from which organ (AO_3) a straight, obliquely ascending series is formed posteriorly by the rest of the AO

anteriores. 1 POL about 2 diameters below the lateral line. AO posteriores in a horizontal series a short distance removed from the base of anal fin. A fourth AO posteriore may possibly have been lost on both sides in the type. 4 PRC equally spaced, in a gradually curving series along the lower part of the base of caudal fin, widely separated from AO posteriores, and extending with the upper PRC only about halfway up from the ventral margin of the tail towards the lateral line. Last interspace in PRC-series slightly enlarged.

A large luminous scale at PLO occupying practically the entire space between this photophore and the pectoral fin.

The following measurements were obtained from the type specimen: Total length without caudal fin 58 mm. Proportions in percent of the length without caudal fin: Length of head 33 percent. Length of maxillary 23 percent. Diameter of eye 12 percent. Greatest depth of body 27 percent. Distance from snout to ventral fins 46 percent. Distance from snout to dorsal fin 51 percent. Distance from snout to anal fin 66 percent. Depth of caudal peduncle 12 percent.

D 13½. A. 13½. Ll. 34.

The above counts and measurements have been verified by a re-examination of the specimen after the completion of the manuscript for these notes. It is probable that Borodin has included the badly damaged caudal fin in the proportions of the depth of the body and length of head to the length of body, thus obtaining his deviating values, although the expression "standard length of body" is used in his text. [1]

The species seems most closely related to *D. fulgens* Brauer [2] and *D. taaningi* Norman [3] and would fall under point "IV, A, 2" together with these two species in the key to the genus *Diaphus* previously published by the writer. [4] *D. intermedius*, however, differs from the other two forms by its number of anal photophores (AO 5 + 4–5 in *D. fulgens* and *D. taaningi*), by the low position of the praecaudal series (last PRC only a little below the lateral line in the other two species), by the elevated second AO anterior, by the position of the VLO, by various proportions and other features of less importance.

[1] Borodin: Proc. New Engl. Zoöl. Club, **11**, 1930, p. 89.
[2] See Parr: Deepsea fishes of the order Iniomi from the waters around the Bahama and Bermuda Islands. Bull. Bingham Oceanogr. Coll., **3**, Art. 3, New Haven, Conn., 1928, pp. 116–117. Only *D. fulgens* Brauer mentioned under point IV, A, Z, *D. taaningi* being a later addition.
[3] J. R. Norman: Oceanic fishes and flatfishes collected in 1925–1927. Discovery Reports, **2**, Cambridge, 1930, p. 332.
[4] See Parr: Ibid.

Diaphus rafinesquei Cocco

Diaphus theta Eigenmann and Eigenmann 1891.

In addition to the specimen of *theta* labelled "Type" in the United States National Museum (No. 41914), previously reported upon by the writer,[1] there is also a specimen (No. 27392) in the Museum of Comparative Zoölogy designated as type of this species. The Cambridge specimen is in a very poor condition, so that it is difficult to make out its characters in any great detail, but it does not appear to differ from the Washington specimen.

Diaphus garmani Gilbert

Diaphus garmani Gilbert, Bull. Mus. Comp. Zoöl., **46**, 1906, p. 258, pl. 2.
Type No. 29070 M. C. Z.

An examination of the type can only serve to confirm the excellent description and illustration already rendered in Gilbert's original account of the species and to verify the subsequent identifications by other authors.

Lampadena luminosa Garman

Myctophum luminosum Garman, Rep. Expl. Albatross 1891. XXVI. The Fishes. Mem. Mus. Comp. Zoöl., **24**, 1899, p. 263, and pl. 55, fig. 2.
Type No. 28498 M. C. Z.

Although the type is now in a relatively poor condition, the following details concerning the numbers and arrangement of the photophores can still be ascertained. PLO quite close to the lateral line, being only about one photophore-diameter removed from the latter. 2 PVO, the lower well below the pectoral fin base, well in advance of second PO and vertically below or slightly in advance of the upper PVO, which is situated in front of the lower part of the base of the pectoral fin. 5 PO, the fourth elevated approximately to the level of the lower PVO and only a short distance behind the third PO. Distance from lateral line to VLO about one-half to two-thirds of the distance from VLO to ventral fins. 5 VO in a straight and equally spaced series. 3 SAO forming a wide, concave angle. Lower SAO above and slightly behind fifth VO so that the line through these two organs runs approximately parallel with the line through second and third SAO. Second SAO somewhat higher than first SAO but only about half as far from

[1] Proc. U. S. Nat. Mus., **76**, 1929, Art. 10, p. 32 and fig. 16.

the latter organ as from the upper SAO which is situated at a distance of only about one-half of its own diameter below the lateral line well in advance of the vertical from the first AO. AO 6 + ? AO anteriores all on the same level. AO posteriores completely lost in type. 1 POL, somewhat behind the last AO anterior and about one diameter below the lateral line. There are 2 PRC'S at the lower margin of the caudal fin base and a last PRC in the lateral line well behind these. It is possible but very uncertain whether certain slight markings in this region may be taken to indicate that a third PRC may have been present well above the lower two organs of the series, so that the series as a whole would form a blunt angle.

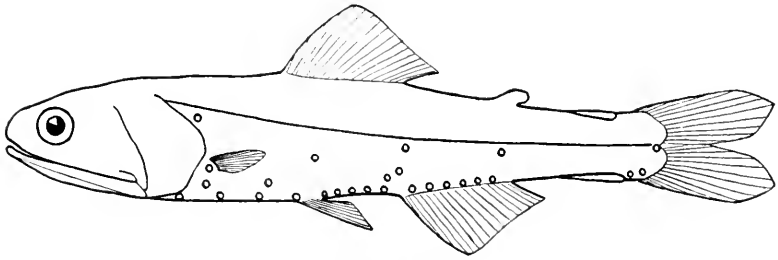

Fig. 5. *Lampadena luminosa* (Garman)

The infracaudal luminous plate occupies about 1/3–2/5 of the ventral free edge of the caudal peduncle, the supracaudal plate about 2/7–1/3 of the distance between caudal and adipose dorsal fins.

Total length without caudal fin about 100 mm. Proportions in percent of this measurement: Length of head 29. Greatest depth of body 19. Diameter of eye 5.5. Length of snout 6.5. Length of lower jaw 21. Snout to dorsal fin 40. Snout to ventrals 43. Snout to anal fin 61.

It is very unfortunate that the condition of the type still leaves in doubt the number of PRC's which would actually be present in an unmolested specimen since the claim of a specific distinction between the Pacific *L. luminosa* and an Atlantic *L. nitida* [1] has been made upon the assumption that 4 (3 + 1) PRC should be present in the form described by Garman. The basis for this assumption is found in the description of a Pacific specimen from the coast of Sumatra rendered

[1] A. V. Taaning: Synopsis of the Scopelids in the North Atlantic. Vidensk. Medd. Dansk Naturhist. Foren., **86**, 1928, p. 63. Vide: J. R. Norman: Oceanic Fishes and Flatfishes collected in 1925–1927. Discovery Reports, **2**, Cambridge, 1930, p. 336, fig. 33.

by Weber and Beaufort [1] in which three anterior lower PRC's were found in equidistant horizontal series along the lower edge of the caudal fin base. This arrangement would not entirely agree with the arrangement faintly indicated in the markings on the tail of the type of *L. luminosa*, if these markings are properly read by the present writer, but it would be futile to carry further a comparison with the hypothetical position of a possible third PRC (third of four organs) the actual existence of which remains extremely uncertain.

[1] M. Weber and L. F. deBeaufort: The fishes of the Indo-Australian Archipelago, **2**, p. 172, fig. 66, Leyden, 1913.

II. Myctophinae collected by C. O'D. Iselin in the North Atlantic in 1928

The following is an account of the Myctophinae collected by Columbus O'D. Iselin on the Schooner Atlantis in the North Atlantic during the summer of 1928, and subsequently received for identification from Dr. N. A. Borodin of the Museum of Comparative Zoölogy. [1] For the sake of completeness, the four specimens of different species from the same collections already previously identified and recorded by Dr. Borodin (loc. cit.), including the type of *Lampanyctus peculiaris*, have been reëxamined by the writer and are also dealt with in the present report so as to give a full account of the material of this particular group.

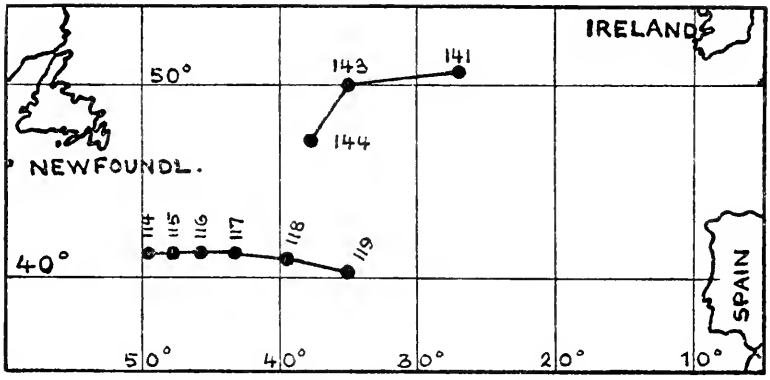

Fig. 6. ATLANTIS stations, summer 1928.

The stations from which the collections were obtained were arranged in two separate sections, each running in an East-westerly direction in mid-Atlantic about 6–10 degrees latitude apart and almost in direct succession to each other in regard to longitude, as shown in the accompanying chart. In the northern section, stations No. 141–144 run from 50° 40′ N. and 27° 16′ W. to 47° 40′ N. and 37° 20′ W.; and in the southern section, stations No. 114–119 from 40° 05′ N. and 35° 10′ W. to 41° 18′ N. and 49° 22′ W. It is of interest in connection with these differences in geographic location to make a comparison between

[1] N. A. Borodin: Atlantic Deep sea Fishes. Bull. Mus. Comp. Zoöl., **72**, 1931, No. 3, p. 55, footnotes 1 and 2.

the catches obtained in each of the two sections, which gives us the following results:

Present in both sections (7 species):

Myctophum glaciale	*Lampanyctus iselini*
Lampanyctus photothorax	*Lampanyctus crocodilus*
Lampanyctus maderensis	*Diaphus dofleini*
Lampanyctus pusillus	

Present in the northern section only (3 species):

Diaphus metopoclampus	*Diaphus gemellari*
Diaphus rafinesquei	

Present in the southern section only (7 species):

Myctophum laternatum	*Lampanyctus alatus*
Myctophum coccoi	*Lampanyctus cuprarius*
Myctophum benoiti	*Lampanyctus resplendens*
Lampanyctus warmingi	

Although the material is, of course, too small to give any great weight to this comparison, it does, at least, clearly show a much richer variety of forms in the southern section than in the northern. The fact that three species of *Diaphus* were obtained in the northern section only, is undoubtedly purely accidental, as adequately proved by the other known records of these forms, but the total absence in this section of the seven species encountered only at the southern stations may have a real relationship to a greater scarcity of at least some of these forms in the more northern waters.

If we finally compare the abundance of *Myctophum glaciale* in the two sections, we discover a relationship which undoubtedly has a real bearing upon the distribution of this species. In the southern section, *M. glaciale* was encountered at only 3 out of the 6 stations at which *Myctophinae* were obtained, giving an average for these six stations of only 0.8 specimens per haul. In the northern section, *M. glaciale* was present at all three stations and was obtained in numbers from 10 to 30, with an average of 17.7 specimens per station. Between the northern and the southern section, there has thus clearly been a great decrease in the abundance of this species.

ATLANTIS COLLECTION OF 1928, BY STATIONS

Station No. 114. Lat. 41° 49′ N.; Long. 49° 22′ W., July 4, depth 800 fathoms (= 1,463 m.).

1. *Diaphus dofleini* 5 specimens

Station No. 115. Lat. 41° 29′ N.; Long. 47° 48′ W., July 5, depth 700–800 fathoms (=1,280–1,463 m.).

1. *Myctophum glaciale* 1 specimen

STATION No. 116. Lat. 41° 30′ N.; Long. 45° 57′ W., July 6, depth 700–800 fathoms (=1,280–1,463 m.).

1.	*Myctophum glaciale*	3 specimens
2.	*Lampanyctus iselini*	2 specimens
3.	*Lampanyctus alatus*	1 specimen
4.	*Lampanyctus pusillus*	3 specimens
5.	*Lampanyctus cuprarius*	2 specimens
6.	*Diaphus dofleini*	1 specimen

STATION No. 117. Lat. 41° 28′ N.; Long. 43° 29′ W., July 7, depth 700–800 fathoms (=1,280–1,463 m.).

1.	*Myctophum glaciale*	1 specimen
2.	*Myctophum laternatum*	4 specimens
3.	*Myctophum coccoi*	1 specimen
4.	*Myctophum affine*	1 specimen
5.	*Myctophum benoiti*	1 specimen
6.	*Lampanyctus photothorax*	1 specimen
7.	*Lampanyctus cuprarius*	1 specimen
8.	*Lampanyctus warmingi*	7 specimens
9.	*Lampanyctus resplendens*	1 specimen
10.	*Lampanyctus pusillus*	2 specimens
11.	*Lampanyctus crocodilus*	1 specimen
12.	*Diaphus dofleini*	2 specimens

STATION No. 118. Lat. 40° 56′ N.; Long. 39° 54′ W., July 8, depth 700–800 fathoms (=1,280–1,463 m.).

1.	*Lampanyctus pusillus*	2 specimens
2.	*Lampanyctus warmingi*	2 specimens
3.	*Lampanyctus cuprarius*	1 specimen [1]

STATION No. 119. Lat. 40° 05′ N.; Long. 35° 10′ W., July 9, depth 700–800 fathoms (=1,280–1,463 m.).

1.	*Lampanyctus photothorax*	1 specimen
2.	*Lampanyctus pusillus*	3 specimens

STATION No. 141. Lat. 50° 40′ N.; Long. 27° 16′ W., August 28, depth 800–1,000 fathoms (=1,463–1,829 m.).

1.	*Myctophum glaciale*	10 specimens
2.	*Lampanyctus iselini*	1 specimen

STATION No. 143. Lat. 50° 00′ N.; Long. 35° 20′ W., September 2, depth 500 fathoms (=914 m.).

1.	*Myctophum glaciale*	30 specimens
2.	*Lampanyctus iselini*	1 specimen
3.	*Lampanyctus photothorax*	1 specimen
4.	*Lampanyctus maderensis*	1 specimen
5.	*Lampanyctus pusillus*	2 specimens

STATION No. 144. Lat. 47° 40′ N.; Long. 37° 20′ W., September 4, depth 600 fathoms (=1,097 m.).

1.	*Myctophum glaciale*	13 specimens
2.	*Lampanyctus crocodilus* [2]	1 specimen
3.	*Lampanyctus iselini*(?)	1 specimen [3]
4.	*Diaphus rafinesquei*	1 specimen
5.	*Diaphus gemellari*	2 specimens
6.	*Diaphus metopoclampus*	1 specimen [4]

[1] *Nannobrachium nigrum* Borodin (Bull. Mus. Comp. Zoöl., **72**, No. 3, 1931, pp. 58 and 76).
[2] *Lampanyctus peculiaris* Borodin (Proc. New Engl. Zoöl. Club, **10**, 1929, p. 111; Bull. Mus. Comp. Zoöl., **72**, No. 3, 1931, pp. 58 and 77), type specimen. See p. 48.
[3] *Nannobrachium nigrum* Borodin, loc. cit. (see footnote 1).
[4] *Diaphus "metaclampus"* Borodin (Bull. Mus. Comp. Zoöl., **72**, No. 3, 1931, p. 76). *Myctophum "metaclampum"* Borodin (ibidem p. 58).

ANNOTATED SYSTEMATIC ACCOUNT

Myctophum glaciale Reinhardt

Station No. 115, 1 specimen. Station No. 116, 1 (+ 2 ?) specimens. Station No. 117, 1 specimen. Station No. 141, 10 specimens. Station No. 143, 29 (+ 1 ?) specimens. Station No. 144, 13 specimens.

The interesting difference between the northern and the southern series of stations in regard to the frequency of this species has already been pointed out in the introductory discussion of the entire collection on p. 55.

The anal organs (AO) were present in the following combinations, each side being counted and entered separately in the table.

AO		posteriores		
		6	7	8
anteriores	5		6	2
	6	20	46	1
	7	8	3	

Only 5 out of 40 specimens legible on both sides show any asymmetry in regard to the numbers of AO. In one specimen with AO 7 + 6 on both sides the two sections of this series (AO anteriores and posteriores) were practically confluent. In another specimen with AO 6 + 7 on both sides the AO posteriores were found to be confluent with the PRC. SAO_1 is generally slightly displaced ventrally from the line through the centres of VLO and SAO_2 although the three organs may in all cases be said to approach very closely to the formation of a straight series. In one specimen the 3 SAO were found to form an absolutely straight series, among themselves. In another specimen the VLO was found to be slightly but distinctly closer to the lateral line than to the ventral fins.

Myctophum laternatum atlanticum Taaning

Station No. 117, 3 specimens.

AO 6 + 3 / 7 + 3; 6 + 3 / 6 + 3; 6 + 4 (3?) / 6 + 3. Upper SAO slightly posterior to first AO.

Myctophum coccoi Cocco

Station No. 117, 1 specimen.

8 gillrakers below and 6 above in first gill arch. D. 11. A. 22. AO 6 + 13 / 6 + 12. First SAO vertically above second VO.

Myctophum affine Lütken

Station No. 117, 1 specimen.

AO 8 + 5 / 8 + 5. Length without caudal fin 15.5 mm.

Myctophum benoiti Cocco

Station No. 117, 1 specimen.

AO 6 + 6 / 6 + 6. Specimen very small.

Lampanyctus warmingi Lütken

Station No. 117, 7 specimens. Station No. 118, 2 specimens. Station No. 143, 1 specimen.

The specimens above listed are all less than 20 mm. long, exclusive of the caudal fin, and mostly not in a very good condition. It is therefore in many of them rather difficult to make out the presence of the various luminous scales so characteristic of this species. This may partly be due to molestation or bad preservation, partly to a relatively undeveloped stage of these luminous scales in such small specimens. In the better ones, however, most of the luminous scales, or traces or indications thereof, can be found by close examination. This holds in the three scales on each side of the throat and the luminous scales flanking the anus, as well as those of the anal fin and the caudal peduncle, but not of the median single series between anus and vent. These may not have developed their special character as yet or may have become lost. The anal organs were found in the following combinations:

AO		posteriores		
		5	6	7
anteriores	5			3
	6	2	15	

Only one asymmetric specimen, of the nature AO 6 + 6/5 + 7, was found.

Lampanyctus resplendens Richardson

Station No. 117, 1 specimen.

AO 7 + 5 / 7 + 5. 37 vertebrae inclusive of the ultimate caudal centrum. 39 scales in the lateral line (as counted by the scars left of the scale pockets). 3 POL in a straight series which is approximately horizontal but when more closely observed may be seen to descend

from the lateral line posteriorly at an angle of about 2°. The specimen is small (22 mm. exclusive of caudal fin) and in several respects rather poorly preserved (skin much abrased) so that it has not been deemed advisable to make it the basis for a more detailed account of the species, although such an account is very badly needed at the present time. The fact that *L. castaneus* Goode and Bean, in which 3 POL are also present, must be considered distinct from *L. resplendens* on the basis of its scale and vertebrae counts, has already previously been pointed out by the writer. [1]

Lampanyctus photothorax Parr

Station No. 117, 1 specimen. Station No. 119, 1 specimen. Station No. 143, 1 specimen.

AO 5 + 4 / 5 + 4; 4 + 5 / 4 + 5; 6 + 4 / 6 + 4. In the specimen from Station No. 119 (AO 4 + 5) a duplication of the first PO on one side is observed, two fully developed organs of quite normal size being found about one diameter apart on the same level, the anterior one in the normal position of the first PO, opposite the single organ on the other side. While the other luminous scales and glands described for this species are all to be found also in the specimens here reported upon, the luminous scale on the thorax cannot be made out on a single one of them, and the conclusion that the development, or at least the presence or recognizability of this organ in preservation, may, on occasion, prove a less reliable feature is also borne out by some of the samples in the much larger material in the Bingham Oceanographic Collection.

Lampanyctus cuprarius Taaning

Station No. 116, 2 specimens. Station No. 117, 1 specimen. Station No. 118, 1 specimen.[2]

The above specimens agree with the descriptions of this species rendered by Taaning [3] and by Parr [4] in regard to all proportions and to the arrangement of the luminous organs, but show somewhat higher fin counts than the previously recorded averages for this form, namely: D. 17. A. 19, in 3 specimens; D. 17. A. 20 in one.

[1] Copeia (Journ. Amer. Assoc. Ichthyol. Herpetol.) 1930, p. 89.
[2] *Nannobrachium nigrum* Borodin (nec Gunther): Bull. Mus. Comp. Zoöl., **72**,, 1931, No. 3, pp. 57 and 76 (partim.).
[3] Taaning: Synopsis of the Scopelids in the North Atlantic. Vidensk. Medd. Dansk Naturhist. Foren., **86**, p. 68, Copenhagen, 1928.
[4] Parr: Bull. Bingham Oceanogr. Coll., **3**. Art. 3, p. 106, fig. 18, New Haven, Conn., 1928.

Lampanyctus pusillus Johnson

Station No. 116, 3 specimens. Station No. 117, 2 specimens. Station No. 118, 2 specimens. Station No. 119, 3 specimens. Station No. 143, 2 specimens.

AO 3 + 6 in 1 count (assymmetric with AO 4 + 6); AO 4 + 6 in 17 counts; AO 5 + 5 in 6 counts.

Although the species is present in both sections, it is evident from the above list of the samples that it was more abundant at the southern series of stations (Nos. 116–119).

Lampanyctus alatus Goode and Bean [1]

Station No. 116, 1 specimen.

Lampanyctus iselini spec. nov.

Type No. 33223 M.C.Z. Atlantis 1928, Station No. 116. Lat. 41° 30′N.; Long. 45° 57′ W.; July 6. Depth 700–800 fathoms (=1,280–1,463 m.).

In addition to the type the collection also contains another specimen (cotype) from station No. 116; one specimen from Station No. 141; one (?) from Station No. 143; and one (?) [2] from Station No. 144.

2 photophores on each cheek. One in, or a little in advance of the middle of the cheek, and another, slightly smaller, immediately in advance of the preopercular free edge. The two organs are situated approximately in a straight line from the centre of the eye parallel with the maxillary. The anterior photophore on the cheek is well preserved in all specimens. The posterior organ is apparently easily subject to loss by abrasion and is found in its normal position only on one side each in the type and cotype, being entirely lost from the other side in both specimens. In the largest specimen (from Station No. 141) the posterior organ on the cheek is only to be found on one side in a tassel of frayed skin barely attached near the corner of the mouth, so that the normal position of the photophore in question cannot be determined in this case.

PLO very high, its distance from the lateral line only about one-third of its distance from pectoral fin. 2 PVO, the upper at the upper part of the pectoral fin base, the lower immediately below the level of the lowest pectoral rays, and slightly behind the upper PVO, in or slightly in advance of the line between upper PVO and second VO.

[1] See Parr: Proc. U. S. Nat. Mus., **76**, Art. 10, p. 25, fig. 12, Washington, 1929.
[2] *Nannobrachium nigrum* Borodin (nec Günther): Bull. Mus. Comp. Zoöl., **72**, No. 3, 1931, pp. 58 and 76 (partim.).

In the type the series formed by the two PVO and PO_2 is practically straight, in the other specimens the deviation from a straight line is somewhat more conspicuous. 5 PO. Fourth PO elevated to, or slightly above the level of the upper PVO. VLO somewhat closer to the lateral line than to the ventral fin, its distance from the former about two-thirds of its distance from the latter. 4 VO, in an equidistant series on the same level. 3 SAO, bluntly angulate. First SAO above interspace between second and third VO on the same level as the second SAO which is closer to the upper than to the first SAO, and closer to the fourth VO than to the upper SAO. Fourth VO, second and third SAO

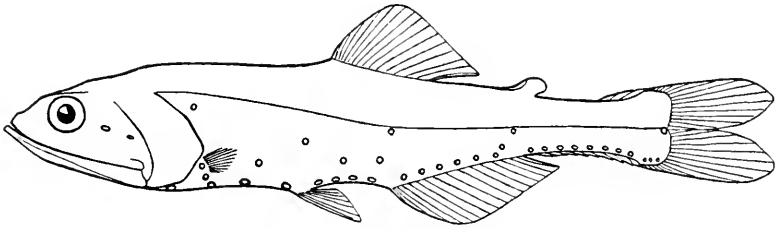

Fig. 7. *Lampanyctus iselini* spec. nov.

forming a very nearly straight oblique series, with the fourth VO only slightly advanced from the line through the centres of the other two organs. Upper SAO at the lateral line in advance of the vertical from the first AO. AO 6 + 8 — 9 (9 AO posteriores on one side in the cotype, but no variations in the other specimens). AO anteriores in a gently convex series with the second and third organs highest. 2 POL in an oblique line forming a nearly or entirely straight series with the last AO anterior. Lower POL closer to AO than to upper POL, which is at the lateral line. AO posteriores entirely behind the base of anal fin, more or less confluent, with the PRC, which can nevertheless be easily distinguished by their smaller size and closer arrangement (see figure).[1] 4 PRC, 3 small organs in a close-set, gently curved series at the lower margin of the caudal fin base; and an upper, larger organ in the end of the lateral line, far above and slightly behind the penultimate PRC.

About 9 infracaudal luminous scales occupy the entire ventral edge of the caudal peduncle between the bases of anal and caudal fin. 3

[1] PRC's partly lost on both sides in the type. Their arrangement described from cotype and other specimens.

supracaudal luminous scales occupy about one-third of the distance between caudal fin and adipose dorsal. A luminous scale covers the anterior edge of the adipose dorsal fin.

TABLE OF MEASUREMENTS

Total length without caudal fin in mm.		28[1]	44
Length of head	In per cent of length without caudal fin	29	30
Diameter of eye	"	6	5.5
Length of snout	"	5.5	6
Length of maxillary	"	23	22
Depth of body	"	20	17
Depth of caudal peduncle	"	9	9
Snout to D	"	49	49
Snout to V	"	43	43
Snout to A	"	56	58

Snout pointed, eyes moderate, about equal to snout. Jaws long. Preopercular margin strongly oblique. Body slender and compressed.

Pectorals very small, not reaching to the bases of the ventrals. Their rays feeble. Ventrals short, inserted well in advance of dorsal fin, barely reaching to the anus but not to the origin of anal fin. Dorsal origin near the middle of the body. Anal origin under the posterior rays of dorsal fin (overlap somewhat less than suggested in the figure). Adipose dorsal immediately behind termination of anal fin.

D. 13 (Type)–14. A. 17–18 (Type). V. 8. P. 12–13. There are 37 scale-pocket scars, corresponding to the number of myotomes between the shoulder and the base of caudal fin, 38 if the last scar left by a scale which must have extended beyond the caudal fin base is included.

It is clear from a few preserved scalepocekts on the cotype and on the larger specimen from Station No. 141 that the mediolateral (or lateral-line) scales of the caudal peduncle must have been enlarged to cover about two-thirds or more of the height of the peduncle.

L. iselini is easily distinguished from the only other species of *Lampanyctus*, *L. taaningi* Parr [2], which is normally known to possess two photophores on each cheek, and two only, by the fact that the pectorals of *L. taaningi* are very long and well developed, whereas those of *L. iselini* are of the reduced or rudimentary *Nannobrachium-*

[1] Type specimen.
[2] Proc. U. S. Nat. Mus., **76**, Art. 10, p. 27. Washington, 1929.

type. *L. iselini* also differs by the presence of the luminous scale in adipose fin, by the low position of the third PRC, and by other additional features.

Keeping in mind the apparently quite great chance of loss of the posterior photophore on the cheeks in particular, *L. iselini* has also been compared with the species described as having only one photophore on each cheek and has been found to differ from each of these various species separately in the following ways: from *L. punctatissimus* Gilbert (AO 6[1] + 6; VLO, SAO_3, POL_2 and PRC_4 equally elevated, near the lateral line) by the lower position of VLO and by the number of AO; from *L. jordani* Gilbert by not having the second and third AO anteriores separately elevated above the rest of the series, by the lower position of VLO and the higher position of the cheek organ; from *L. stilbius* Gilbert (Eye less than 3 in head, AO 6 + 4) by the much smaller eyes and different number of AO; from *L. pusillus* Johnson by the higher position of VLO, the different number of AO, the reduction of the pectorals, and the presence of luminous scale in adipose fin; from *L. ritteri* Gilbert by the higher position of VLO and the entirely different position of the main organ on the cheek and by the presence of a luminous scale in adipose dorsal; from *L. regalis* Gilbert (5 VO) by the position of the main organ on the cheek, by having only 4 VO and by the presence of a luminous scale in the adipose dorsal fin; from *L. alatus* Goode and Bean by the reduction of pectoral fins, the number of AO, the positions of VLO and of ultimate PRC (in relation to PRC_3); from *L. intricarius* Taaning by the reduction of pectoral fins and the number of AO.

On the basis of these comparisons, the new species is herewith introduced, although confirmation of its characters from better preserved specimens still seems desirable.

Some doubts about their actual identity still attach to two of the specimens tentatively listed above as *L. iselini*, particularly to the specimen from Station No. 144. This specimen is the largest of the lot (47 ml. exclusive of caudal fin) but is unfortunately in a rather poor condition, and it is impossible to discover any trace of a posterior photophore on the cheeks. The PRC and the ultimate AO posteriores are also lost, but it seems probable that there may have been 7 + 9 AO in the undamaged specimen. All the AO anteriores are, on the other hand, well preserved on both sides. The specimen differs from the

[1] Gilbert (Mem. Carnegie Mus., **6**, No. 2, p. 103. Pittsburg, 1913), in giving the numbers of antero-anals, counts only one POL, designating the lower POL in the usage of Brauer *et al*, as an elevated AO anterior.

other species previously described in having only one organ on each cheek in exactly the same position as one of the pair in *L. iselini* and has therefore been tentatively identified with the latter.

Lampanyctus crocodilus Risso

Lampanyctus peculiaris Borodin, Proc. New Engl. Zoöl. Club, **10,** 1929, p. 111; Bull. Mus. Comp. Zoöl., **72,** No. 3, 1931, pp. 58 and 77.

Station No. 117, 1 specimen. Station No. 144, 1 specimen (type of *L. peculiaris* Borodin).[1]

AO 6 + 8 symmetrically in both specimens.

Diaphus metopoclampus Cocco

Diaphus "metaclampus" (*sic.*), Borodin, Bull. Mus. Comp. Zoöl., **72,** No. 3, 1931, p. 76.

"Myctophum metaclampum" (*sic.*), Borodin, loc. cit., p. 58.

Station No. 144, 1 specimen.

AO 6 + 6 on both sides. Last AO anterior slightly elevated. Length without caudal fin 58 mm. Although well recognizable, the characteristic shape of the antorbital organs is less sharply defined in this specimen than in the other samples of the species previously seen by the writer. So far as the marginal projection of the upper antorbital is concerned, this is evidently largely due to damage. But in the rather gradual, instead of very abrupt, posterior expansion of the lower antorbital, we apparently see a natural feature of the specimen at hand. The 4 PRC are arranged in a straight, very oblique series (about 45°) extending upwards to a short distance below the lateral line, with the ultimate interspace increased to equal the entire distance from the first to the third PRC. Second interspace (PRC) also somewhat greater than the first.

Diaphus gemellari Cocco

Station No. 144, 2 specimens.

These two specimens together with the material of *D. dofleini* recorded below do not entirely remove the author's doubts as to whether the two species are actually distinct from each other or merely represent groups of individual variants, although it must be admitted that they are rather easily differentiated in this small collection. The two specimens listed above (67 and 37 mm. lengths exclusive of caudal fin) show approximately the same arrangement as that shown in Bull.

[1] See p. 48.

Bingham Oceanogr. Coll., Vol. III, Art. 3, fig. 22, No. 5, with OA_4, OA_5 and POL forming only a very slight angle and with first AO posterior elevated. They also show a slightly but distinctly increased interspace between PRC_3 and PRC_4 although it does not nearly reach the width of the same interspace in *D. doflcini*. AO 5 + 5 (?) on both sides in both specimens.

Diaphus dofleini Zugmayer

Station No. 114, 5 specimens. Station No. 116, 1 specimen. Station No. 117, 2 specimens. Station No. 144, 4 specimens.

As here identified *D. doflcini* is characterized by the greatly increased interspace between PRC_3 and PRC_4 and by the fact that the last AO anterior is in or below the line between penultimate AO anterior and POL, while in *D. gemellari* the ultimate AO anterior is always situated more or less above this line. Individual variations, however, seem to bridge the gap between the two forms or groups of specimens thus defined and it does not seem quite certain as yet whether they actually represent distinct species (see under *D. gemellari*, above). AO 5 + 5 in 18 counts; AO 5 + 6 in 3 counts.

Diaphus rafinesquei Cocco

Station No. 144, 1 specimen.

AO 6 + 4 on both sides. A typical representative of *D. rafinesquei, sensu stricto*, also in regard to the characters by which Taaning has attempted to differentiate this form as a separate species from *D. holti* Taaning.

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A SECOND REVISION OF THE ANTS OF THE GENUS LEPTOMYRMEX MAYR

BY WILLIAM MORTON WHEELER

CAMBRIDGE, MASS. U. S. A.
PRINTED FOR THE MUSEUM
JUNE, 1934

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No. 3.— *A Second Revision of the Ants of the Genus Leptomyrmex Mayr*

By William Morton Wheeler

Since the publication in 1915 of my paper on Leptomyrmex[1] so many additional specimens have come to light that it seems advisable to make a second revision of the genus. Most of this new material was obtained by Dr. P. J. Darlington and myself while on the Harvard Expedition to Australia in 1931–'32, and by Mr. F. H. Taylor, Mr. H. Hacker, Dr. R. J. Tillyard and Mr. A. M. Lea, who have generously sent me collections of ants from time to time. Mr. H. Stevens, who was a member of the Australian Expedition, and Messrs. W. J. Eyerdam and L. Wagner also secured a few very interesting forms in New Guinea. It has not seemed necessary to repeat all of the bibliographic and synonymic citations prior to 1915 or the detailed account of what was known of the morphology and ethology of Leptomyrmex at that time. I have, however, combined all the older with the newer habitat records in the following paper for the purpose of giving a more adequate picture of the known geographical range of the various species and subspecies.

To the myrmecologist the genus Leptomyrmex is of unusual interest. It is so unlike the other genera of the subfamily Dolichoderinæ that it constitutes an independent tribe (Leptomyrmicini Emery). Its phylogenetic age is attested by the fact that its only near relative among the Formicidæ is an extinct genus, Leptomyrmula, which was described by Emery (1891) from a male specimen in the Sicilian Amber (Middle Miocene). Among the more striking specializations of Leptomyrmex are the great attenuation of the body and appendages, the distinct separation of the antennal and clypeal foveæ, the singular shape of the proventriculus (gizzard), the peculiarly simplified venation of the fore wing of the male — very unlike that of any other ants, the unusual form and pilosity of the larva, the assumption by certain workers of a replete, or honey-storing rôle — unknown among other Dolichoderinæ, the habit of foraging singly, instead of in files — unusual in the subfamily, of carrying the gaster folded forward over the thoracic dorsum, of occupying preformed cavities in the soil or in logs, instead of excavating nests like other ants, etc.[2] Very interesting also is the geographical distribution of the genus, which is confined to forested, hilly or mountainous country in a rather narrow zone extending from the equator to 37° south latitude and embracing New

[1] The Australian Honey Ants of the Genus Leptomyrmex Mayr. Proc. Amer. Acad. Arts Sci., **51**, 1915, pp. 255–286, 12 figs.

[2] Owing to the unusual position in which the gaster is carried the Australian naturalists call these ants "motorcar ants." The thorax represents the tonneau of the motor car, the upturned or overhanging, black gaster the hood, and the bright red or yellow head of certain common forms (*L. erythrocephalus, varians ruficeps*, etc.), the headlight.

South Wales and Queensland in Eastern Australia, New Caledonia, the Loyalty Islands, New Guinea, the Aru Islands, and Ceram. At the present time 14 species are known. Several of them exhibit well-marked color forms, which Emery, Forel and I regarded as "varieties." Their constancy and local distribution, however, have convinced me that we are really dealing with distinct races or "Formenkreise." I have therefore raised all these varieties to subspecific rank. The following table gives a list of the known forms with their general distribution: —

Species and Subspecies of Leptomyrmex	New South Wales	Queensland	New Caledonia	Loyalty Islands	New Guinea	Aru Islands	Ceram
L. erythrocephalus (Fabr.)	x	x	*	*	*	*	*
unctus subsp. nov.	x	*	*	*	*	*	*
mandibularis Whlr.	x	*	*	*	*	*	*
venustus subsp. nov.	x	*	*	*	*	*	*
brunneiceps subsp. nov.	x	*	*	*	*	*	*
basirufus subsp. nov.	*	x	*	*	*	*	*
rufithorax Forel	*	x	*	*	*	*	*
decipiens Whlr.	*	x	*	*	*	*	*
cnemidatus Whlr.	x	x	*	*	*	*	*
L. nigriventris (Guérin)	x	*	*	*	*	*	*
tibialis Emery	x	x	*	*	*	*	*
hackeri subsp. nov.	*	x	*	*	*	*	*
L. wiburdi Whlr.	x	*	*	*	*	*	*
pictus Whlr.	x	*	*	*	*	*	*
L. froggatti Forel	x	*	*	*	*	*	*
L. varians Emery	*	x	*	*	*	*	*
rothneyi Forel	*	x	*	*	*	*	*
ruficeps Emery	x	x	*	*	*	*	*
rufipes Emery	x	x	*	*	*	*	*
quadricolor subsp. nov.	*	x	*	*	*	*	*
L. darlingtoni sp. nov.	*	x	*	*	*	*	*
jucundus subsp. nov.	*	x	*	*	*	*	*
fascigaster subsp. nov.	*	x	*	*	*	*	*
L. unicolor Emery	*	x	*	*	*	*	*
L. mjöbergi Forel	*	x	*	*	*	*	*
L. pallens Emery	*	*	x	x	x	*	*
geniculatus Emery	*	*	x	*	*	*	*
nigriceps Emery	*	*	x	*	*	*	*
L. lugubris sp. nov.	*	*	*	*	x	*	*
L. puberulus sp. nov.	*	*	*	*	x	*	*
L. niger Emery	*	*	*	*	x	*	*
L. fragilis (F. Smith)	*	*	*	*	x	x	x
femoratus Santschi	*	*	*	*	x	*	*
melanoticus subsp. nov.	*	*	*	*	x	*	*
L. gracillimus sp. nov.	*	*	*	*	x	*	*
Total number of subspecies	13	17	3	1	8	1	1
Number of species represented	5	6	1	1	6	1	1

It will be noticed that New South Wales, Queensland and New Guinea have each very nearly the same number of species — five, six and six respectively, though the total number of subspecies in New South Wales (13) and especially in Queensland (17) is considerably greater than in New Guinea (8). But the numbers for New Guinea may not be very significant, because so much of that great island is still a myrmecological *terra incognita*. I am unable to throw much additional light on the interesting problems suggested by this distribution and therefore quote my former statement. "Did the species of Leptomyrmex like so many of the animals and plants of Eastern Queensland and New South Wales, originate in New Guinea and migrate into Australia, or is it an indigenous Australian genus, which, like some of the Eucalypti, Epacrideæ and phyllodineous Acacias among plants, has spread to New Guinea and New Caledonia? The larger size of the species and their greater number in Australia certainly indicate that this is the center of distribution, but whichever view we take, we are bound to assume that the genus could only have reached its present distribution at a time when land connections existed between New Guinea, Australia and New Caledonia, if I am right in maintaining that winged females do not occur in the genus." As I shall show in the sequel, the apterous female of Leptomyrmex has now been discovered, so that the existence of the genus in both Eastern Australia and Papua must have antedated the breaking of their former land-connection. An analogous case is furnished by the Doryline genus Aenictus, which also has apterous females and occurs in both Queensland and New Guinea. In this case, however, as there are only a few species of Aenictus in Queensland and these confined to the tropical scrub of its northern portion, whereas the great majority of the species occur in Papua, Indonesia, India and Africa, we are justified in assuming that the genus must have entered Australia from New Guinea. The same interpretation applies to the Ponerine genus Diacamma, which has apterous, ergatomorphic females and is represented by only a single species in northern Queensland but by several in Papua and especially in Indonesia. On the other hand, in another Ponerine genus, Rhytidoponera, which has ergatomorphic females and is represented by numerous species, particularly in arid districts throughout Australia, and by only a few species in the Papuan Region and none elsewhere, we assume an Australian origin and ancient emigration from Queensland to New Guinea and the Solomon Islands. Though there is much less numerical disparity between the Australian and Papuan species of Leptomyrmex, and though the genus is repre-

sented only in Eastern Australia, I am inclined to regard the mountains of New South Wales and Queensland as its center of origin and distribution. In my former paper I pointed to the development of repletes, or honey-storing workers in the Australian Leptomyrmex as an adaptation to arid conditions, and in that connection called attention to the absence of repletes in *L. unicolor* Emery, which lives in the moist, tropical scrub of northern Queensland. Similarly, none of the Papuan species, which I have since examined, shows any traces of having developed repletes. But these considerations are of no assistance in determining the original home of the genus, since if we assume an Australian origin, the habit might be said to have been lost by the forms that immigrated into the humid forests of Northern Queensland and Papua, and if we assume a Papuan origin, it might be said to have been acquired in adaptation to the more xerothermal conditions of Southern Queensland and New South Wales.

Although the foregoing discussion adds little to our previous knowledge of the general geographical distribution of the genus Leptomyrmex, I am able to supply information on three important matters, which, owing to lack of material, were insufficiently discussed in my previous revision. These are the phylogenetic sequence of the color patterns in the subspecies and the interesting peculiarities of the female and male.

The workers of Leptomyrmex, like those of other Dolichoderine genera, are poor in plastic taxonomic characters and these are mostly differences in size and rather subtle peculiarities in the shape of the head, petiole and tibiæ. The head, and especially the genitalia, of the males furnish more pronounced characters. The color patterns of the workers are very useful for recognition of the subspecies, which are known to exist in fully half of the species. These patterns, however, keep recurring in different species, so that considerable care must be exercised in the identification of specimens. An inspection of all the known forms shows that the color-patterns of the body may be reduced to eight, which may be arranged in a nearly continuous series, beginning with almost total melanism and ending in a complete absence of black pigment except in the eyes or portions of the femora and tibiæ. The pale colors are brownish red, rufotestaceous, testaceous or yellow and as a rule replace the black in an anteroposterior direction, with an "all or none" tendency, at least so far as the head, thorax and petiole are concerned. This is shown in the diagram of the eight patterns (fig. 1), which may be designated by Roman numerals and briefly described as follows:

I. Entirely black or dark brown forms, like *unicolor, niger, lugubris,* etc., which I regard as representing the primitive type of coloration and the initial stage of the series.

II. This stage resembles I, except in having the thorax rufotestaceous, with more or less black remaining on the pro- and mesonotum.

III. This stage, which is derived from II and has the thorax entirely rufotestaceous, with the head, petiole and gaster black, is rare, occurring only in one subspecies, *pallens nigriceps.*

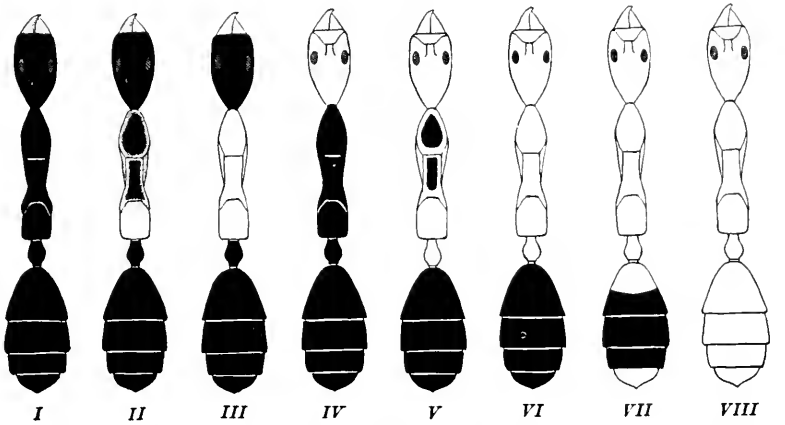

Fig. 1. Eight stages in the demelanization of the body of various forms of Leptomyrmex. For explanation see text.

IV. Forms of this pattern, derived directly from I, by a change of the head alone to rufotestaceous or testaceous, are much more frequent and constitute the beginning of the remainder of the series (V to VIII).

V. Resembles II but the head is rufotestaceous as well as the thorax, with more or less infuscation of the pro- and mesonotum.

VI. In this pattern only the gaster remains black.

VII. The pale coloration invades the gaster, most frequently at the base of the first segment or at the anal end, but the whole gaster may lose the black pigment, except at the sides (*fragilis femoratus*) or on the first and at the bases of the second and following segments (*darlingtoni fascigaster*).

VIII. In this final stage, as above stated, the black pigment disappears entirely except from the eyes and the body is testaceous or reddish yellow throughout.

The following table shows the occurrence and recurrence of the various color-patterns in the fourteen species of Leptomyrmex and their subspecies. In no species is the whole series represented though *erythrocephalus* and *varians* each show five of the stages of demelanization. No doubt others will be added in the course of future explorations. The femora and tibiæ also undergo progressive demelanization, beginning at their bases, but a regular sequence of stages is not so readily detected as in the color-pattern of the body. The tarsi are pale in all the species and subspecies and may even be white in the most melanic forms. It is possible to recognize similar but less striking color-pattern series in other ant-genera, notably in Iridomyrmex, Formica and Camponotus.

Leptomyrmex Species	Color Patterns of Workers							
	I	II	III	IV	V	VI	VII	VIII
erythrocephalus	*	x	*	x	x	x	x	*
nigriventris	*	*	*	*	x	x	*	*
wiburdi	*	*	*	x	x	*	*	*
froggatti	x	*	*	*	*	*	*	*
varians	*	x	*	x	x	x	x	*
darlingtoni	*	*	*	x	*	x	x	*
unicolor	x	*	*	*	*	*	*	*
mjöbergi	x	*	*	*	*	*	*	*
pallens	*	*	x	*	*	x	x	*
lugubris	x	*	*	*	*	*	*	*
puberulus	x	*	*	*	*	*	*	*
niger	x	*	*	*	*	*	*	*
fragilis	x	*	*	*	*	*	x	x
gracillimus	*	*	*	*	*	*	*	x

Of course, the series might be read in the opposite direction as a progressive acquisition instead of a progressive loss of black pigment, but I believe that in Leptomyrmex at least we must regard the completely melanic forms, which all occur in the tropical rain-forests of Northern Queensland and New Guinea, as the most primitive, the red and black forms as more recently adapted to the xerophyllous forest regions of Southern Queensland, New South Wales, and New Caledonia, and the very pale forms (*fragilis* and *gracillimus*) as probably crepuscular or nocturnal species of the more open tropical bush. Only the second of these groups seems to have developed honey-storing repletes.

Many specimens of Leptomyrmex have been collected since Mayr established the genus in 1862, but the female remained quite unknown till very recently. Although I examined several living colonies and many preserved specimens in 1914, I failed to detect any form sufficiently different from the typical worker to be regarded as a fertile female, or queen. I therefore inferred that this caste must be apterous and so highly ergatomorphic as to be indistinguishable from the worker, as in certain genera of Ponerine ants (Leptogenys *sens. str.*,

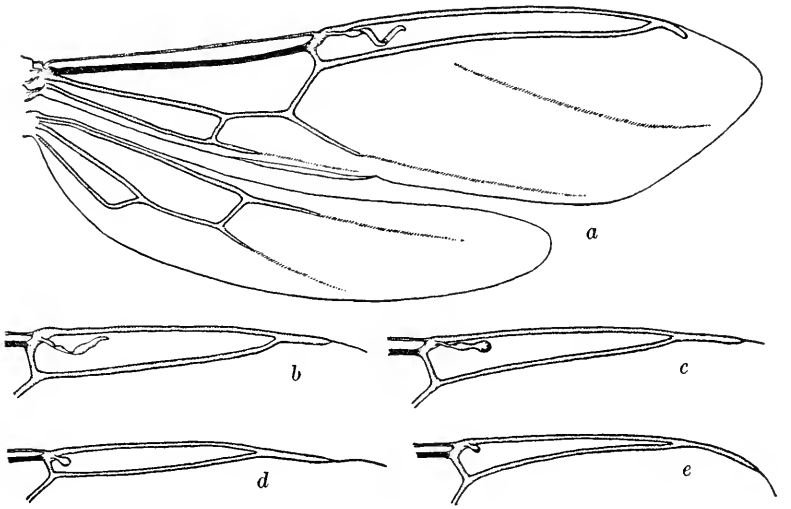

Fig. 2. *a*, Fore and hind wings of *Leptomyrmex nigriventris tibialis* Emery; *b*, radial cell of *L. varians ruficeps* Emery; *c*, of *L. erythrocephalus cnemidatus* Wheeler; *d*, of *L. darlingtoni* sp. nov; *e*, of *L. fragilis melanoticus* subsp. nov.

Rhytidoponera, Dinoponera, etc.). I am now obliged to admit that I was partially mistaken: Leptomyrmex *does* have an apterous and highly ergatomorphic female, but it is nonetheless distinguishable from the worker, at least in certain species, by its stouter build, larger gaster, broader legs, higher petiolar node and developed ocelli. As if to celebrate the seventieth anniversary of the establishment of the genus, Mr. Frank H. Taylor of the School of Tropical Medicine at Sydney, on February 2, 1932 captured a female of *L. erythrocephalus venustus* subsp. nov. on Mt. Tomah, New South Wales, and a few weeks later in the same month Dr. P. J. Darlington secured one of *L. nigriventris tibialis* Emery at an altitude of 3000 ft. in the Dorrigo,

in the same state. These very interesting insects, which are clearly analogous to the females of the Ponerine subgenus Lobopelta, are described and figured below (pp. 88 and 96, figs. 5 and 9).

My revision of 1915 contained another serious lacuna, owing to my insufficient acquaintance with the very interesting males. At that time the males of only four species were known to me from brief descriptions, those of *L. erythrocephalus* (?) and *fragilis*, described by Emery and those of *froggatti* and *varians ruficeps*, described by Forel. I possessed only a single male specimen, which could not be referred to any of the described workers. There are now before me males of several species, accompanied by workers from the same colonies, so that it is possible to give a much more accurate account of the generic characters of this caste.

Unquestionably, the most singular and intriguing feature of the male is its wing venation. Emery, in the Dolichoderine fascicle of the "Genera Insectorum" (1912, p. 16) suggests the following interpretation which the reader may follow with the aid of my Fig. 2*a* of the wings of *L. nigriventris tibialis* and Fig. 3, which is a reproduction of Emery's figure of the male *Leptomyrmula maravignæ* from the Sicilian Amber. "The venation of the fore wing presents a condition found in no other ant. What strikes one at first sight is the vestigial pterostigma, then the extraordinarily long and narrow radial cell and the cubital cell reduced to a branch which arises from the radial vein and passes in a curve towards the tip of the wing. But what is the meaning of the transverse vein that arises from the pterostigma and joins the medius? This vein is divided into two parts, one of which, between the pterostigma and the radius is properly the base of the radius, the other of which, following and eventually attaining the medius, corresponds to a tranverse cubital vein and the recurrent vein combined. Hence, in my opinion, Leptomyrmex lacks the discoidalis, that is, the very important transverse vein (fundamental in the anterior wing of Hymenoptera) which unites the costa with the medius and gives rise at its middle to the cubital vein." And he adds in a foot-note: "This interpretation is supported by a species which I described from the Sicilian amber (*L. maravignæ* Emery, Mem. Accad. Sc. Bologna, **5**, Vol. I, p. 578, pl. 2, fig. 22, 1891), in which a rudiment of the discoidalis is present, arising from the medius. Formerly I referred this ant to the genus Leptomyrmex, but the radial cell is much larger and there is a developed pterostigma. On account of these differences I establish for this fossil species a new genus, Leptomyrmula, closely related to Leptomyrmex."

Essentially the same interpretation is advanced by Emery in his paper of 1913.[1] "In the genus Leptomyrmex, the venation of the anterior wing undergoes a singular metamorphosis: the pterostigma is very narrow, almost *nil;* the radial cell is long and very narrow; from the middle of the radius arises a curved, sometimes interrupted vein, which joins the medius. I interpret this latter vein as a vestige of the cubitus which has been fused with the recurrent vein; consequently,

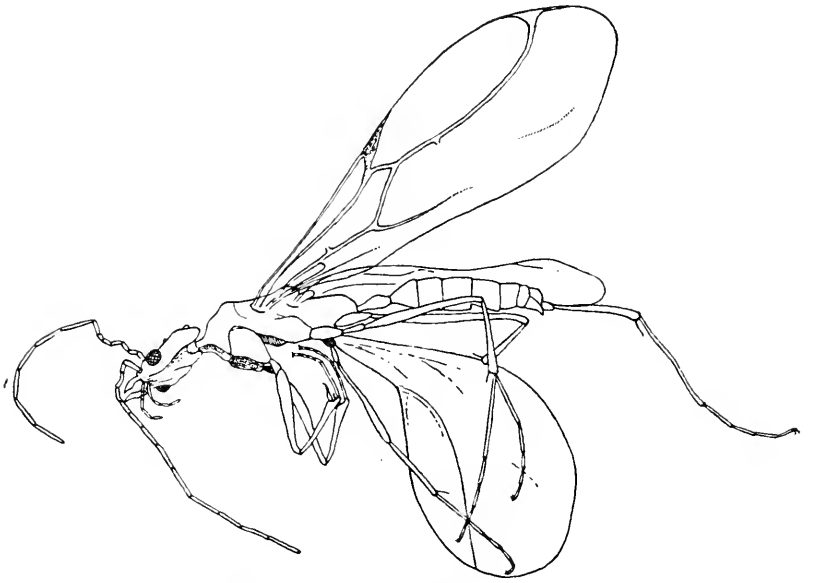

Fig. 3. Male of *Leptomyrmula maravignæ* Emery, from the Sicilian Amber (After Emery).

the cell enclosed by this vein, the subcosta and the medius, which reaches to the base of the wing, comprises in itself the first cubital, the discoidal and the median cell. There is therefore no discoidal (or basal) vein. As a proof of my contention, there is in the wing of the male Leptomyrmula, a fossil ant from the Sicilian amber, which I figured in my memoir of 1891, a rudiment of the discoidal vein, arising from the subcosta; moreover, in this ant, the venation is almost identical with that of Leptomyrmex. The reduction of the discoidal

[1] La Nervulation des Ailes Antérieures des Formicides. Rev. Suisse Zoöl., **21**, 1913, pp. 577–587, 4 figs.

vein is found in no other ant-genus except Leptomyrmex and its fossil ally Leptomyrmula."

Emery's interpretation of the venation of the fore wing of Leptomyrmex seems to me to be very artificial. Professor C. T. Brues, whose wide knowledge of many families of Hymenoptera lends weight to his opinion, has aided me in working out a simpler and much more natural interpretation. The vein which Emery calls the "discoidal," that is, the basal of most Hymenopterists,[1] is, in our opinion, not absent but present as the cross-vein connecting the apical pterostigmal end of the subcosta with the medius and giving rise to the radius, which in turn gives rise to the cubitus. The large cell between the subcosta and the medius is not, therefore, as Emery supposed, equivalent to the medial, *plus* the first cubital *plus* the discoidal cell but the medial cell alone, which is of much the same size and shape in most other Formicidæ. This interpretation is supported both by the configuration of the discoidal and subdiscoidal veins of most authors, which form a continuation of the medius, and have the same appearance in Leptomyrmex as in other ants, and also by the presence of a basal vein ("basella" of Rohwer and Gahan) in the hind wing. Owing to the great reduction of the pterostigma in the fore wing, the base of the radius arises from the basal vein near its junction with the subcosta. Thus the fore wing of Leptomyrmex has four closed cells, the subcostal, radial, median and submedian. The cubital cells are represented by the space between the radius and the feeble cubitus, which is usually interrupted at the base. The discoidal cell, if present, would lie distally to the basal and discoidal veins, while the first and second brachial cells are confluent as in other ants and are represented by the area bounded proximally by the closed submedian cell, the medius and brachius (anal), and distally by the discoideus and subdiscoideus anteriorly and the anal border of the wing posteriorly. We believe that the same interpretation applies to the wing of Leptomyrmula, since we do not regard the small stump at the middle of the median vein (not the subcosta, as stated by Emery in the last quotation) as a vestige of the basal vein. [2]

There are certain other peculiarities in both the fore and hind wings that were overlooked by both Emery and myself. The anterior border

[1] For the venation of the ant wing see my "Ants, their Structure", etc., 1910, pp. 24–26 and for the wings of Hymenoptera in general, S. A. Rohwer and A. B. Gahan, "Horismology of the Hymenopterous Wing", Proc. Ent. Soc. Washington, **18**, 1916, pp. 20–76, 3 pls.

[2] After this article had gone to the printer I received from Dr. Santschi a paper entitled "Sur l'origine de la nervure cubitale chez les Formicides", Mitteil. Schweiz. Ent. Gesell. 15, 1933, pp. 557–566, which contains an interpretation of the wing venation of Leptomyrmex, essentially the same as the one here adopted. I do not, however, accept Dr. Santschi's phylogenetic derivation of the Hymenopterous venation from such a highly specialized condition as that of the termite wing.

of the base of the fore wing, comprising the whole narrow subcostal cell as far as the pterostigmal region is bent ventrally at a right angle to the plane of the remainder of the wing and the costa forming its border is extremely tenuous and weak, whereas the subcostal vein is stout and often more deeply pigmented than any of the other veins. At its tip the subcostal vein swells slightly but perceptibly to form the vestigial pterostigma. Attached to the distal end of this swelling on the ventral side of the wing is a peculiar structure which is indicated in Emery's diagram in the Genera Insectorum (Pl. I, Fig. 13) and more clearly in Fig. 3 of my paper of 1915.[1] This structure, which I call the 'pterostigmal appendage' and which exists in no other genus of ants, nor indeed, to my knowledge, in any other insects, is a hollow sac with constricted base and of variable length in different species, depending from the costa on the ventral side in contact but not united with the membrane of the radial cell. When it is highly developed this appendage may be swollen and somewhat sausage-shaped (fig. 2*c*) or collapsed and shaped like a ribbon, which may be more or less twisted or folded (fig. 2*a*, *b*). When vestigial it may be reduced to a mere rounded tubercle (fig. 2*d*, *e*), but I have found it in all the males I have examined. I am unable to suggest any homologue of this structure, unless it be a peculiarly modified remnant of what was a large pterostigma in the ancestors of the genus. There is no trace of such an appendage in Leptomyrmula, which has a distinctly developed pterostigma. The radial cell, as Emery observed, is very long and narrow. At its tip the gradually converging costa and radius fuse to form an appendicular vein of variable length which strengthens the anterior border of the wing apex. The cubitus is rarely complete, its basal fourth to half being usually absent. Although the frenal fold of the hind border of the fore wing is present, the hamuli along the anterior border of the hind wing are either completely absent or very small and weak. The frenal apparatus, therefore, is vestigial and, I believe, quite functionless. The great simplification of the wing venation and the degeneration of the frenal apparatus in the male Leptomyrmex is probably correlated with the absence of a true marriage flight and the fecundation of the females either in the nest or on the ground in its vicinity.

The males of Leptomyrmex exhibit a number of other interesting characters. The mandibles appear at first sight to be well-developed but they cannot be very efficient organs because their denticles are

[1] The specimen from which this wing was drawn was erroneously identified as *L. erythrocephalus*. I now find that it is really a male of *L. varians ruficeps* Emery.

either extremely minute or entirely absent and their tips are usually blunt. The antennæ are very long, with distinctly developed scapes, the first funicular joint cylindrical and usually somewhat longer than broad, the third to sixth joints much elongated and more or less bent, especially near one end. The thorax is conspicuously long and narrow, with the mesonotum convex anteriorly and overhanging the short pronotum, the epinotum with very long base and short declivity, the mesepisterna large and protuberant, especially below. The legs are long, the middle tibiæ uniformly bowed, the hind tibiæ and sometimes also the hind basitarsi more or less flexuous, or sigmoidally bent. The genitalia, which are either retracted or exserted in dried specimens, have the stipes hairy, subtriangular or more rarely bilobed (*L. darlingtoni*), the lacinia small, simple, styliform and concealed, the volsella large and highly variable, usually bifurcate (boot-shaped, T-shaped or Y-shaped, with two acute prongs) but in one species (*darlingtoni*) trifurcate, and in one (*fragilis*) simple and uncinate, the sagitta compressed, with straight dorsal and convex, serrate ventral border.

Key to the Workers of Leptomyrmex

1. Eyes hairless; pubescence on body very short and appressed.....2
   Eyes hairy; pubescence longer and oblique; color black.....34
2. Tibiæ broad, distinctly compressed and flattened; postocular portion of head rather short and broad.....3
   Tibiæ slender, either not or less distinctly flattened; postocular portion of head longer and narrower.....17
3. Postocular portion of head subtrapezoidal, the sides behind the eyes rather straight, converging posteriorly; ventral surface of petiole feebly convex; larger species (8–12 mm.).....4
   Postocular portion of head shorter and more rounded; ventral surface of petiole strongly convex; smaller species (6.5–9 mm.).15
4. Head without the mandibles twice as long as broad.....5
   Stouter; head without the mandibles less than twice as long as broad.....13
5. Thorax entirely black.....6
   Thorax entirely or largely rufotestaceous.....8
6. Mandibles and clypeus rufotestaceous like the head. Length 9–10 mm. New South Wales.....*erythrocephalus* (Fabr.) typical
   Mandibles darker than the head.....7

7. Mandibles brown; surface of the body shining, with an oily luster. Length 11–12 mm. New South Wales, subsp. *unctus* subsp. nov.
   Mandibles and clypeus black; surface of body less shining, as in the typical *erythrocephalus*. Length 11 mm. New South Wales.....subsp. *mandibularis* Wheeler
8. Pro- and mesonotum partly black.....9
   Thorax entirely rufotestaceous, rarely with pronotum slightly infuscated.....10
9. Head entirely rufotestaceous. Length 8–9 mm. New South Wales.....subsp. *venustus* subsp. nov.
   Posterior portion of head brown. Length 8–9 mm. New South Wales.....subsp. *brunneiceps* subsp. nov.
10. First gastric segment rufotestaceous. Length 10–10.5 mm. Queensland.....subsp. *basirufus* subsp. nov.
    Gaster entirely black.....11
11. Petiole black. Length 9–10.7 mm. Queensland..... subsp. *rufithorax* Forel
    Petiole rufotestaceous.....12
12. Femora black throughout. Length 9 mm. Queensland..... .....subsp. *decipiens* Wheeler
    Femora black only at tips. Length 8–9.5 mm. Queensland, New South Wales.....subsp. *cnemidatus* Wheeler
13. Legs entirely rufotestaceous. Length 9–12 mm. New South Wales.....*nigriventris* (Guérin), typical
    Tibiæ and tips of femora black or dark brown.....14
14. Thorax entirely rufotestaceous. Length 9–11 mm. Queensland, Northern New South Wales.....subsp. *tibialis* Emery
    Pronotum with a large black spot. Length 10–11 mm. Queensland.....subsp. *hackeri* subsp. nov.
15. Head black. Length 8–9 mm. New South Wales....*froggatti* Forel
    Head rufotestaceous.....16
16. Head with brownish vertex; thorax brown black, except inferior border of epinotum. Length 6.5–8 mm. New South Wales .....*wiburdi* Wheeler
    Thorax rufotestaceous; dorsal portions of pro- meso- and epinotum black. Length 7–8 mm. New South Wales, subsp. *pictus* Wheeler
17. Head distinctly constricted at the occiput.....18
    Head not constricted at the occiput, the sides of its postocular portion nearly straight or feebly convex and very gradually converging to a narrow occipital border.....25

18. Occipital constriction short and not very pronounced; larger species (8.5–11 mm.) 19
    Occipital constriction longer and more pronounced; smaller species (6.5–7.5 mm.) 23
19. Thorax entirely or very largely rufotestaceous 20
    Thorax entirely or very largely black or dark brown 22
20. Pronotum and sometimes a spot on the mesonotum black. Length 8.5–10 mm. Queensland ..... *varians* Emery, typical
    Thorax and anal segments entirely rufotestaceous 21
21. First gastric segment with a yellow spot at its base. Length 9–10 mm. Queensland ..... subsp. *rufipes* Emery
    Femora largely dark brown; tibiæ pale yellow; first gastric segment without a yellow spot. Length 9–10 mm. Queensland ..... subsp. *quadricolor* subsp. nov.
22. Head, excepting the mandibles, brown black; thorax partly rufotestaceous. Length 11 mm. Queensland ..... subsp. *rothneyi* Forel
    Head rufotestaceous, thorax entirely black. Length 9–11 mm. Queensland ..... subsp. *ruficeps* Emery
23. Body entirely pale testaceous, often with an elongate brown spot on each side of the gaster. Length 6.5–7 mm. New Guinea, Aru Islands, Ceram ..... *fragilis* (F. Smith) typical
    Body and legs with more or less dark brown or black pigment .. 24
24. Spots on sides of gaster and the middle and hind femora fuscous. New Guinea ..... subsp. *femoratus* Santschi
    Body almost entirely dark brown. Length 6.5–7.5 mm. New Guinea ..... subsp. *melanoticus* subsp. nov.
25. Black species 26
    At least the head or thorax rufotestaceous or pale testaceous .. 28
26. Very small species (5.3–6 mm.); petiole nearly twice as high as long, strongly inclined forward. Queensland ..... *mjöbergi* Forel
    Larger (6–7 mm.); petiole longer than high, not inclined forward 27
27. Head without the mandibles two-fifths as high as long at the front; eyes rather small, elliptical; frontal carinæ low, not closely approximated. Length 8 mm. New Guinea ..... *niger* Emery
    Head longer and narrower, with narrower occipital border, without the mandibles only half as high as long; eyes larger and more

nearly circular; frontal carinæ high and closely approximated. Length 6–7 mm. New Guinea ..... *lugubris* sp. nov.

28. Entirely pale testaceous; very slender, with very long legs; head more than twice as long as broad, without the mandibles. Length 9–9.5 mm. New Guinea ..... *gracillimus* sp. nov.
Gaster at least in part black; smaller and stouter with shorter head and legs 29
29. Petiole broader than long 30
Petiole distinctly longer than broad 32
30. Head, thorax and petiole pale rufotestaceous; gaster black. Length 6–7.5 mm. New Caledonia, New Guinea, Loyalty Islands ..... *pallens* Emery, typical
Other parts besides the gaster black 31
31. Head, excepting the mandibles, black. Length 7.5 mm. New Caledonia ..... subsp. *nigriceps* Emery
Rufotestaceous, with the two first gastric segments and the distal halves of the femora black. Length 8 mm. New Caledonia ..... subsp. *geniculatus* Emery
32. Black, with the head rufotestaceous. Length 7.5–9 mm. Queensland ..... *darlingtoni* sp. nov., typical
All or most of the thorax as well as the head rufotestaceous 33
33. Pronotum clouded with brown on sides, mesonotum fuscous; gaster black, with extreme base of first segment yellow. Length 7 mm. Queensland ..... subsp. *jucundus* subsp. nov.
Pronotum not clouded with brown, first gastric segment and posterior borders of three following segments rufotestaceous. Length 7.5 mm. Queensland ..... subsp. *fascigaster* subsp. nov.
34. Head without the mandibles only about one and one-half times as long as broad, with broad occipital border. Length 7–8.5 mm. Queensland ..... *unicolor* Emery
Head without the mandibles fully twice as long as broad, with narrow occipital border. Length 7–7.5 mm. New Guinea ..... *puberulus* sp. nov.

Key to the Known Males of Leptomyrmex

1. Second funicular joint scarcely longer than the first 2
Second funicular joint much longer than the first 4
2. Stipes of genitalia subtriangular; volsella stout, simple and hook-shaped 3

Stipes of genitalia bilobed; volsella biramous, pickaxe-shaped with an accessory tooth at the base of the posterior prong..... ..... *darlingtoni* sp. nov.

3. Body yellowish testaceous..... *fragilis* F. Smith
   Body dark brown..... subsp. *melanoticus* subsp. nov.
4. Second funicular joint nearly as long as the scape; cheeks anteriorly converging; tips of mandibles sharply truncated..... ..... *varians ruficeps* Emery
   Second funicular joint much shorter than the scape; cheeks subparallel; tips of mandibles not sharply truncated.....5
5. Eyes and ocelli rather small, the former not much longer than the cheeks; volsellæ T-shaped, very slender; wings strongly infuscated.....6
   Eyes and ocelli very large, the former much longer than the cheeks; volsellæ stouter, Y-shaped or boot-shaped; wings paler.....7
6. Stipes subtriangular with acuminate tip; volsella with its anterior prong longer than the posterior..... *nigriventris* (Guérin)
   Tip of the stipes acute but not acuminate; anterior prong of volsella shorter and thinner than the posterior..subsp. *tibialis* Emery
7. Second funicular joint only twice as long as the first; stipes with broadly rounded tip. Wing membranes dull.....8
   Second funicular joint more than twice as long as the first; stipes more pointed; wing membranes smooth and shining.....9
8. Wings brown; stipes triangular..... *froggatti* Forel
   Wings yellowish; stipes oval..... *wiburdi* Wheeler
9. Rufotestaceous throughout; wings slightly smoky..*pallens* Emery
   At least the gaster black or dark brown; wings yellowish, with yellow veins.....10
10. Tips of mandibles and stipes broad and bluntly rounded; volsellæ T-shaped, with the anterior prong longer than the posterior..... *erythrocephalus* (Fabr)
    Tips of mandibles and stipes narrower and more pointed.....11
11. Volsellæ T-shaped with nearly equal prongs; tips of mandibles acute..... subsp. *decipiens* Wheeler
    Volsellæ boot-shaped, with posterior prong reduced to an acute point; tips of mandibles very narrow but blunt..... ..... subsp. *cnemidatus* Wheeler

LEPTOMYRMEX ERYTHROCEPHALUS (Fabricius)

Fig. 4

Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 265, fig. 5 ♀.

New South Wales: Blue Mts. (Beccari and E. D'Albertis); Sydney (Lowne, L. M. D'Albertis, W. W. Froggatt); Katoomba and Wentworth Falls (W. M. Wheeler); Wentworth Falls (W. M. Mann; P. J. Darlington); Jenolan Caves (J. C. Wiburd); Mittagong (A. M. Lea; W. W. Froggatt); Mt. Wilson (P. J. Darlington); National Park, near Sydney (W. M. Wheeler); Lawson (A. M. Lea).

Queensland: Rockhampton (W. W. Froggatt); Peak Downs (Museum Godeffroy); Mackay (G. Turner).

As I have seen specimens of the typical form of this species only from New South Wales, I still believe that the foregoing Queensland records refer to some of the following subspecies or even more probably to *L. varians ruficeps* Emery which has a very similar coloration.

Male.— Length nearly 10 mm.

Head without the mandibles fully twice as long as broad, the large prominent eyes at the middle of its sides; postocular portion subtrapezoidal, its sides feebly convex, slightly longer than the straight occipital border, cheeks straight, parallel, about two-thirds as long as the eyes. Mandibles narrow, with very blunt, rounded tips, their masticatory border microscopically denticulate, longer than the internal border which forms with it a distinct obtuse angle. Clypeus large, nearly as long as broad, rather flat, with broadly rounded anterior border and rounded, projecting anterior corners. Ocelli moderately large. Antennal scapes about four times as long as broad, with slender base, only slightly thicker than the funiculus, the first joint of which is slightly longer than broad, the second three times as long as broad; remaining joints missing in the specimen. Thorax very long and narrow; mesonotum nearly one and one-half times as long as broad, strongly convex anteriorly where it overarches the pronotum; base of epinotum long and sloping, transversely concave just in front of the declivity, which continues the slope of the base and is not clearly marked off from it. Petiole resembling that of the worker, but the node is lower and subangular in profile, with straight instead of convex anterior slope, the ventral surface feebly convex. Gaster narrow; genitalia small and retracted; stipes subtriangular, slightly longer than broad, with bluntly rounded tip, convex anterior and concave posterior border; volsellæ with straight, narrow shaft, bifurcated at summit and T-shaped, the anterior prong straight, very

slender and acute, the posterior prong shorter and broader, curved and acute. Legs long and slender, hind femora, tibiæ and basitarsi distinctly flexuous. Wings long and narrow, measuring nearly 9 mm; cubital and median veins complete in one of the forewings of the specimen; middle portion of cubitus lacking in the other; pterostigmal appendage long, pendunculate at the base, knob-shaped at the tip. Hamuli present on anterior border of hind wing, but small and often merely setiform and not distinctly hooked at the tip.

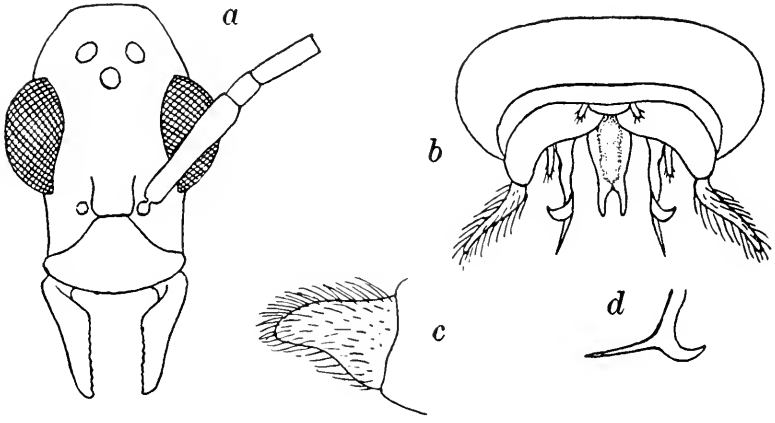

Fig. 4. *Leptomyrmex erythrocephalus* Fabr. *a*, head of male, dorsal aspect; *b*, genitalia of same, posterior aspect; *c*, stipes, lateral aspect; *d*, tip of volsella, lateral aspect.

Surface subopaque, finely shagreened or punctulate. Wing membranes smooth and shining.

Pilosity consisting of a few stiff black hairs at the tips of the mandibles and on the ventral surface of the petiole and gaster. Stipes covered and fringed with delicate, glistening white hairs. Pubescence white, fine and appressed, distinct on the thorax, gaster and legs, longest on the gaster, almost lacking on the head.

Dull brownish yellow, genitalia more reddish; gaster, epinotum, median portions of coxæ, femora and tibiæ, except their tips and bases, brown-black; sides of thorax clouded with brown. Wing membranes and veins yellow.

Described from a single defective specimen labelled New South Wales (Staudinger). Since it is not accompanied by the worker I am not sure that it is the male of the typical *erythrocephalus*. Emery also

described and figured in his paper on the ants of the Sicilian amber what he supposed to be a male of this species from Queensland. The specimen, which lacked the two last gastric segments, the ends of the antennæ and portions of the legs, was described as "tutto testaceo." I have already expressed my doubt of the occurrence of the true *erythrocephalus* in Queensland. Judging by its coloration, Emery's male would seem to belong to some one of the following subspecies, probably *rufithorax* Forel (*vide infra* p. 92).

Subsp. UNCTUS subsp. nov.

Worker.— Length 11–12 mm.

Differing from the typical form of the species in its distinctly larger size, in having the head and often also the funiculi and tarsi of a deeper rufotestaceous tint, the antennal scapes and first funicular joint dark brown or black; the mandibles brown, darker than the head, the surface of the whole body distinctly more shining, with an oily luster, and the fine pubescence less developed on all parts of the body than in the typical *erythrocephalus*.

Described from numerous specimens, including a number of repletes, taken by Dr. R. J. Tillyard from a large colony nesting under a stone at Condor Creek, alt. 2800 ft., near Canberra in the Federal Commonwealth Territory.

Subsp. MANDIBULARIS Wheeler

L. erythrocephalus var. *mandibularis* Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 268 ♀.

New South Wales: Sydney (H. Ashton.)

The worker of this subspecies is very similar to the preceding and of the same size, but the mandibles, clypeus and frontal carinæ are black and the funiculi and tarsi brown. The surface of the body is more subopaque as in the typical *erythrocephalus*.

Subsp. VENUSTUS subsp. nov.

Fig. 5

Worker.— Length 8–9 mm.

Head and antennal scapes bright rufotestaceous, almost orange yellow; thorax, petiole, funiculi, coxæ, trochanters, basal third of femora, knees, tarsi and tibial spurs paler yellow; apical two-thirds of

femora, tibiæ, palpi and a large subtriangular spot on the middle of the pronotum black. Base of epinotum in profile with a distinct median impression. Hairs black, pubescence grayish, very fine, not concealing the shagreened surface of the body which is somewhat shining.

Female.— Length 10 mm.

Differing from the worker in its decidedly more robust stature, broader head, stouter thorax, larger gaster, broader scapes, femora and tibiæ, the scapes distinctly enlarged near the base and at the tips. Occipital border slightly impressed in the middle. Clypeus with nearly straight, transverse, anterior border. Eyes slightly larger than in the worker. There are three crowded, rather deeply impressed ocelli on the vertex, the anterior one large, those of the posterior pair small and abortive. Pro- and mesonotum much higher and more convex than in the worker, so that they appear shorter, the mesonotum set off more sharply from the epinotum, which is higher and broader, with the median transverse impression of its base much feebler. Petiolar node decidedly broader and higher than in the worker, broader than long, its summit with a distinct median longitudinal impression posteriorly.

Surface of body duller and more opaque throughout than in the worker, very indistinctly shagreened.

Hairs as in the worker but longer and more abundant on the mandibles, where they are fine and pale, as contrasted with the stiff black hairs on the clypeus and venter; on the flexor surface of the tibiæ very short, forming a sparse series as in the worker. Pubescence yellowish, longer than in the worker, especially on the gaster, so that the surface of the body appears somewhat dusty or pollinose.

Color like that of the worker but only the basal fourth of the femora yellow, the black spot on the pronotum larger, the clypeus with a pair of fuscous spots, the mesonotum with two pairs, the mandibles fuscous, with yellow masticatory borders.

Described from six workers and a single female taken Feb. 2, 1932, by Mr. Frank H. Taylor on Mt. Tomah, New South Wales.

Subsp. BRUNNEICEPS subsp. nov.

Worker.— Length 8–9 mm.

Very similar to the subsp. *venustus* but the head posteriorly and the mandibles brown, the yellow of the thorax and legs distinctly brownish and the basal pale portions of the femora less extensive. There is an elongate black or dark brown spot on the middle of the mesonotum

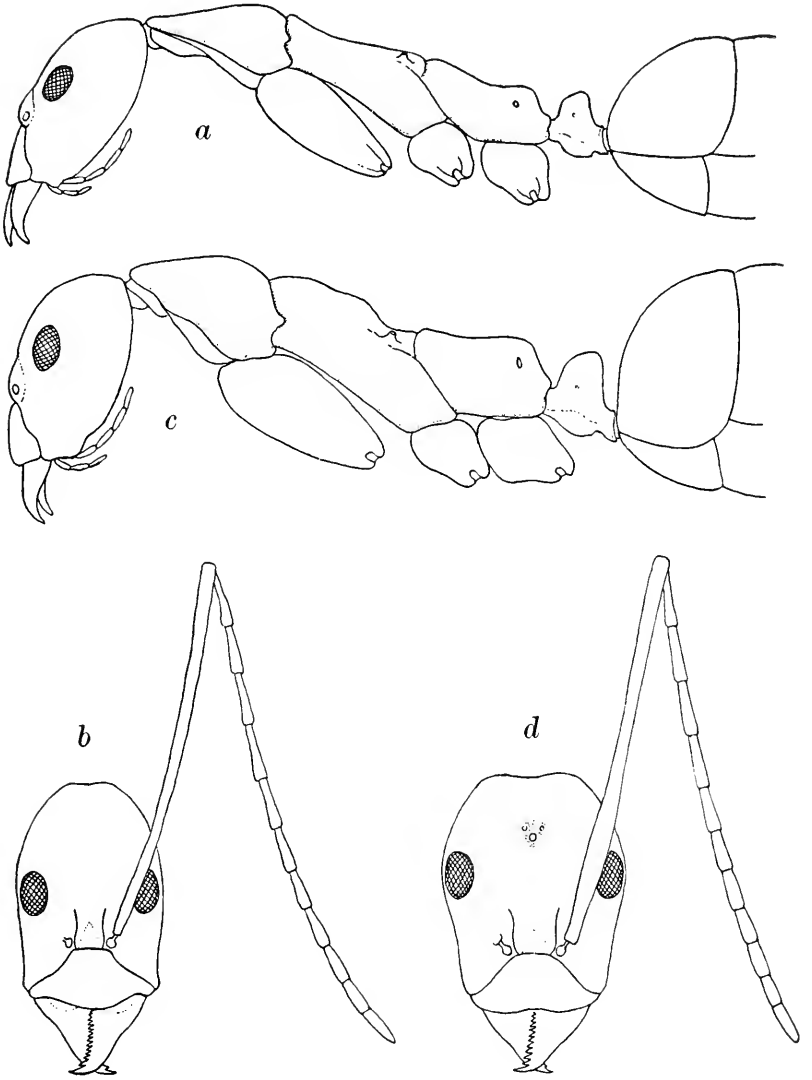

Fig. 5. *Leptomyrmex erythrocephalus venustus* subsp. nov. *a*, worker in profile; *b*, head of same, dorsal aspect; *c*, female in profile; *d*, head of same, dorsal aspect.

and the pronotum is black, with the exception of its border. The surface of the body is decidedly more shining and less pubescent than in *venustus*.

Described from nine workers taken by Dr. P. J. Darlington in the Blue Mts. of New South Wales, seven on Mt. Wilson (type-locality) and two at Wentworth Falls.

Subsp. BASIRUFUS subsp. nov.

Worker.— Length 10–10.5.

Head, antennæ, thorax, petiole and first gastric segment brownish rufotestaceous, the head slightly darker; remainder of gaster black; lower surfaces of prosterna, the coxæ, trochanters, femora, tibiæ, palpi and sometimes the mandibles, castaneous brown; tarsi and tibial spurs yellow. Surface of body slightly shining, very finely, grayish pubescent.

Two specimens taken by Mr. H. Hacker in the Buderim Mts., Queensland (type-locality) and a single worker taken by Mr. A. M. Lea at Bundaberg, in the same state. The latter specimen has the antennæ dark brown, like the legs, and the inferolateral portions of the first gastric segment black.

Subsp. DECIPIENS Wheeler

Fig. 6

L. erythrocephalus var. *decipiens* Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 268 ♀.

Queensland: Gin Gin (W. W. Froggatt); Dawson River (A. M. Lea); McPherson Range, National Park (P. J. Darlington).

The worker of this subspecies is evidently very similar to that of *rufithorax* Forel and was described in the same year. In my specimens, however, the head, thorax and petiole are sordid rufotestaceous and the femora and tibiæ are dark brown. Forel described the petiole as black in his *rufithorax*.

Male (undescribed).— Length 7.5–8 mm.

Resembling the male of the typical *erythrocephalus* but smaller. Tips of mandibles acute. Antennæ nearly as long as the body, with joints 3–5 of the funiculus distinctly bent. Thorax shorter, with more distinct and less sloping declivity. Genitalia exserted; stipes with more acute and more acuminate tip; volsellæ with nearly equal prongs,

the anterior being shorter than in *erythrocephalus*. Middle tibiæ bowed; hind femora, tibiæ and basitarsi flexuous. Wings as in *erythrocephalus* but the basal third of the cubitus is absent; pterostigmal appendage rather long and ribbon-shaped.

Sculpture, pilosity and color much as in the typical form but the head and mandibles are covered with white pubescence like the remainder of the body. Tibiæ paler and the dark markings on the thorax and coxæ variable; in one specimen the whole epinotum, mesepisterna and coxæ are black, in two others the dark markings are much reduced

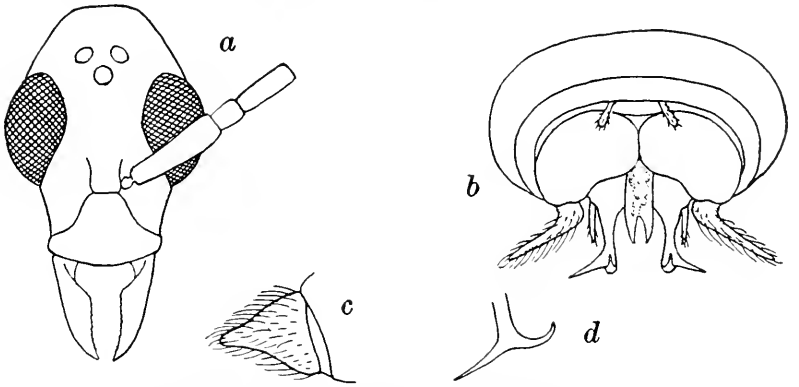

Fig. 6. *Leptomyrmex erythrocephalus decipiens* Wheeler; *a*, head of male, dorsal aspect; *b*, genitalia of same, posterior aspect; *c*, stipes, lateral aspect; *d*, volsella, lateral aspect.

in extent and intensity; in two the summit of the petiolar node is infuscated. Wings with smooth and shining membranes, tinged with grayish yellow; veins yellowish brown.

Described from four specimens taken by Dr. Darlington in the McPherson Range, National Park, Queensland, during March 1932. They are not accompanied by workers but certainly belong to some form of *erythrocephalus*, *decipiens* being indicated by elimination of the other subspecies.

Subsp. RUFITHORAX Forel

L. erythrocephalus var. *rufithorax* Forel, Ark. f. Zoöl., **9**, 1915, p. 83, ♀.
Queensland: Mt. Tambourine (E. Mjöberg, A. M. Lea).

Forel described the worker of this subspecies very briefly as measuring 9–10.7 mm. and as being "entirely like the type of the species but

with the whole thorax and not only the head red. Legs, petiole and gaster black."

A single male taken by Mr. A. M. Lea on Mt. Tambourine, Queensland seems to belong to this species. It has lost its gaster but must have measured about 10 mm. Head, thorax and petiole uniformly pale rufotestaceous (the missing gaster may have been black), the tibiæ and apical two-thirds of femora dark brown. Structurally very similar to the male of *decipiens*, but the second funicular joint is only two and one-half times as long as broad, the very long joints 4–7 distinctly bent, the seventh quite strongly. Petiole small, its node low and rounded in profile. Mandibles pointed and very finely denticulate. Middle tibiæ strongly bowed; hind tibiæ and basitarsi flexuous. Wings 8.5 mm. long, smooth and shining, their membranes and veins yellow; pterostigmal appendage knob-shaped, with a slender peduncle. Very delicately shagreened and more shining than the male of *decipiens*. Pubescence white, appressed, abundant on the thorax, tibiæ, antennæ and mandibles, almost absent on the head.

Subsp. CNEMIDATUS Wheeler

Fig. 7

L. erythrocephalus var. *cnemidatus* Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 268 ☿.

I described this form from a single worker specimen received from Staudinger and Bang-Haas, presumably from New South Wales, but without precise locality label. Numerous fresh specimens, including several males, recently received from the following localities, now enable me to give a more adequate description:

New South Wales: Dorrigo (W. Heron); same locality, 3,000 ft. (P. J. Darlington).

Queensland: Mt. Tambourine and National Park (H. Hacker).

Worker.— Length 8–9.5 mm.

Head and antennæ rather clear rufotestaceous; thorax, coxæ, trochanters, femora, knees, tibial spurs and anal segments yellow; tarsi whitish yellow; gaster black, with bluish reflections; tibiæ and a spot at the tip of each femur dark brown or black. Some specimens have also an ill-defined median fuscous spot on the pronotum. Surface moderately shining, somewhat pruinose, with very fine, grayish pubescence. Erect hairs on venter and clypeus black; flexor borders of tibiæ with a sparse series of minute bristles.

Male (undescribed).— Length 7–8 mm.

Head decidedly longer than its transverse diameter through the eyes, which are very large and prominent, subreniform, with sinuate

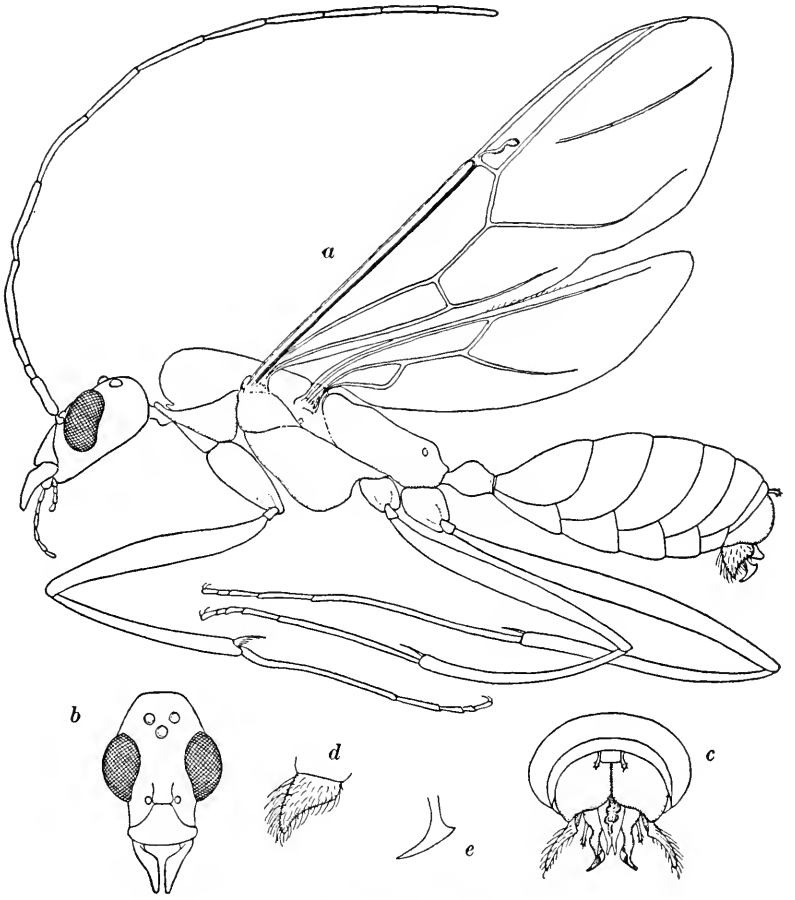

Fig. 7. *Leptomyrmex erythrocephalus cnemidatus* Wheeler, male; *a*, in profile; *b*, head, dorsal aspect; *c*, genitalia, posterior aspect; *d*, stipes and *e*, tip of volsella, lateral aspect.

mesial and external orbits. Ocelli large. Posterior portion of head subtrapezoidal, with rather straight lateral and posterior borders. Cheeks very short, concave, not more than one-third as long as the

eyes. Mandibles with blunt tips, the angle between the internal and longer masticatory border broadly rounded, the latter without any traces of denticles. Clypeus flattened, its anterior border straight in the middle, sinuate on each side. Antennæ somewhat shorter than the body; scapes subcylindrical, fully three times as long as broad, slightly stouter than the filiform funiculus; first funicular joint a little longer than broad, second joint about three times as long as broad; joints 3–5 much longer, each of them constricted and bent, the fourth near the base, the two others near the apex; remaining joints gradually decreasing in length to the tip. Pronotum produced and narrowed anteriorly; mesonotum subelliptical, somewhat longer than broad, strongly convex dorsally and overarching the pronotum anteriorly; scutellum nearly twice as broad as long, convex in the middle, depressed and narrowed on each side; mesosterna very long and convex; epinotum very long, from above one and three-fourths times as long as broad, as broad behind as in front, the sides slightly concave in the middle. Base of epinotum in profile very long and sloping, with two sinuate, transverse impressions, the declivity very short, rounded and not distinctly marked off from the base. Petiole evenly convex dorsally and ventrally. Gaster narrowed at the base, enlarged toward the tip. Genitalia extruded; squamulæ large, convex, smooth and shining; stipites rather large, with broadly excised posterior border; volsellæ boot-shaped; Legs very long, middle tibiæ strongly bowed. Wings long (8 mm.); pterostigmal appendage well-developed, pedunculate and sausage-shaped; basal third of cubitus absent.

Shagreened, the thorax more coarsely than the head and gaster, subopaque, except the epinotum and gaster which are distinctly shining.

Hairs absent, except on the ventral surface of the gaster where they are black, coarse and stiff, and on the mandibles and stipites, where they are fine, short, abundant and white. Pubescence very fine, short, white and appressed, visible on the pleuræ, epinotum, gaster and appendages and sufficiently abundant to produce a pruinose effect.

Brownish testaceous or brown; epinotum, gaster, mesopleuræ and femora dark brown; tibiæ, tarsi and genital valves yellow; veins and membranes of wings yellowish; palpi brownish.

Dorrigo, New South Wales, may be regarded as the type-locality of this subspecies. Some of the workers collected by Darlington are repletes. The males, of which there are four taken by Heron and three taken by Darlington, show some variation in the infuscation of the

thorax and those taken by Heron are decidedly more yellow and less brownish. The same is true of the accompanying workers. The large size of the eyes and ocelli and the very different shape of the volsellæ, as compared with the corresponding organs of the typical *erythrocephalus* and the subspecies *decipiens*, suggest that *cnemidatus* may be a distinct species. But since the males of more than half of the subspecies of *erythrocephalus* are still unknown, the value of these characters cannot be determined.

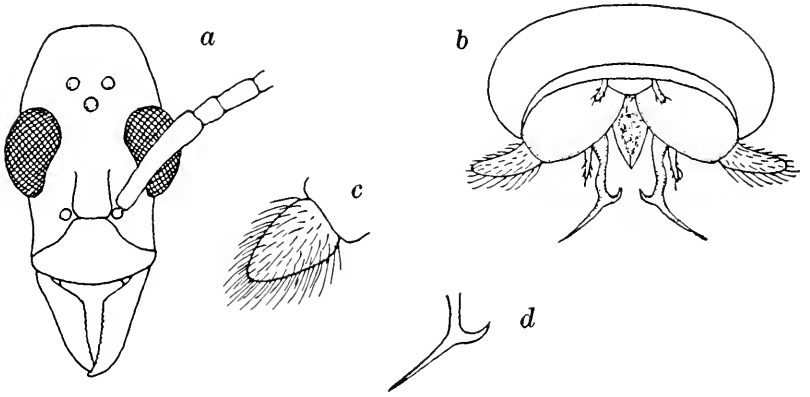

Fig. 8. *Leptomyrmex nigriventris* (Guérin), male. *a*, head, dorsal aspect; *b*, genitalia, posterior aspect; *c*, stipes enlarged, lateral aspect; *d*, tip of volsella, enlarged, lateral aspect.

LEPTOMYRMEX NIGRIVENTRIS (Guérin)

FIG. 8

Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915 p. 270, fig. 6. ♀.

New South Wales: Blue Mts. (Beccari and E. D'Albertis); Mt. Victoria (L. M. D'Albertis); Leura, Katoomba and Wentworth Falls (W. M. Wheeler); Wentworth Falls and Mt. Wilson (P. J. Darlington).

The typical form of this species seems to be known only from the Blue Mts. of New South Wales. Stitz's citation of its occurrence in New Guinea must be due either to misidentification or an erroneous locality label. In 1932 Darlington took a male specimen with workers on Mt. Wilson.

Male (undescribed).— Length 9.5 mm.

Head twice as long as broad through the eyes and shaped much like that of *erythrocephalus cnemidatus* but the mandibles with the blunt tips and masticatory borders very minutely denticulate. Eyes small compared with those of *cnemidatus*, scarcely longer than the cheeks. Ocelli small, with impressed internal orbits. Antennæ long; scapes fully four times as long as broad; first funicular joint longer than broad, second twice as long as broad; joints 3–6 much longer and each distinctly bent near its distal end. Thorax shaped as in *cnemidatus*. Petiole like that of the worker, with the node subrectangular in profile. Gaster short, elongate-elliptical. Genitalia smaller and more retracted; the stipites small, triangular and pointed; volsellæ very slender, pickaxe-shaped, the anterior prong long and acutely pointed, the posterior curved and much shorter; sagittæ uncinate. Legs very long; median tibiæ bowed; hind femora somewhat angularly bent in the middle; hind tibiæ slightly flexuous at their tips. Wings rather small and narrow, only 7 mm. long. Pterostigmal appendage small, pedunculate, sausage-shaped; cubital vein completely absent in both fore wings.

Finely shagreened and subopaque; gaster somewhat more shining.

Hairs and pubescence whitish, the former absent, except on the mandibles and external genital valves; pubescence very fine and appressed, rather uniform over the surfaces of the body and appendages.

Yellowish brown; mesonotum with an anteromedian and a pair of lateral darker brown spots; gaster black, base of its first segment yellow; distal two-thirds of middle and hind femora blackish. Wings distinctly and uniformly infuscated; their veins pale yellow, with brown outlines.

Subsp. TIBIALIS Emery

Figs. 9 and 10

L. nigriventris var. *tibialis* Emery, Ann. Soc. Ent. Belg., **39**, 1895, p. 39 ♀; Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915 p. 272 ♀.

Queensland: Northern part of the commonwealth (Podenzana), type-locality; Mt. Tambourine (A. M. Lea); National Park (H. Hacker).

New South Wales: The Dorrigo (W. Heron, P. J. Darlington).

Female (undescribed).— Length nearly 9 mm.

Resembling the female of *erythrocephalus venustus* and exhibiting similar differences from the worker. Body and appendages stouter. Head as broad in front as behind, with the sides concave just anterior

to the eyes and the occipital border slightly emarginate in the middle. Clypeus with straight, transverse anterior border. Eyes slightly larger than in the worker. All three ocelli present, each lying in an impression, the posterior pair smaller than the anterior ocellus. An-

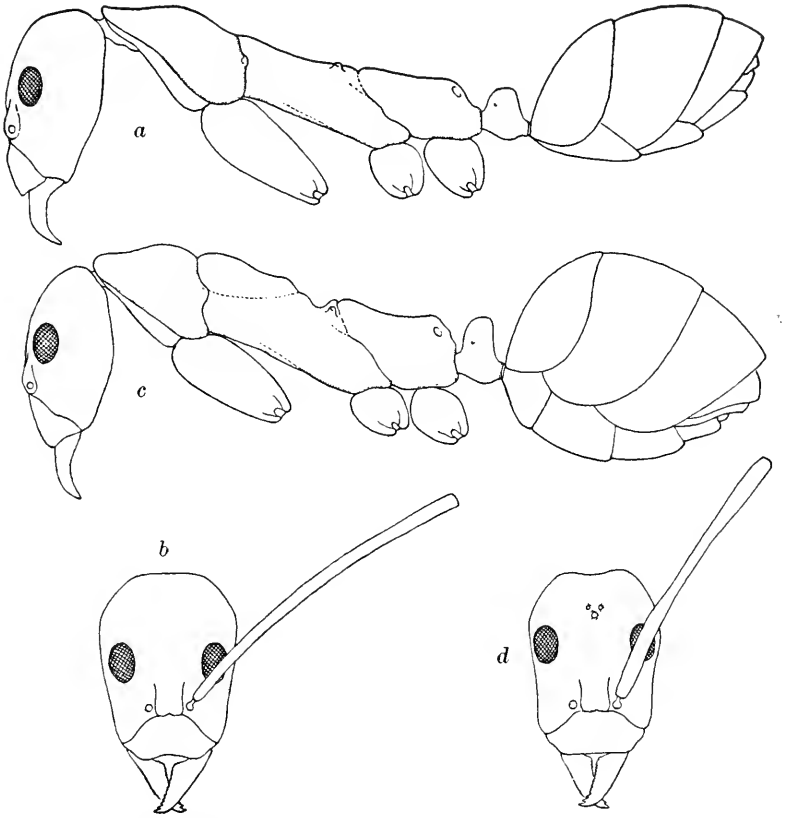

Fig. 9. *Leptomyrmex nigriventris tibialis* Emery. *a*, worker, in profile; *b*, head of same, dorsal aspect; *c*, female, in profile; *d*, head of same, dorsal aspect.

tennal scapes shorter than in the worker, distinctly enlarged near the base and at the tip, as in the female *venustus*. Pronotum nearly as broad as long, strongly convex; promesonotal suture deeply impressed; mesonotum convex anteriorly, with indistinct lateral sutures. A scutellar sclerite, bounded by a crescentic groove posteriorly, is

clearly indicated by a rounded projection just behind the convexity of the mesonotum. Metanotum short and concave rising behind in the form of a point to the distinct meta-epinotal suture. Epinotum only about one-fourth longer than broad, subcuboidal, as broad behind as in front, its base in profile horizontal, distinctly concave, twice as long as the sloping declivity, with which it forms on each side a distinct angle. Petiolar node broader and higher than long, rounded anteriorly, with a longitudinally grooved summit and flat, perpendicular posterior surface. Gaster much larger than that of the worker, nearly as high as long, laterally somewhat compressed. Legs decidedly shorter and perceptibly stouter than in the worker.

Subopaque and very indistinctly shagreened.

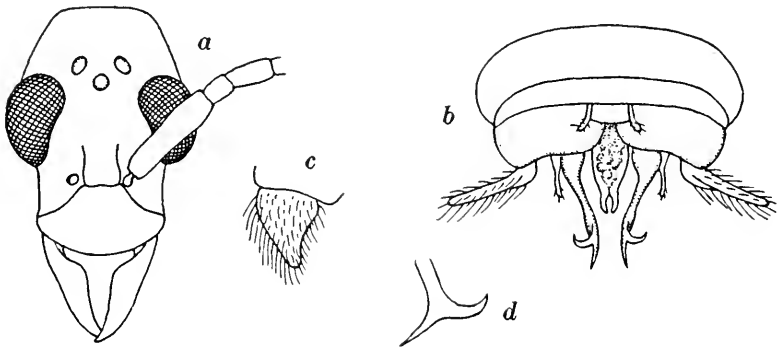

Fig. 10. *Leptomyrmex nigriventris tibialis* Emery, male; *a*, head, dorsal aspect; *b*, genitalia, posterior aspect; *c*, stipes, lateral aspect; *d*, tip of volsella enlarged, lateral aspect.

Pilosity and pubescence as in the worker, but the pubescence somewhat longer and denser on the gaster and less conspicuous on the thorax.

Head and thorax of a deeper rufotestaceous coloration than in the worker of the typical *nigriventris*, with the tibiæ and distal ends of the femora, except the knees, black and therefore darker than in the worker *tibialis*.

Male (undescribed).— Length 8–10.3 mm.

Differing from the male of the typical *nigriventris* in having the head shorter, especially behind the eyes, in lacking the dark spots on the mesonotum, in having the tibiæ and tips of the femora dark brown and the wings of a distinctly more yellow tinge. There is also a differ-

ence in the shape of the volsellæ of the genitalia, which have the prongs of their pickaxe-shaped tips stouter and much more nearly of the same length.

The female is described from a single specimen taken by Dr. Darlington in the Dorrigo, New South Wales, at an altitude of 3000 ft., between Feb. 15 and March 1, 1932, a male which was taken with it and several workers, a male taken in the same locality by Mr. W. Heron and three males taken by Mr. H. Hacker in the National Park, Queensland.

Subsp. HACKERI subsp. nov.

Worker.— Length 10–11 mm.

Differing from *tibialis* in its distinctly narrower head, which is therefore more like that of the typical *nigriventris*, and in having a large black spot on the middle of the pronotum. The tibiæ and apical halves of the femora are black and therefore decidedly darker than in the worker *tibialis*, and the rufotestaceous color of the head and thorax is perhaps a shade deeper.

Two workers from Stradbroke Island, Queensland (H. Hacker).

LEPTOMYRMEX WIBURDI Wheeler

Fig. 11

Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 272, fig. 7, ♀.

New South Wales: Jenolan Caves (J. C. Wiburd); Bulli Pass and Wentworth Falls (W. M. Wheeler); Mt. Wilson, 3500 ft. (P. J. Darlington).

Male (undescribed).— Length 7 mm.

Head, including the mandibles, twice as long as broad, the postocular portion subtrapezoidal, with straight posterior and lateral borders and rounded posterior corners. Eyes very convex, subreniform, with sinuate internal orbits, only about twice as long as the concave, subparallel cheeks and therefore intermediate in size between the eyes of *L. erythrocephalus cnemidatus* and *L. nigriventris*. Ocelli also intermediate. Mandibles short and thick, with obtuse tips, their masticatory border short and not distinctly denticulate, scarcely longer than the basal border with which it forms a rounded obtuse angle. Antennal scapes nearly four times as long as broad; first funicular joint slightly longer than broad, second joint twice as long; joints 3–6 much longer, bent near their base. Thorax shaped as in the species previously described, but the base of the epinotum in profile straight and only

twice as long as the straight sloping declivity and forming a distinct obtuse angle with it. Petiole very slightly longer than broad, its node much lower and less differentiated than in the worker; in profile somewhat higher and feebly angular in the middle; ventral surface only slightly convex anteriorly. Gaster clavate, narrow at the base, enlarged at the tip. Genitalia large, extruded; stipites oval, or rounded-triangular, longer than broad, punctate, densely and finely pilose; volsellæ rather broad, boot-shaped. Legs short; tibiæ terete, median pair bowed, hind pair feebly flexuous. Wings rather small (7 mm.) pterostigmal appendage pedunculate, sausage-shaped; basal two-fifths of cubitus absent.

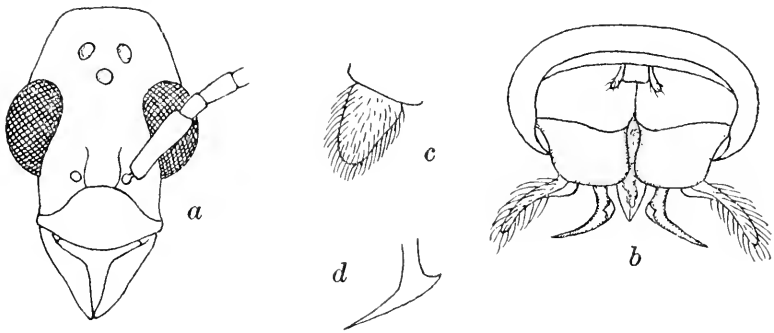

Fig. 11. *Leptomyrmex wiburdi* Wheeler, male. *a*, head, dorsal aspect; *b*, genitalia, posterior aspect; *c*, stipes and *d* tip of volsella, lateral aspect.

Subopaque; gaster more shining, rather finely and sharply shagreened.

Hairs almost absent, except on the stipites and cerci; very few on the mandibles. Pubescence yellowish, very fine, appressed, most distinct on the gaster, head, epinotum and mesopleuræ.

Pale brownish yellow; gaster dark brown, except the base of its first segment, which is yellow, and the genital squamulae, which are rich castaneous brown, very smooth and shining. Pleuræ, epinotum and dorsal surface of petiole clouded with fuscous. Wings yellow, with pale yellow veins.

Described from a single specimen taken by Dr. Darlington with several workers on Mt. Wilson, New South Wales, in January, 1932. These workers have the head, funiculi and tarsi of a deeper, slightly more brownish red than the types taken by Wiburd at Jenolan Caves

and specimens taken by myself at Wentworth Falls in December, 1931. I possess a second male captured by Wiburd at Jenolan Caves, but it is immature and was therefore not described in my former paper.

Subsp. PICTUS Wheeler

L. wiburdi var. *pictus* Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 274 ♀.
New South Wales: Bulli Pass (W. M. Wheeler).

This subspecies may be easily confused with *L. erythrocephalus venustus* which has a very similar color pattern, but the latter has the head longer and less rounded behind the eyes and decidedly longer legs, with more compressed tibiæ.

LEPTOMYRMEX FROGGATTI Forel

Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 269 ♀ ♂.
New South Wales: Noundoc (W. W. Froggatt).

I have not been able to recognize this species among my material. Forel's description of the worker suggests that it may be a black-headed form of what I have called *wiburdi*, but he says that the external genital valves (stipites) of the male have "the form of an obtuse equilateral triangle" and that "one of the rami (volsella) of the median valves is prolonged into a narrow style forked like a Y, the inferior branch of which is sharp and pointed like a needle." This description, as will be seen from Fig. 11 does not apply very closely to the *wiburdi* male. There is still a possibility, however, that this species and its subspecies *pictus* may have to be regarded eventually as subspecies of *froggatti*, which was described in 1910.

LEPTOMYRMEX VARIANS Emery

Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 278 ♀.
Queensland: Rockhampton (Museum Godeffroy).

The typical form of this species has not been taken, to my knowledge, since it was described by Emery in 1895. He described the head, thorax, petiole and antennæ as rufotestaceous and the legs, with the exception of the tarsi, the gaster, the pronotum and in some specimens a spot on the mesonotum as black. This is a color pattern surprisingly like that of *L. erythrocephalus venustus*, but the typical *varians* has a differently shaped head and its tibiæ are slender and terete and not

strongly compressed as in all the varieties of *erythrocephalus*. I have seen numerous specimens of the four following subspecies of *varians*, all of which have yellow tibiæ.

Subsp. ROTHNEYI Forel

L. varians var. *rothneyi* Forel, Rev. Suisse Zoöl., **10**, 1902 p. 473, ☿ ; Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 281, ☿ .

Queensland: Brisbane (Rothney, H. Hacker, F. H. Taylor); Enoggera (W. M. Wheeler); Blackal Range (E. Mjöberg); Caloundra.

My specimens of this subspecies show some variation in coloration. In topotypes from Brisbane taken by Hacker and Taylor, the head, pronotum, dorsum of mesonotum, summit of petiolar node, gaster, fore coxæ and all the femora are dark brown; the mandibles, sides of clypeus, antennæ, pleuræ, epinotal declivity, ventral portions of petiole and anus are red, the tibiæ and tarsi yellow. In the specimen from Enoggera the red portions are paler and more yellowish and in those from Coloundra the head is almost entirely deep red, so that they may be said to represent a transition to the typical *varians*.

Subsp. RUFICEPS Emery

Fig. 12

L. varians var. *ruficeps* Emery, Ann. Soc. Ent. Belg., **39**, 1895, p. 352 ☿ ; Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 28, fig. 11, ☿ ; Forel, Ark. f. Zoöl., **9**, 1915, p. 84 ☿ ♂.

Queensland: Mt. Bellenden Ker, type-locality (Podenzana); Cairns (W. W. Froggatt, A. M. Lea); Kuranda (W. M. Wheeler); Glen Lamington, Logan Village, Atherton, Malanda, Cedar Creek, Herberton (E. Mjöberg); Cooktown (Staudinger).

New South Wales: Katoomba, Blue Mts. (F. Silvestri).

Male.— Length 9 mm.

Head elongate-elliptical, including the mandibles twice as long as its transverse diameter through the eyes, the latter very large and protuberant, somewhat nearer the anterior clypeal than the occipital border, which is straight; the sides behind the eyes evenly rounded and gradually converging posteriorly; cheeks nearly straight, half as long as the eyes, converging anteriorly. Ocelli large and prominent. Mandibles small, with sharply truncated tips, their masticatory border short, without denticles, scarcely longer than the basal border. Cly-

peus nearly as long as broad, rather flat, indistinctly subcarinate, with broadly rounded anterior border. Antennal scapes short, not more than three times as long as broad; first funicular joint as broad as long, second joint slightly shorter, third longer than the scape. Thorax resembling that of the other species but more slender, with less overhanging and narrower mesonotum and much less protuberant mesepisterna; epinotum very low, its base concave in profile, passing into the short and very sloping declivity without a distinct angle. Petiole nearly as broad as long, its node low and indistinct, in profile with longer anterior slope meeting the posterior slope at an obtuse

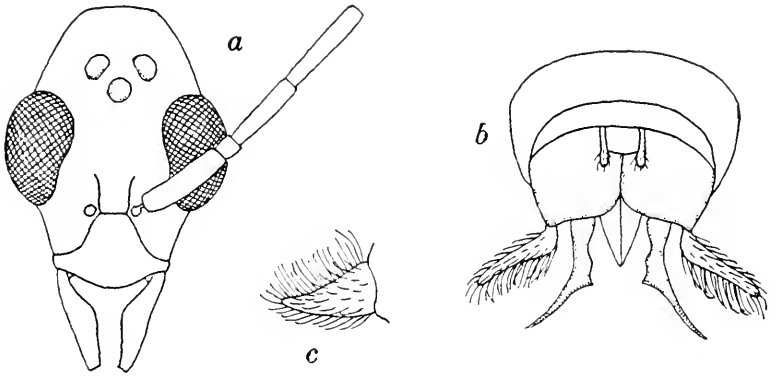

Fig. 12. *Leptomyrmex varians ruficeps* Emery; male; *a*, head, dorsal aspect; *b*, genitalia, posterior aspect; *c*, stipes, lateral aspect.

angle. Gaster narrow, elongate-elliptical. Genitalia small but extruded; stipites triangular, longer than broad, with rather acute tips; volsellæ rather stout, boot-shaped, the anterior prong very long, slender and aciculate, the posterior prong reduced to a point. Legs long and slender; middle tibiæ and hind femora bowed. Wings short, measuring only 6 mm.; pterostigmal appendage long and ribbon-shaped; cubitus complete.

Moderately smooth and shining throughout, very delicately shagreened; mandibles opaque; squamulæ of genitalia very smooth and shining.

Hairs almost absent, present on the venter where they are very short, and on the stipites where they are very fine, long and dense. Pubescence delicate and dilute, most distinct on the gaster.

Yellow throughout, except the squamulæ which are reddish brown, even the wings tinged with yellow and with yellow veins.

I have redescribed this sex from two specimens, one taken by Mr. A. M. Lea at Cairns, Queensland, with workers and a defective specimen from Cooktown obtained from Staudinger.

Subsp. RUFIPES Emery

Emery, Ann. Soc. Ent. Belg., **39**, 1895, p. 352 ♀ ; Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 279 ♀ .

Queensland: Laidley, Brisbane (Podenzana), type-locality; Mackay (G. Turner); Brisbane (F. H. Taylor); Brisbane Botanical Garden, Darra, Toowong (W. M. Wheeler); Blackal Range (E. Mjöberg); Mt. Tambourrine (A. M. Lea).

New South Wales: Gosford (F. Silvestri).

I doubt the occurrence of this and the preceding subspecies in New South Wales as far south as Gosford and Katoomba.

Subsp. QUADRICOLOR subsp. nov.

Worker.— Length 9–10 mm.

Averaging larger than *rufipes.* Head, antennæ, thorax, petiole, middle and hind coxæ brownish red, decidedly darker than the corresponding parts of *rufipes;* gaster black, prosterna, fore coxæ and all the femora, except their extreme bases, dark brown or blackish; anal segments yellowish brown; tibiæ and tarsi pale or whitish yellow. Antennæ and legs much longer than in *rufipes;* anterior surface of petiolar node with a distinct transverse impression, the posterior surface flat and with a rather sharp lateral and superior border.

Described from numerous specimens taken by Dr. P. J. Darlington at Lankelly Creek in the McIlthwaite Range, Cape York Peninsula, Queensland.

LEPTOMYRMEX DARLINGTONI sp. nov.

Fig. 13

Worker.— Length 7.5–9 mm.

Head, without the mandibles, one and two-thirds times as long as the ocular diameter, the sides straight and parallel anteriorly, behind the eyes feebly convex and gradually narrowed to the straight posterior border. Mandibles with nearly straight external borders. Clypeus

feebly convex in the middle, its anterior border nearly straight. Eyes moderately large and convex, at the median transverse diameter of the head. Antennæ very long and slender; scapes extending fully three-fifths their length beyond the posterior border of the head.

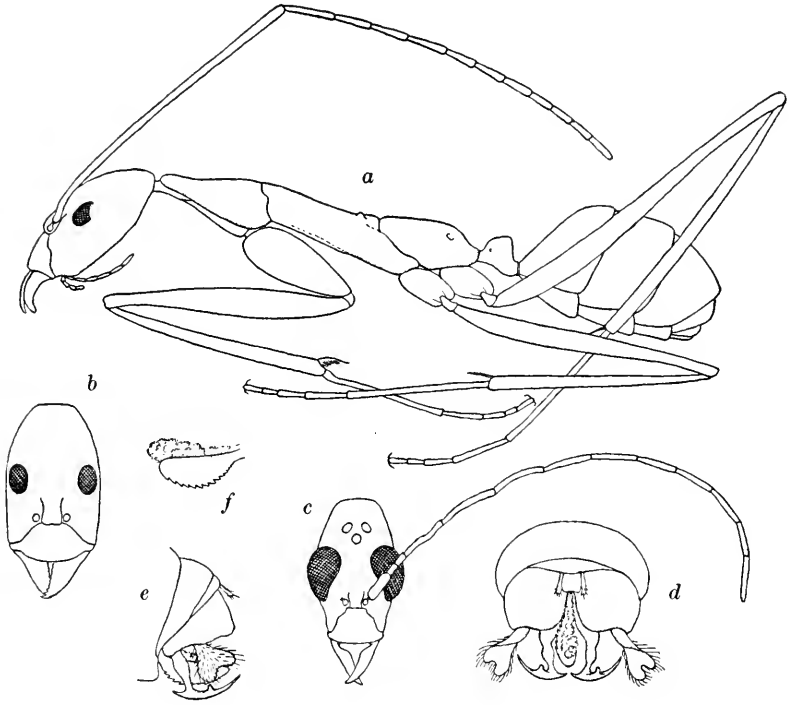

Fig. 13. *Leptomyrmex darlingtoni* sp. nov. *a*, worker in profile; *b*, head of same, dorsal view; *c*, head of male; *d*, genitalia of same, posterior view; *e*, same, lateral view; *f*, sagitta in profile.

Thorax slender, of the usual conformation, epinotum short, not much longer than broad, its base straight and horizontal in profile, twice as long as the sloping declivity with which it forms a very rounded angle. Anterior and posterior surfaces of petiolar node in profile meeting at a sharp rectangle, the former somewhat shorter than the latter which is very flat or even slightly concave, with marginate border, ventral surface only feebly convex posteriorly. Gaster elongate-elliptical.

Legs very long and slender, the tibiæ distinctly though not strongly compressed.

Very finely shagreened and somewhat shining throughout.

Hairs and pubescence white, the former sparse, largely confined to the venter, coxæ and legs, very short on the tibiæ, forming a sparse series on their flexor surface; pubescence moderately dense, rather uniform over the whole surface.

Head and antennæ rufotestaceous; remainder of body, femora and tibiæ brown-black, with the sutures of the thorax and the trochanters brownish yellow; knees, tibial spurs and tarsi very pale yellow, nearly white.

Male.— Length 6.5–7 mm.

Head narrow, without the mandibles nearly twice as long as the ocular diameter. Eyes very large and prominent, placed at the middle of the sides; postocular region subtrapezoidal, its posterior border straight, as broad as the length of the adjacent sides; cheeks *plus* the outer corners of the clypeus nearly as long as the eyes, feebly concave and somewhat converging anteriorly. Ocelli large and prominent. Mandibles slender with acute tips, their masticatory border without denticles, much longer than the internal border and forming with it a distinct but rounded angle. Clypeus nearly as long as broad, with straight anterior border. Antennæ as long as the body; scapes somewhat less than three times as long as broad; first funicular joint slightly longer than broad, the second only a little longer; joints 3–5 much longer, the third bent near its apex, the fourth and fifth more uniformly bowed. Thorax rather short compared with that of other species, mesepisterna very prominent; mesonotum longer than broad, narrowed anteriorly, epinotum less than twice as long as broad, its base in profile rather straight, sloping, twice as long as the more sloping declivity and passing into it without a perceptible angle. Petiole somewhat longer than broad, its node much lower than in the worker, in profile straight and horizontal in the middle, convex in front and sloping behind. Gaster clavate, its first segment narrowed anteriorly, the genitalia large and extruded, of a very different structure from those of the other species; squamulæ separated at the base; stipites narrowed at the base, with broad, bilobed tips; volsellæ large, flattened, bearing at their tips a curved three-pronged crosspiece, the longest slender and acute prong directed posteriorly; sagittæ forming a large keel-shaped structure, with its ventral border regularly serrate. Legs very long and slender, hind femora constricted and flexed in the middle; all the tibiæ bisinuately bent. Wings short and narrow,

measuring only 6 mm.; pterostigmal appendage vestigial, reduced to a mere nodule; basal half of cubitus absent.

Sculpture, pilosity and pubescence as in the worker, but the coxæ and legs without hairs; squamulæ very smooth and shining; hairs on the borders of the stipites long and delicate but not dense.

Described from numerous workers and two males taken by Dr. P. J. Darlington from a single colony at Lankelly Creek, in the McIlthwaite Range, Cape York Peninsula, Queensland. There are several fine repletes among the workers.

The male of this species is easily distinguished by the very unusual structure of the genitalia, the very short second funicular joint, pointed mandibles, etc. The worker differs from *varians* and its varieties in its smaller size, differently shaped head and distinctly compressed tibiæ. It is more closely related to *pallens* Emery, which has the head of the same conformation, but its tibiæ are more slender and terete and the petiole is longer. Except in its smaller size and the coloration of the tibiæ, *darlingtoni* bears a close superficial resemblance to *erythrocephalus* and *varians ruficeps*.

Subsp. JUCUNDUS subsp. nov.

Worker.— Length 7 mm.

Like the typical *darlingtoni*, except in color. Thorax, coxæ, petiole and extreme anterior end of the gaster, as well as the head and antennæ, brownish yellow, with a poorly defined spot on each side of the pronotum and the dorsum of the mesonotum fuscous; legs colored as in the typical *darlingtoni* but their black portions more brownish and the femora yellow at the base.

Two specimens taken by Dr. P. J. Darlington at Coen, Cape York Peninsula, Queensland.

Subsp. FASCIGASTER subsp. nov.

Worker.— Length 7.5 mm.

Resembling the preceding subspecies in the yellow coloration of the head, thorax, petiole and coxæ, but the femora, bases of the tibiæ, entire first gastric segment and a band at the posterior border of the second and third segments are also of the same color. The pro- and mesonotum are immaculate.

Two specimens taken by P. J. Darlington at Coen, Cape York Peninsula, Queensland.

LEPTOMYRMEX UNICOLOR Emery

Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 282, ☿.
Queensland: Cairns (Podenzana), type-locality; Kuranda (W. M. Wheeler, F. P. Dodd).

The worker of this black species is quite unlike those described in the preceding pages in the shape of the head of both the adult and larva, in possessing hairy eyes and in probably not developing repletes. On reëxamining the long series of specimens which I collected at Kuranda, Queensland in 1914, I find that all possess a small anterior ocellar pit and that two others have a small ocellus and also a considerably larger gaster. If these two specimens represent the fertile female, as seems probable, this caste is decidedly more ergatomorphic than in *erythrocephalus* and *nigriventris*.

LEPTOMYRMEX MJÖBERGI Forel

Forel, Ark. f. Zoöl., **9**, 1915, p. 84, ☿; Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 285 ☿.
Queensland: Colosseum, Tolga, Herberton (E. Mjöberg).

This black species, which I know only from Forel's description, is not only the smallest of the genus, measuring only 5.3–6 mm., but also unique in the structure of the petiole which "is rather strongly inclined forward, nearly twice as high as long and has about the form of an anteriorly inclined parallelopipedon, which is, however, somewhat convex above and with flat, but anteriorly inclined anterior and posterior surface." The description seems to imply that the petiolar node is thinner and more nearly squamiform than in the other species of the genus.

✓ LEPTOMYRMEX PALLENS Emery

Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 276, ☿ ♂.
New Caledonia: Oubatche, Yambé, Hienghiéne, Coné, Canale, Valley of the Négropo, Coindé, La Foa, Valley of Ngoi, Nouméa (Sarasin and Roux).
Loyalty Islands: Ouvea, Fayaoué (Sarasin and Roux).
German New Guinea: (Lauterbach).
Dutch New Guinea: Tana (Moszkowski).

The worker of this species is very similar to that of *darlingtoni* in size and in the shape of the head, thorax and petiole, but the tibiæ are thinner and terete, instead of compressed. Unfortunately, Emery's description of the male is very brief and contains no mention of the genitalia.

Subsp. GENICULATUS Emery

L. pallens var. *geniculatus* Emery in Sarasin and Roux, Nova Caledonia, Zoöl., **1**, 1914, p. 418, ☿ ; Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 278 ☿ .

New Caledonia: Tchalabel, Coula-Borearé (Sarasin and Roux).

Subsp. NIGRICEPS Emery

L. pallens var. *nigriceps* Emery, in Sarasin and Roux, Nova Caledonia, Zoöl., **1**, 1914, p. 418 ☿ ; Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 278, ☿ .

New Caledonia: La Madelaine (Sarasin and Roux).

The color pattern of this variety is unlike that of any of the other forms of Leptomyrmex, the head, except the mandibles, and the whole of the gaster being black, the remainder of the body and the appendages rufotestaceous.

LEPTOMYRMEX NIGER Emery

Fig. 14, *a*, *b*

Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 274 ☿ ; Emery, Nova Guinea, Zoöl. **9**, 1911, p. 249 ☿ ; Santschi, Formicidæ in Result. Sci. Voy. Ind. Orient. Neerland., **4**, 1932, p. 16, ☿ .

New Guinea: (L. Biró); Huongolf (Neuhaus); Siwi and forest between Lomira and Lake Kamakahwalla (Prince Leopold of Belgium); Merauki; Mt. Misim, 5850 ft. in rain forest (H. Stevens).

There are in New Guinea at least four black forms of Leptomyrmex of so nearly the same size, color and structure as to pass on superficial examination for *L. niger* Emery. Only one of these belongs to Emery's species, another proves to be a melanotic subspecies of *L. fragilis* F. Smith and two are independent, unpublished species. I here redescribe *niger* from a cotype received from Emery and two specimens recently collected by Mr. Stevens on Mt. Nizim, New Guinea at an elevation of 5850 ft., with emphasis on certain details not mentioned by Emery, but of importance in comparison with the two species described below.

Worker.— Length 8 mm.

Head, including the mandibles, twice as long as broad, and excluding these fully two-fifths as high as long at the front, the anteocular portion with slightly sinuate, subparallel cheeks, the postocular portion with rounded sides gradually converging to the slightly concave occipital border. Eyes distinctly behind the middle of the head,

small and elliptical, but convex. Mandibles broad and flat, their masticatory borders coarsely denticulate. Clypeus large, feebly convex in the middle, flattened at the sides, the anterior border straight, thick and bevelled. Frontal carinæ low, parallel, not closely approximated; frontal area distinct. Antennal scapes extending fully three-fifths their length beyond the occipital border, distinctly compressed. Thorax of the usual shape; pronotum fully one and two-thirds as long as broad, sharply truncated anteriorly, with straight, posteriorly diverging sides; mesonotum more than twice as long as broad, flattened, its dorsal surface straight in profile; epinotum rounded-rectangular, nearly as broad as long, with a pronounced transverse depression near its anterior end. Petiole nearly twice as long as broad, broader in front than behind, its node thick, with short perpendicular anterior surface, its summit rounded, with a shallow, longitudinal, median groove, its posterior surface long, flat and sloping, the ventral surface nearly straight, not projecting. Legs long and slender, both the femora and tibiæ rather distinctly compressed. Gaster broadly elliptical.

Distinctly shagreened and moderately shining throughout; mandibles more subopaque.

Hairs black, bristle-like, sparse, long on the venter, clypeus and coxæ, short on the tips of the femora, shorter, more delicate and oblique on the surfaces of the femora and tibiæ. Pubescence brownish, long, generally distributed but most abundant on the gaster and anterior portion of the head, on both these regions longer and less appressed, especially on the sides of the gaster, cheeks, clypeus and mandibles. Eyes hairless.

Brown black; palpi black; funiculi, knees and inner borders of the mandibles, except the teeth, yellowish brown; fore tarsi yellow, middle and hind tarsi white.

L. niger closely resembles *unicolor* but is at once distinguished by its longer, narrower head, less elongate gaster, different pilosity, pubescence, etc. Emery's figure of the head of *niger*, reproduced in my former paper, is too long and more like the head of the two following species.

Leptomyrmex lugubris sp. nov.

Fig. 14, *c*, *d*

Worker.— Length 6–7 mm.

Differing from *niger* in the following particulars: smaller and decidedly more slender, the integument, especially of the thorax thinner,

collapsible. Head narrower and longer, with larger, more nearly circular and more convex eyes. Cheeks straight and parallel, occipital border much narrower; dorsoventral diameter of head at front much shorter, only half its length without the mandibles. Frontal carinæ

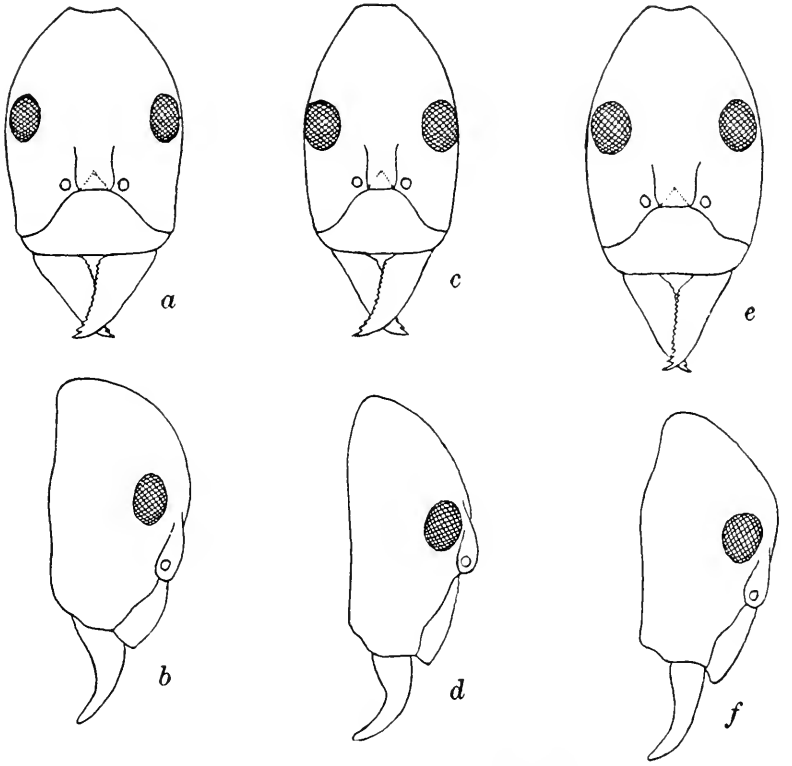

Fig. 14. *a* and *b*, dorsal and lateral aspects of head of *Leptomyrmex niger* Emery, worker; *c* and *d* of *L. lugubris* sp. nov., worker; *e* and *f* of *L. puberulus* sp. nov., worker.

more elevated and more approximated. Clypeus even flatter. Antennal scapes and legs more slender though compressed. Dorsal surface of pronotum very flat. Petiole much like that of *niger* but shorter, the longitudinal groove on the summit of the node more distinct, the posterior surface shorter and less sloping. Gaster more elongate elliptical.

Surface of body and appendages smoother and more shining. Pubescence grayish, not dense even on the gaster; hairs as in *niger*, except that they are fewer on the clypeus and absent on the tibiæ except in a very sparse and irregular row along the flexor borders. Eyes hairless.

Deep brownish black; palpi black; mandibles yellowish piceous, with blackish external borders; antennæ and legs dark brown, slightly paler than the body; tarsi and tibial spurs white.

Described from six workers taken by Mr. H. Stevens at the junction of Bulolo and Watut Creeks, Biolowat, 2000–3000 ft., New Guinea.

Leptomyrmex puberulus sp. nov.

Fig. 14, *e*, *f*

Worker.— Length 7–7.5 mm.

Somewhat larger than *lugubris* and intermediate in the width and thickness of the head between that species and *niger*, but more like the former in the slenderness of the thorax. Eyes even larger, more nearly circular and more convex than in *lugubris*. Frontal carinæ and area as in *niger*. Petiole like that of *lugubris* but with the groove in the summit of the node even deeper and broader. Scapes and tibiæ very slender, only slightly compressed. Gaster rather narrow, as in *lugubris*.

Very finely and superficially shagreened and with the exception of the gular surface distinctly less shining than *niger* and especially than *lugubris*.

Erect hairs as in the latter. Pubescence gray, long and abundant on all parts of the body and appendages, but especially on the head and gaster, oblique or suberect, even longer and more abundant on the scapes. Eyes hairy.

Brown black; sides and anterior portion of head somewhat paler, more castaneous brown; palpi, anterior border of clypeus, mandibles, except their teeth, and antennæ brownish yellow; bases of scapes dark brown; femora blackish brown; tibiæ somewhat paler, with their bases and spurs, and the tarsi white.

Described from fifteen specimens taken by Mr. H. Stevens, eleven in the Morobe District (type locality) and four at Biolowat, 2000–3000 ft., New Guinea. In possessing hairy eyes and in the abundant, oblique or suberect pubescence of the body and appendages this species is most like *L. unicolor* but is in other respects very different.

LEPTOMYRMEX FRAGILIS (F. Smith)

Wheeler, Proc. Amer. Acad. Arts Sci., **51**, 1915, p. 275, fig. 9, ☿ ♂; Emery, Nova Guinea, Zoöl., **5**, 1910, p. 532; *ibid.* **9**, 1911, p. 249 ☿.
Aru Islands: (A. R. Wallace).
Ceram: (Tavern).
British New Guinea: Moroka, Bujakori, Haveri, Paumomu River (L. Loria).
Dutch New Guinea: Mt. Cyclope, Manikion, Moaif, Senbani, Merauki, Baie Etna, Bivak-Leuvel.

This species seems to be closely related to the Australian *varians* but the postocular portion of the head of the worker is more elongated, with a longer constriction near the occipital border, which is shorter, and the genital appendages of the male are very different. Both worker and male of the typical *fragilis* have the body yellowish testaceous throughout. The gaster of the worker often has a yellowish brown spot on each side.

Subsp. FEMORATUS Santschi

L. fragilis var. *femorata* Santschi, Formicidæ in Result. Sci. Voy. Ind. Orient. Neerland., **4**, 1932, p. 17 (?) ☿ fig.
Dutch New Guinea: Siwi (Prince Leopold of Belgium).

In the worker of this subspecies the general color of the body is more reddish than in the typical form, the lateral spots on the gaster are nearly black and the middle and hind femora are brown.

Subsp. MELANOTICUS subsp. nov.

Fig. 15

Worker.— Length 6.5–7.5 mm.

Differing from the two preceding forms in its much darker color. Head, palpi, thorax, petiole, gaster and coxæ brown-black; sides of head, coxæ and femora more castaneous brown; scapes and tibiæ pale brown; mandibles, except the teeth, anterior border and corners of clypeus and funiculi brownish yellow; tarsi and extreme bases of tibiæ white or yellowish white.

Male.— Length 6.5 mm.

Head without the mandibles nearly twice as long as its width through the eyes, which are unusually large and convex, with feebly sinuate internal orbits and situated distinctly in front of the middle of the head. Cheeks more than half as long as the eyes, concave, con-

verging anteriorly. Postocular borders of head long, very feebly concave, rapidly converging to the short, straight occipital border. Ocelli large but not prominent. Mandibles small and narrow, with pointed tips, their masticatory border without denticles, somewhat longer than the basal border and curving into it without a perceptible angle. Clypeus as long as broad. Antennæ very long and slender, fully as long as the body; scapes two and one-half times as long as broad; first funicular joint half as long as the scapes, joint 2 of the same length as the first, succeeding joints much longer, feebly flexuous. Thorax long, mesonotum one and one-half times as long as broad,

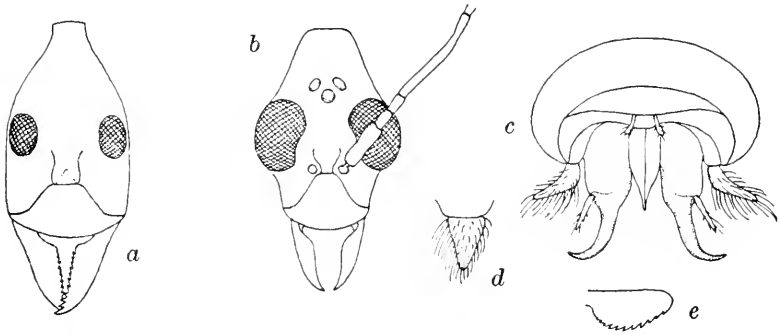

Fig. 15. *Leptomyrmex fragilis melanoticus* subsp. nov. *a*, head of worker, dorsal aspect; *b*, head of male, dorsal aspect; *c*, genitalia, posterior aspect; *d*, stipes and *e*, sagitta, lateral aspect.

narrowed anteriorly where it is very convex and strongly overarching the pronotum; mesepisterna very protuberant as in the other species; epinotum low, its base straight in profile, nearly three times as long as the straight, sloping declivity, with which it forms a distinct angle, marked on each side by the projecting epinotal stigma. Petiole from above twice as long as broad, broader behind than in front, with straight sides; in profile without a distinct node, its dorsal and ventral surfaces nearly parallel, the dorsal slightly convex, the ventral straight. Genitalia retracted basally, their appendages exserted and spread; stipites small, subtriangular, longer than broad, with bluntly rounded tip, their ventral border with numerous long cilia; volsella long, flattened, hook-shaped, membraneous at the base where it bears a slender, styliform lacinia; sagittæ flattened, subtriangular, with straight dorsal border, rounded tip and convex, serrate ventral border. Legs ex-

tremely long and slender, middle tibiæ bowed, fore and hind tibiæ flexuous, the latter very strongly so. Wings short, measuring only 5 mm.; apterostigmal appendage minute, nodiform; basal half of cubital vein absent.

Lustrous or somewhat shining, very finely shagreened or punctulate.

Hairs and pubescence pale, the former short, absent, except on the stipites, lower surface of petiole and anterior border of clypeus; pubescence rather long, appressed, not very dense, generally distributed.

Head, thorax, gaster, dorsal surface of petiole and coxæ dark brown; mandibles, clypeus, scapes, front, sutures of thorax, wing-insertions, ventral portion of petiole and genital appendages yellowish brown or brownish yellow; femora paler brown than the coxæ, their tips, the tibiæ, tarsi and funiculi white. Wings distinctly infuscated, with brown veins.

Described from six workers and two males taken by Mr. W. J. Eyerdam at China Straight, New Guinea (Papua).

That this is really only a dark form of *fragilis* and not a distinct species is shown by the close agreement of the genitalia with Emery's description of these appendages in the typical *fragilis*. The male of this species, as will be seen from my description and figures is quite as unlike any of the other Leptomyrmex males as that of *darlingtoni*.

Leptomyrmex gracillimus sp. nov.

Fig. 16

Worker.— Length 9–9.5 mm.

Very slender; head without the mandibles somewhat more than twice as long as broad, with the moderately large and convex eyes distinctly in front of the middle; preocular portion subrectangular, broader than long, with straight, parallel cheeks, the postocular with feebly convex sides very gradually converging to the short, straight, delicately marginate occipital border. Mandibles large and flat, their external borders nearly straight, their masticatory borders with only the larger apical denticles set at right angles to the blade, the others serrate and directed backward. Clypeus large, feebly convex but not subcarinate in the middle, depressed on the sides, the anterior border thin, straight in the middle, broadly rounded at the corners. Frontal carinæ parallel; frontal area distinct. Antennæ very long and slender, scapes feebly and uniformly curved, distinctly compressed, extending more than three-fifths their length beyond the occipital border.

Thorax very long and slender; pronotum nearly twice as long as broad, its sides and anterior border straight, its dorsal surface straight in front and very feebly convex behind; mesonotum fully twice as long as its width at its dorsal junction with the epinotum, its dorsal outline in profile somewhat concave anteriorly; epinotum one and two-thirds times as long as its posterior width, subrectangular behind, semicircularly rounded in front, its base in profile straight, twice as long as the very sloping declivity and arcuately rounding into it. Petiole twice as long as broad, with nearly parallel sides, the node in

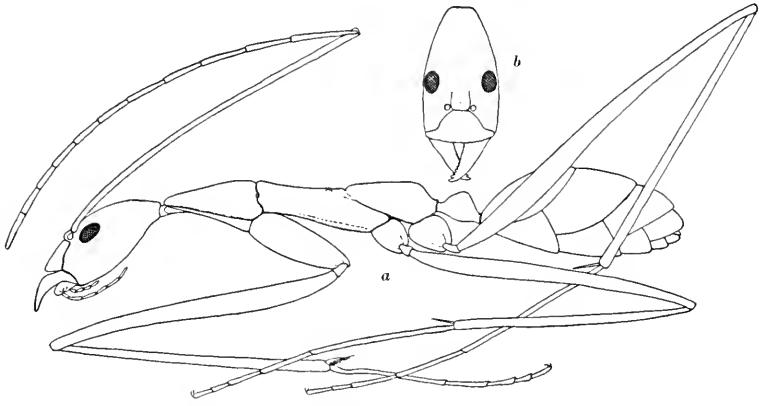

Fig. 16. *Leptomyrmex gracillimus* sp. nov., Worker. *a*, profile aspect; *b*, head, dorsal aspect.

profile with the anterior and posterior surfaces straight and subequal, meeting at a rounded right angle, the anterior surface feebly, longitudinally grooved; ventral surface not strongly convex. Gaster elongate-elliptical, fully three times as long as broad, the first segment longer than broad, narrowed anteriorly. Legs very slender and greatly elongated, especially the fore and hind pairs; tibiæ distinctly compressed.

Very finely and indistinctly shagreened, almost subopaque, the gula and sides of head more shining; mandibles granular, with a row of coarse punctures along the masticatory border.

Hairs reddish brown, few, sparse, long and erect, confined to the venter, fore coxæ and clypeus; tibiæ with an uneven row of short, pale, oblique hairs or bristles along their flexor border. Pubescence whitish, appressed, distinct and moderately long and dense on the

head and gaster, shorter and much more dilute on the thorax, petiole and appendages.

Pale testaceous or brownish yellow, sides of gaster indistinctly clouded with brown; middle and hind tarsi white, mandibular teeth red.

Described from five specimens taken by Mr. L. Wagner at Finschhafen, New Guinea.

This species is rather closely related to *L. fragilis*, but is decidedly larger and more slender and the sides of the long, attenuated postocular portion of its head are very feebly and evenly convex throughout their length, without any indications of a constriction.

ADDENDA

Among some ants received from Mr. John Clark, Curator of Entomology in the Melbourne Museum, I find two workers labelled "*L. froggatti*". They prove to belong to a new form of *erythrocephalus*, which is here briefly described as

Subsp. *clarki* subsp. nov.

Worker.— Length 8–8.5 mm.

Differing from all the previously described forms of the species in coloration, being brown black, with the funiculi beyond the first joint, the thoracic sutures, metanotal region, posterior half of the epinotum, petiole, trochanters, middle and hind coxae and tips of fore coxae, tarsi and extreme bases of tibiae rufotestaceous. Spurs of the middle and hind tibiae black. Pilosity black, very short and sparse, confined to the mandibles, clypeus, venter and flexor surfaces of the tibiae. Pubescence very short, dilute and indistinct.

Two specimens from Fletcher, Queensland (E. Sutton). This is the only form of *erythrocephalus* with an entirely black head.

I find that I have overlooked an important account of *Leptomyrmex niger* and *fragilis* by Karawaiew (Ameisen aus dem Indo-Australischen Gebiet. Treubia, **8**, 1926, pp. 430–433). He took many workers and males of the former species on Kobror Island, in the Aru Archipelago, and describes the male in detail with two figures (Figs. 5 and 6), one of which shows the genitalia. The volsellæ terminate in a simple hook as in *fragilis melanoticus*. The single very flourishing colony of *niger*, which Karawaiew found, was inhabiting a nest one and one-half to

two meters long and consisting of loose earth on each side of a decayed log, into which the ants' galleries partially extended.

He took workers of *L. fragilis* on both Kobror and Wammar Islands, in the Aru Archipelago, and describes one of the nests as consisting of earth between two roots at the base of a tree trunk, above and below a termitarium, which was also inhabited by the ants. The whole structure, including the termitarium was 35 cm. high and half as broad. The descriptions indicate that the two Papuan species of *Leptomyrmex*, unlike the Australian species which I have observed, are able to construct nests, but the occupation of the deserted termite galleries by *fragilis* and of possibly preformed cavities in the log by *niger*, suggests that the earthen portions of the nests may also have been constructed by previous occupants.

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THE ANOLES
II. THE MAINLAND SPECIES FROM MEXICO SOUTHWARD

By Thomas Barbour

CAMBRIDGE, MASS., U.S.A.:
PRINTED FOR THE MUSEUM
June, 1934

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No. 4.— *The Anoles. II. The Mainland Species from Mexico Southward*

By Thomas Barbour

Introduction

This list is in no sense final. The author is under no delusions as to its unsatisfactory nature. The final arrangement of Anolis, especially the indicating of phyla, of "Formen kreisen," the probable division of this unwieldy genus into several genera and a complete list of the species will not be written for many, many years. Nevertheless our knowledge of Anolis has advanced enormously since the appearance of the second volume of the Catalogue of Lizards in the British Museum from the pen of Dr. G. A. Boulenger in 1885.

This list then is simply an attempt to set forth our present state of knowledge.

I list those forms of which the validity and status is well established and all others concerning which there is no information to counter-indicate their validity. The synonymy is not complete nor intended so to be. It contains the important references since the work of Boulenger which I have just mentioned. For convenience, however, the original description is given and the type locality is likewise recorded as well as the place where the types are preserved. The last information, however, is not complete for some cotypes have no doubt been distributed of which I know not, while in other cases they appear to be lost.

Where species have been originally proposed under some generic name other than Anolis this name appears within parentheses. Boulenger's Catalogue of 1885 gives full details concerning this synonymy of years ago and this stands except where his conclusions are counter-indicated herein.

This little paper is the complement to one which I published in the Bulletin of the Museum of Comparative Zoölogy, Vol. 70, 1930, p. 103–144, in which I listed all of the Insular Anoles known to that year.

I have added occasional notes as to seasonal appearance or abundance where I have information worth recording.

It is a pleasure to record the assistance which I have had from my old friend and student Professor E. R. Dunn, who has read the whole manuscript and added many valuable notes and suggestions, as well as from my other friends, Mrs. Frederick M. Gaige, Miss Doris Cochran, and needless to say I have never written a paper which

amounted to much of anything without having benefited from the advice and sage criticism of Dr. Stejneger. No one of these scholars is, however, to be held accountable for errors of omission or commission.

Anolis aequatorialis Werner, Zoöl. Ans., **17,** 1894, p. 157 (type locality, Ecuador; type in Vienna Institute of Zoöl. and Comp. Anat.; collected by Schmarda).

Said to be allied to *A. pachypus* of Central America. The type should be re-examined.

Anolis albi Barbour, Proc. N. Engl. Zoöl. Club., **12,** 8 Feb. 1932, p. 101 (type locality, Andagoya on the San Juan River above Buenaventura, Colombia; types in Mus. Comp. Zoöl.; Dr. W. H. White leg.).

A species of the excessively rainy forest of the Choco, which seems to be without close allies among the many forms described from that region.

Anolis altae Dunn, Proc. N. Engl. Zoöl. Club, **12,** 7 Aug. 1930, p. 17 (type locality, Acosta Farm, 7000 ft. alt., Volcan Barba, Costa Rica; type, Mus. Comp. Zoöl. 29,385; collected by E. R. Dunn and Manuel Valerio).

Most closely allied to *Anolis concolor.*

Anolis andianus Boulenger, Cat. Liz. Brit. Mus. **2,** 1885, p. 60 (type locality, Milligalli, Ecuador, 6200 ft. alt.; type in Brit. Mus., 1 ♀; collected by E. Whymper).

A species somewhat similar to *Anolis chloris* but larger, with the dorsal scales tubercular rather than keeled.

Anolis antonii Boulenger, Ann. Mag. Nat. Hist., (8), **2,** 1908, p. 517, fig. 2 (type locality, San Antonio, southwestern Colombia; type in Brit. Mus., 1 ♀; collected by Merwin G. Palmer).

Anolis tolimensis Werner, Zoöl. Anz. **47**, 1916, p. 303 (type locality, Cañon [not "Coñon"] de Tolima, 1700 m. alt., Colombia; types 8 specimens in Landesmuseum, Brünn, Austria; collected by Fassl.).

The allocation of *A. tolimensis* Werner to the synonymy of *A. antonii* is probably correct but better topotypical material, together with an actual comparison of the types is obviously desirable.

Anolis apollinaris Boulenger, Proc. Zoöl. Soc., London, 1919, p. 79, fig. 4, a-b (type locality, near Bogota, Colombia; type in Brit. Mus., 1 ♀; collected by Hermano Apolinar Maria). Burt, Proc. U. S. Nat. Mus., Wash., **78**, Dec. 1930, p. 8 (Macas, Oriente, Ecuador; collected by Madira). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 255 (many locs. in Colombia).

Burt maintains that this species is allied to *A. chrysolepis* and mentions its similarity to *A. gemmosus* with which it may be identical or subspecifically connected.

Anolis aureolus Cope, Proc. Am. Philos. Soc., **22**, 1885, p. 390 (type locality, Yucatan; types now Mus. Comp. Zoöl., 10,929 [formerly U. S. Nat. Mus. 25,858] from Yucatan and 24,850–1 and 25,854–7 in U. S. Nat. Mus.; collected Yucatan, by A. Schott; Guatemala, by Henry Hague). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 49 (no specimens). Günther, Biol. Cent. Amer. Rept., 1885, p. 45 (nominal mention). Barbour and Cole, Bull. Mus. Comp. Zoöl., **50**, 1906, p. 148 (Chichen Itza, Yucatan; in Mus. Comp. Zoöl.; collected by L. J. Cole).

Anolis acutirostris Ives, Proc. Acad. Nat. Sci. Phila., 1891, p. 459 (type locality, Citilpech, Yucatan; type, a single ♂ No. 7889, Acad. Nat. Sci. Phila. collection). Barbour and Cole, Bull. Mus. Comp. Zoöl. **50**, 1906, p. 149 (Chichen Itza, Yucatan; Mus. Comp. Zoöl. Coll.; L. J. Cole, Leg.).

Apparently a very common species in the dry scrub of central Yucatan.

Anolis baccatus Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 59, pl. 14, fig. 14 (type locality, Mexico; type in Paris Mus., 1 ♀; collected by Sallé). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 54 (no specimens). Günther, Biol. Cent. Amer., Rept., 1885, p. 46 (nominal

mention). Cope, Proc. Am. Philos. Soc., **22**, April 17, 1885, p. 391 (diagnosis).

We have in this Museum a single specimen apparently representing this species from Sepaquite, Guatemala. I have photographs of the type in the Paris Museum.

Anolis beckeri Boulenger, Proc. Zoöl. Soc. London, 1881, p. 921 (type locality, Yucatan; types in Royal Belgian Mus., 2 ex.; collected by M. A. Boucard). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 46 (no specimens). Günther, Biol. Cent. Amer., Rept., 1885, p. 45 (nominal mention). Barbour and Cole, Bull. Mus. Comp. Zoöl., **50**, 1906, p. 149 (Chichen Itza, 1 in Mus. Comp. Zoöl.; collected by L. J. Cole).

We have this species only from the vicinity of Chichen Itza, where it seems to be rare.

Anolis binotatus Peters, Monatsb. Berl. Acad., 1863, p. 140 (type locality, Guayaquil; type no. 4685 in Berlin Mus.; collected by Consul Reisf.). Bocourt (part), Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 92, livr. **3**, 1874, pl. 16, fig. 22–23 (fig. 22 is of type).

I thought I took this species in Darien, but I was mistaken and I have not seen it.

Anolis (Dactyloa) biporcatus (Wiegmann), Herp. Mex., 1834, p. 47 (type locality, not specifically mentioned, Mexico; type in Berlin Mus.).

Anolis biporcatus Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 98, pl. 15, fig. 8 (had a cotype and others from several localities in Guatemala and "Cuba" [in errore]). O'Shaughnessy, Ann. Mag. Nat. Hist., (4), **15**, 1875, p. 274 (a short note referring Cope's *A. vittigerus* to the synonymy). Boulenger, Cat. Liz. Brit. Mus. **2**, 1885, p. 88 (many localities in Cent. Amer., Venez., Ecuador and Trinidad, these, in part at least, referable to *A. vittigerus*). Günther, Biol. Cent. Amer. Rept., 1885, p. 52 (synonymy, list of localities, part).

Anolis carolinensis (part) Duméril & Bibron, Erp. Gén., **4**, 1837, p. 127 (erroneous allocation to synonymy).

Anolis principalis (part) Gray, Cat. Liz. Brit. Mus., 1845, p. 202 (erroneous allocation to synonymy).

Anolis bourgaei Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 76, pl. 15, fig. 9 (type locality, Huatusco and Orizaba, Vera Cruz, Mexico; types first ex. in Berlin Mus., second in Paris Mus.; collector anonymous and Bourget). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 74 (no specimens).

I wish the type of the species might be found and settle the identity of this doubtful form. I had confused it with *Anolis copei* but Dr. Dunn has corrected me in this. It is not at all improbably an earlier name for what we are calling *Anolis petersii*.

Anolis bitectus Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 171 (type locality, Western Ecuador; types 2 ex. in Brit. Mus.; collected by Fraser). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 71, pl. 5, fig. 2 (types only). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 256 (Ventura, Ecuador).

I have seen no specimens of this apparently valid species.

Anolis bocourtii Cope, Jour. Acad. Nat. Sci. Phila., (2), **8**, 26 Nov. 1875, p. 167 (type locality, Nauta, Peru; cotypes in Acad. Nat. Sci. Phila., Mus. Zoöl. Univ. Mich. and Mus. Comp. Zoöl.; collected by Orton). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 50 (no specimens).

Orton collected a fine series of this form. I have seen no recent material.

Anolis boettgeri Boulenger, Ann. Mag. Nat. Hist., (8), **7**, 1911, p. 19 (type locality, Huancabamba [in errore] really Oxapampa, Eastern Peru, types 4 ♀ in Brit. Mus.; collected by Enrique Boettger.

A fine distinct species of which there is a topotype in the Mus. Comp. Zoöl.

Anolis bombiceps Cope, Jour. Acad. Nat. Sci. Phila., (2), **8**, 26 Nov. 1875, p. 168 (type locality, Nauta, Peru; type not in Acad. Nat. Sci.

Phila., lost; collected by Orton). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 94 (no specimens).

More intensive collecting at the type locality is necessary to establish the status of this apparently valid form.

Anolis boulengeri O'Shaughnessy, Proc. Zoöl. Soc., London, 1881, p. 242, pl. 24 (type locality, Canelos, Ecuador; type a ♀ in Brit. Mus.; collected by Buckley). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 58 (a note only that the species may be a synonym of *A. punctatus*).

More material is needed to determine the status of this form also. It is most unfortunate to describe Anoles from single *female* specimens as also Boulenger did on all too many occasions.

Anolis breviceps Boulenger, Proc. Zoöl. Soc. London, 1913, p. 1031, pl. 107, fig. 1 (type locality, Peña Lisa, Condoto, Choco, Colombia, 300 ft. alt.; types 3 ex. in Brit. Mus.; collected by Dr. H. G. F. Spurrell).

Of this species we have a specimen from Andagoya, not far from the type locality. It is a good, distinct species.

Anolis buckleyi O'Shaughnessy, Proc. Zoöl. Soc. London, 1880, p. 492, pl. 49 (type locality, Canelos, Ecuador, types 2 ♂ in Brit. Mus., collected by Buckley). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 58 (no new specimens). Cope, Proc. Am. Philos. Soc., **22**, Oct. 2, 1885, p. 101 (Pebas, Peru; collected by Hauxwell).

Mr. O. C. Felton has recently sent us a topotype of this species right from Canelos.

Anolis capito Peters, Monatsb. Berl. Acad. 1863, p. 142 (type locality, Costa Rica; types 2, No. 4086, in Berlin Mus.; collected by Dr. C. Hoffman). Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 101, livr. **4**, 1874, pl. 16, fig. 27 (specimens from Vera Paz and Tabasco; figures head of the type). Cope, Jour. Acad. Nat. Sci. Phila., (2), **8**, 1875, p. 124 (Old Harbor near Pt. Limon, Costa Rica). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 94 (description, range Tabasco to Costa Rica. Specimen from Vera Paz in Brit. Mus.). Günther, Biol. Cent. Amer. Rept., 1885, p. 52 (synonymy, list of localities).

Cope, Proc. Am. Philos. Soc., November 20, 1885, p. 276 (Nicaragua; collected by Bransford). Dunn, Proc. New England Zoöl. Club, **12**, August 7, 1930, p. 18 (diagnosis, distribution).

Anolis carneus Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 171 (type locality, Lower Vera Paz forests, Guatemala; type an adult ♀ and juvenile ♂ in Brit. Mus.; collected by Osbert Salvin).

Anolis longipes Cope, Proc. Am. Philos. Soc., **31**, Dec. 23, 1893, p. 343 (type locality, Palmar and Boruca, Costa Rica; type from Palmar in Amer. Mus. Nat. Hist. No. 16,350; Boruca; Amer. Mus. Nat. Hist. 16,351–2; collected by Cherrie). Dunn, Proc. N. Engl. Zoöl. Club, **12**, August 7, 1931, p. 21 (synonymy, diagnosis, distribution).

Occurs from Mexico to Darien.

Anolis chloris Boulenger, Proc. Zoöl. Soc. London, 1898, p. 110, pl. 10, fig. 3 (type locality, Paramba, Ecuador; type 1 ♂ in Brit. Mus.; collected by W. F. H. Rosenberg).

The Museum has a paratype from Paramba.

Anolis chrysolepis Duméril & Bibron, Erp. Gén., **4**, 1837, p. 94 (type locality, Guyana [French Guiana & Surinam]; types 2 specimens in Paris Museum). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 89 (synonymy, redescription, new localities — some obviously wrong). Barbour, Bull. Mus. Comp. Zoöl. **70**, April, 1930, p. 118 (synonymy). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 257 (many localities in British Guiana; crit.).

The common, large, woodland Anole of Trinidad, occurring also in the Guianas and probably in the forest region of the Orinoco delta.

Anolis concolor Cope, Proc. Acad. Nat. Sci. Phila., 1862, p. 180 (type locality, Nicaragua; types 4 in U. S. Nat. Mus., No. 6055; collected by Charles Wright). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 74 (no specimens). Günther, Biol. Cent. Amer., Rept., 1885, p. 48 (nominal mention only). Dunn, Proc. N. Engl. Zoöl. Club, **12**, August 7, 1930, p. 17 (discussion).

Anolis refulgens (non Schlegel) Hallowell, Proc. Acad. Nat. Sci. Phila., 1860, p. 480 (Nicaragua).

The Museum has a cotype Mus. Comp. Zoöl. No. 22,341 from Nicaragua and a good series from Old Providence Island which I got last year.

Anolis copei Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 77, pl. 15, fig. 10 (type locality, Santa Rosa de Pansos, Guatemala; types in Paris Museum; collected by Miss. Sci. Mex.). Cope, Jour. Acad. Nat. Sci. Phila., (2), **8**, 1875, p. 121 (3 in Phila. Acad. from Old Harbor, near Pt. Limon, Costa Rica). Cope, Proc. Am. Philos. Soc., **22**, November 11, 1885, p. 276 (Nicaragua, collected by Bransford). Dunn, Proc. N. Engl. Zoöl. Club, **12**, August 7, 1930, p. 19 (discussion, synonymy).

Anolis copii Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 65 (synonymy, description. "W. Ecuador" in errore?), Günther, Biol. Cent. Amer. Rept., 1885, p. 47 (Costa Rica; collected by Salvin). Boulenger, Proc. Zoöl. Soc., London, 1898, p. 111 (Paramba, Ecuador, collected by Rosenberg).

Anolis fraseri (part) Günther, Proc. Zoöl. Soc., London, 1859, p. 407 (type locality, Andes of Western Ecuador; types in Brit. Mus.; collected by Fraser; 1 ♀ — *A. copei* included in series of cotypes). Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, pl. 15, fig. 10 (figures ♀ cotype of *A. fraseri* which was really an *A. copei*.)

Anolis brevipes Boettger, Cat. Rept. Senck. Mus., **1**, 1893, p. 57 (type locality, Cairo Plantation, La Junta, near Pto. Limon, Costa Rica; type 1 ♀ Senckenberg Mus., No. 5047, 1 a; collected by Carl Fleishmann).

Anolis obtusirostris Peters, Mon. Berl. Acad., Jan. or Feb., 1874, p. 741 (type locality, Chiriqui Province, Panama; type 1 ex. Berlin Mus., No. 7,829). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 95 (redescription, no specimens).

Anolis petersii Schmidt, Smith. Misc. Coll., **89**, 1, March 16, 1933, p. 9 (Gatun, Panama Canal Zone).

I agree with Dunn that this is the southern representative of *Anolis petersii* which occurs in Mexico and part of Guatemala. This species, or perhaps really better subspecies, ranges southward to Panama. It is the rather sluggish, heavy bodied, green Anole which is not uncommon in wooded areas of the Canal Zone especially

during the rainy season. I do not mean by this that it is strictly a forest species for it is not.

Dr. Stejneger writes me that the Library of Congress copy of the Berlin Monatsberichte has the original covers and internal evidence shows that Peters' important paper appeared between 3 Jan. and 10 Feb. 1874. *Copei* of Bocourt definitely appeared in 1873, for the Smithsonian copy of his work is in the original covers also.

Anolis crassulus Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 173 (type locality, Coban, Guatemala, 2 spec., and "Central America," 1 spec.; types in Brit. Mus. and Acad. Nat. Sci. Phila. 8,023–27, Central Guatemala, Vaux coll., a probable cotype in U. S. Nat. Mus., No. 13,977 from Nicaragua). Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 82, livr. **4**, 1874, pl. 17, fig. 17 (Plateau of Guatemala). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 81 (synonym and description). Günther, Biol. Cent. Amer., Rept., 1885, p. 50, pl. 27, fig. F. (Vera Cruz, fide Sumichrast *in litt.* only). Cope, Proc. Am. Philos. Soc., **22**, November 20, 1885, p. 276 (Nicaragua; collected by Bransford).

Dunn says this species is distinct from *Anolis tropidonotus* of Mexico. There are none in this Museum.

Anolis cumingii Peters, Mon. Berl. Acad., 1863, p. 140 (type locality, Mexico; type 1 ♀ in Berlin Mus.; collected by Herr. Cuming). Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 89, livr. **3**, 1874, pl. 16, fig. 20 (fig. of type and description of ♀ type and ♂ in Milan Mus.). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 80 (no specimens, difference from *A. sallaei* noted). Günther, Biol. Cent. Amer. Rept., 1885, p. 50 (nominal mention only).

Another species of very unsatisfactory status. I have seen no specimens.

Anolis cupreus Hallowell, Proc. Acad. Nat. Sci. Phila., 1860, p. 481 (type locality, Nicaragua; types in U. S. Nat. Mus. and Mus. Comp. Zoöl.). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 80 (synonymy, description, records for Guatemala and Costa Rica).

Günther, Biol. Cent. Amer., Rept., 1885, p. 50 (synonymy, copy of Blg. l. c., list of locality records). Boettger, Cat. Rept. Senckenb. Mus., **1**, 1893, p. 59 (San José, C. R.). Dunn, Proc. N. Engl. Zoöl. Club, **12**, August 7, 1930, p. 17 (Discussion of status, distribution). Schmidt, Field Mus. Publ. Zoöl., **12**, 16, Nov. 21, 1928, p. 195 (Salvador).

Anolis hoffmanni Peters, Monatsb. Berl. Acad., 1863, p. 142 (Costa Rica, collected by Hoffmann). Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 86, pl. 15, fig. 15–16 (fig. of type and a ♂ from Costa Rica, suspects close similarity with *cupreus*).

Anolis dollfusianus Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 84, livr. **3**, 1874, pl. 16, fig. 19 (3 cotypes from forest near San Agustin, and 1 from Volcan Atitlan, alt. 1,200 m., Guatemala, collected by Dollfuss of Miss. Sci. Mex.).

Dunn remarks that this species is common in Upper Costa Rica and Nicaragua. It, with *Anolis intermedius*, is very common about San José. There are large series in the Museum as well as cotypes.

Anolis cymbops Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 173 (type locality, Vera Cruz, Mexico; type 1 ♀ in Brit. Mus.). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 73 (redescription). Günther, Biol. Cent. Amer. Rept., 1885, p. 48 (nominal mention only).

I have never seen this species at all.

Anolis damulus Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 169 (type locality, unknown; type in Brit. Mus., ♂). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 47, pl. 2, fig. 2 & 2 a (redescription; type poorly figured).

Dr. A. G. Ruthven, who has examined the type of this species tells me he believes it to be valid. No further information as to the range of the species has been forthcoming.

Anolis eulaemus Boulenger, Ann. Mag. Nat. Hist., (8), **2**, 1908, p. 516, fig. 1 (type locality, Las Pavas, southwestern Colombia; type in Brit. Mus., 1 ♂; collected by Merwin G. Palmer).

Boulenger says that this species is related to *Anolis fasciatus* of which I suspect it may be but a subspecies.

Anolis fasciatus Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 59, pl. 3, fig. 1 (type locality, Guayaquil, Ecuador; type 1 ♂ in Brit. Mus.; collected by Mr. Fraser). Peracca, Bol. Mus. Torino, **19**, 465, 1904, p. 3 (3 examples Rio Peripa, Ecuador shows that *elegans* goes into synonymy and cites Boulenger as agreeing). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 258 (near Bucay; Sumaco Mts., and Normandia, Ecuador).

Anolis elegans Boulenger, Proc. Zoöl. Soc. London, 1898, p. 109, pl. 10, fig. 2 (type locality, Chimbo, Ecuador; type 1 ♂ in Brit. Mus.; collected by W. F. H. Rosenberg).

Anolis irregularis Werner, Verh. Ges. Wien., **51**, 1901, p. 594 (type locality, unknown; type a ♂ in Berlin Mus., fide Dr. O. Wettstein *in litt.*).

Another species of which, I am sorry to say, we have no examples.

Anolis festae Peracca, Bol. Mus. Torino, **19**, 465, 1904, p. 4 (type locality, Balzar, humid coastal plain of Ecuador; types 2♂ and 1♀ in the Royal Museum, Turin, Italy; collected by Dr. E. Festa).

An apparently valid species known from the types only.

Anolis fraseri (part) Günther, Proc. Zoöl. Soc. London, 1859, p. 407, (type locality, Andes of Western Ecuador; types in Brit. Mus., originally included 1 ♀ *A. copei;* collected by Fraser). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 65, pl. 4 (specimens from Quito and Nañegal beside type; no mention as to which one is figured). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 258 (Rio Pescado and Bucay, Ecuador).

Anolis deVillei Boulenger, Bull. Soc. Zoöl. France, 1880, p. 42 (type locality, Quito, Ecuador; type 1 in Paris Museum).

Another Ecuadorian species of which I have not seen specimens.

Anolis fusco-auratus D'Orbigny, Voy. Amer. Mer., Rept., pl. 3, fig. 2, (type locality, "Chile"; type in Paris Museum, collected by D'Orbigny). Duméril & Bibron, Erp. Gén., **4**, 1837, p. 110 (redescription); Guichenot in Gay, Hist. Chile Rept., 1848, p. 21. Bocourt, Nouv. Archiv. Paris Mus., **6**, 1870, Bull. p. 15 (type locality corrected Prov. Moxas, Bolivia). Miss. Sci. Mex., Rept. livr. **2**, 1873, pl. 14, fig. 16 (Bolivia, Quito & Brazil). Boulenger, Bull. Soc. Zoöl. France, **5**, 1880, p. 42 (Quito); Cat. Liz. Brit. Mus., **2**, 1885, p. 48 (description, synonymy, additional locality records); Zoöl. Rec. 1887, rept. p. 10 (*A brunetti* = *A. fusco-auratus*). Peracca, Bull. Mus. Torino, **19**, 465, 1904, p. 2 (Gualaquiza, Ecuador). Burt, Proc. U. S. Nat. Mus., Wash., **78**, 6, December, 1930, p. 8 (Hyutaihan, Lower Amazon, Brazil). Burt. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 259 (many localities in British Guiana, Colombia and Ecuador).

Dactyloa fusco-aurata Fitzinger, Syst. Rept., 1843, p. 67. Tschudi Faun. Peru, 1845, p. 24 (Vitoc, Peru).

Anolis viridaeneus, Peters, Mon. Berl. Ac., 1863, p. 147 (Quito; type, compared with type of *fusco-auratus* in Paris by Bocourt, declared identical).

Anolis brunetti (sic) Thominot, Bull. Soc. Philom., (7), **11**, 1887, p. 184 (type 1 ex. Brazil, in Paris Mus., collected by Brunet).

We have this species from the Rio Ucayali, Peru where it is common, as well as from Buenavista, Dept. of Santa Cruz, Bolivia. From the latter locality Mr. José Steinbach has sent a fine suite to the University of Michigan Museum.

Anolis gadovii Boulenger, Proc. Zoöl. Soc., London, 1905, **2**, p. 245 (type locality, Tierra Colorada, So. Guerrero, Mexico; type in Brit. Mus.; collected by Gadow).

Known from the type only.

Anolis gemmosus O'Shaughnessy, Ann. Mag. Nat. Hist., (4), **15**, 1875, p. 280 (type locality, unknown; type in Brit. Mus.; collected by J. Brenchley). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 60, pl. 3, fig. 2 (description and locality, Intac, Ecuador). Fowler, Proc. Acad. Nat. Sci. Phila., 1913, p. 169 (Bucay, Ecuador). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 256.

Burt suspects that *Anolis apollinaris* may be a synonym or at most a Colombian subspecies of this form. I suspect that the latter surmise is the correct one.

Anolis godmani Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 85 (type locality, Guatemala; (This cotype in Brit. Mus. is *A. limifrons*). Mt. Irazu, Costa Rica; cotypes 5 in Brit. Mus., 2 in Mus. Comp. Zoöl.; collected by Salvin & Godman). Dunn, Proc. N. Engl. Zoöl. Club, **12**, August 7, 1930 (status).

According to Dunn this species differs from *Anolis limifrons* only in having keeled ventrals not smooth ones.

The Museum has two specimens from Navarro, Costa Rica, taken by Dr. E. R. Dunn. He informs me that it is really an annectant between *A. limifrons* and *A. tropidogaster*. We agree that as it has a rather well defined range the name had best be maintained.

Anolis gracilipes Boulenger, Proc. Zoöl. Soc. London, 1898, p. 112, pl. 11, fig. 3 (type locality, Paramba, Ecuador; types 4 ex. in Brit. Mus.; collected by W. F. H. Rosenberg).

I know of no specimens other than the types having been taken.

Anolis granuliceps Boulenger, Proc. Zoöl. Soc. London, 1898, p. 111, pl. 11, fig. 2 (type locality, Paramba, Ecuador; types several specimens in Brit. Mus.; collected by W. F. H. Rosenberg).

Another form known from the type series only.

Anolis guentheri Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 61, pl. 14, fig. 15 (type locality, Mexico; type 1 ex. Paris Mus., ex. Mus. Milan). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 54 (redescription, no specimens). Cope, Proc. Am. Philos. Soc., **22**, April 17, 1885, p. 391 (diagnosis).

I know of no specimen of this species with a definite locality nor have I ever seen a single individual.

Anolis heliactin Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 172 (type locality, Mexico; type, in poor condition, head only well preserved; 1 ex. Acad. Nat. Sci. Phila., No. 7,914 ex. Paris Mus.). Bocourt, Miss. Sci. Mex. Rept. livr. **2**, 1873, p. 106, pl. 8, fig. 4, 4a, 4b, 4c, pl. 16, fig. 32 (Oaxaca, Mex., 1 ex. Paris; collected by Sallé). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 72, (redescription, 1 example, no locality, Brit. Mus.).

A southern Mexican species which I have never seen but which, from Bocourt's figure, must be a singularly lovely little form.

Anolis humilis Peters, Mon. Berl. Akad., 1863, p. 138 (type locality, Veragua; type no. 500 Berl. Mus.; collected by von Warszewicz; cotype in Paris Mus.). Bocourt, Miss. Sci. Mex., Rept., livr. **3**, 1873, p. 105, pl. 8, fig. 7 pl. 16, fig. 31 (notes and figures of a cotype). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 82 (description, record for "Vera Paz," [loc.?]). Dunn, Proc. N. Engl. Zoöl. Soc., **12**, 1930, p. 16, 23. Schmidt, Smith. Misc. Coll., **89**, 1, March 16, 1933, p. 8 (Cerro Brujo, Prov. Colon, Panama).

Anolis quaggulus Cope, Proc. Am. Philos. Soc., **22**, April 17, 1885, p. 391 (type locality; San Juan R., Nicaragua; type 1 ex., No. 24,979, U. S. Nat. Mus.; collected by R. Kennicott). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 83 (description but had seen no specimen). Cope, Proc. Am. Philos. Soc., **22**, November 20, 1885, p. 276 (Nicaragua, coloration).

It occurs from Darien to Nicaragua.

We have an enormous series from many places in Costa Rica and Honduras as well as western Panama.

Anolis impetigosus Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 174 (type locality, unknown; type 1 ex. Brit. Mus.). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 55, pl. 2, fig. 3 (description, no new specimens).

Known from an unique with no locality. Imagine making such a specimen the type of a new species; but this was not considered a sin in 1864!

Anolis incompertus incompertus Barbour, Proc. N. Engl. Zoöl. Club, **12**, 8 Feb. 1932, p. 99 (type locality, Villavicencio, Terr. of San

Martin, Colombia; type series in Mus. Comp. Zoöl.; Brother Niceforo Maria leg.).

Probably near *A. lemniscatus* and from a region hitherto unexplored herpetologically. Villavicencio is near the edge of the great Amazonian forest in the lowlands of southeastern Colombia.

Anolis incompertus nicefori Barbour. Proc. N. Engl. Zoöl. Club, **12**, 8 Feb. 1932, p. 100 (type locality, Humbo, Dept. of Boyacá, Colombia; types in Mus. Comp. Zoöl., Brother Niceforo Maria leg.).

I take this to be the representative of *A. i. incompertus* in the highlands of Boyacá.

Anolis insignis Cope, Proc. Acad. Nat. Sci. Phila., 1871, p. 213 (type locality, "San José" — probably the forests of La Palma — Costa Rica; type formerly in U. S. Nat. Mus., now lost; collected by Van Patten). Jour. Acad. Nat. Sci. Phila., (2), **8**, 1875, p. 120, pl. 24, fig. 1 (description). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 63 (description, no new localities). Dunn. Proc. N. Engl. Zoöl. Club, **12**, August 7, 1930, p. 21 (diagnosis).

A fine, big, forest species rare in upper Costa Rica. We have it from La Palma on the old road from Guapiles to San José.

Anolis intermedius Peters, Mon. Berl. Akad., 1863, p. 143 (type locality, Veragua; type 1 ♂ in Berlin Mus.). Bocourt, Miss. Sci. Mex., Rept., livr. **3**, 1873, p. 69, pl. 15, fig. 4 (description and notes). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 78 (description, synonymy, new locality records). Cope, Proc. Am. Philos. Soc., **31**, 1897, p. 344 (San José, C. R.). Dunn, Proc. N. Engl. Zoöl. Club, **12**, August 7, 1930, p. 18 (diagnosis, distribution).

Anolis nannodes Cope, Acad. Nat. Sci. Phila., 1864, p. 173 (type localities, Coban, Vera Paz, Guatemala; 2 ex. in Brit. Mus.; 1, "Arriba" [*i.e.* highlands], Costa Rica, U. S. Nat. Mus. 12,206 [3 ex.] and 1, Jalapa, Mexico, formerly in U. S. Nat. Mus., now lost). Bocourt, Miss. Sci. Mex., Rept., livr. **3**, 1873, p. 71, pl. 15, fig. 5.

Anolis tessellatus O'Shaughnessy, Ann. Mag. Nat. Hist., (4), **15**, 1875, p. 279 (type locality, Costa Rica; type in Brit. Mus.).

Said to be not uncommon around San José. We have it from Jalapa, Mexico, as well as from Mt. Irazú and the Cerro Carpintero, Costa Rica.

Anolis jacare Boulenger, Ann. Mag. Nat. Hist. (7), **11**, 1903, p. 482 (type locality, Merida, Venezuela, alt. 1,600 m.; types in Brit. Mus.; collected by Briceño). Burt, Proc. U. S. Nat. Mus., Wash., **78**, Dec. 1830, p. 8 (Tapatá, Dept. Norte de Santander, Colombia). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 259 (Rio Chama, Rio Alborregas and Rio Milla, Venezuela).

A fine, well defined species which we have from Merida.

Anolis kugleri Roux, Verh. Naturf. Ges. Basel, **40**, 2, 1929, p. 29 (type locality, El Mene, Acosta distr., Prov. Falcon, Venezuela; type 1 ♀ in Basel Mus. No. 9,927).

Roux allies this form on the one hand with *Anolis fusco-auratus* of the Amazonian Forest and on the other with *Anolis antonii* of Colombia.

Anolis kidderi Ruthven, Occ. Papers, Mus. Zoöl. Univ. Mich., 257, 1933, p.l (type locality: Merida, Yucatan; type 1 specimen in Mus. Zoöl., Univ. Mich., no. 72851).

Known only from type locality. Probably related to *A. ustus*, *nebulosus* and *sallaei*, according to describer.

Anolis laeviventris Wiegmann, Herp. Mex., 1834, p. 47 (type locality, Mexico; type 1 example ♂ in Berlin Mus.?). Peters, Mon. Berl. Acad., 1863, p. 141 (redescription). Bocourt, Miss. Sci. Mex., Rept., livr. **3**, 1873, p. 87, pl. 16, fig. 18–18 a. Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 76 (copy of description).

We have not this species in the collection.

Anolis latifrons Berthold, Abh. Ges. Gottingen, **3**, 1847, p. 6, pl. 1, fig. 2 (type locality, Popayan, Colombia, type in Mus. Göttingen?). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 62 (redescription only). Barbour, Occ. Papers Mus. Zoöl. Univ. Mich., no. 129, 1923, p. 5

(Sapo Mts., E. Panama and synonymy). Dunn, Proc. N. Engl. Zoöl. Club, **12**, August 7, 1930, p. 21 (diagnosis). Burt, Proc. U. S. Nat. Mus., Wash., **78**, December 1930, p. 8 (Turbo, Colombia). Burt. Bull. Amer. Mus. Nat. Hist., **61**, July 11, 1931, p. 259 (Quesada R., W. Colombia; criticism).

Anolis princeps Boulenger, Ann. Mag. Nat. Hist., (7), **9**, 1902, p. 54 (type localities, St. Javier, Salidero, Rio Lita, and Paramba, N. W. Ecuador; types in Brit. Mus.). Peracca, Bol. Mus. Torino, **19**, 465, 1904, p. 4 (forests of Rio Peripa, Ecuador; collected by Festa).

A splendid, giant species of the deep, rainforest where Brooks and I found it in Eastern Panama and which we have also from the Choco of Colombia.

Anolis lemniscatus Boulenger, Proc. Zoöl. Soc. London, 1898, p. 113, pl. 10, fig. 4 (type locality, Chimbo, Ecuador; types in Brit. Mus.). Peracca, Bol. Bus. Torino, **19**, 465, 1904, p. 3 (Rio Peripa, Ecuador). Burt, Bull. Amer. Mus. Nat. Hist., **61**, July 11, 1931, p. 260 (Bucay, Ecuador).

The Museum is fortunate in having a cotype of this species from Chimbo.

Anolis lemurinus Cope, Proc. Acad. Nat. Sci. Phila., 1861, p. 213 (type locality, Veragua, probably Cucuyos as in *A. limifrons*): types 3 ♂ and 1 ♀ in Acad. Nat. Sci. Phila., now lost; collected by R. W. Mitchell. Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 86 (copy of original description). Schmidt, Smith. Misc. Coll., **89**, 1, March 16, 1933, p. 8 (diagnosis; Mt. Pirri, Darien).

Anolis (*Dracontura*) *vittigerus* (Cope), Proc. Acad. Nat. Sci. Phila., 1862, p. 192 (Truando R., Colombia; cotypes in Acad. Nat. Sci. Phila. and U. S. Nat. Mus. No. 4,332; collected by Schott on the Michler Expedition). Dunn, Proc. N. England. Zoöl. Club, **12**, August 1930, p. 18 (diagnosis, synonymy).

Anolis palpebrosus Peters, Mon. Berl. Akad., Jan. or Feb. 1874, p. 740 (type locality, Chiriqui Prov., Panama; type Berlin Mus. No. 7,868). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 77 (redescription, no specimens). Dunn, Proc. Acad. Nat. Sci. Phila., **84**, March 22, 1932, p. 27 (records, specimens from Tela, Lancetilla, Potrerillos, Lake Yojoa, Patuca and La Ceiba, Honduras).

Anolis frontatus Thominot, Bull. Soc. Philom. Paris, (7), **11**, 1887, p. 185 (type locality, Darien; type Paris Mus. No. 1,669, Alpha; collected by Viguier).

Anolis biporcatus Peracca, Bol. Mus. Torino, **19**, 465, 1904, p. 4 (Punta de Sabana, Darien; collected by Festa). Boulenger, Proc. Zoöl. Soc. London, 1898, p. 113 (Paramba, Ecuador; collected by Rosenberg).

Anolis binotatus Barbour, Occ. Papers, Mus. Zoöl. Univ. Mich., **129**, 1923, p. 6 (Darien, colors in life).

Schmidt has made a good case for the determination of the Mt. Pirri specimen in Washington, and Dunn feels sure that this arrangement of synonyms is probably now correct. I owe him a deep debt of gratitude for setting me straight on this species. It really seems to be well set off from Peters' *A. binotatus* which is still known only from the type from Guayaquil.

Anolis lentiginosus O'Shaughnessy, Ann. Mag. Nat. Hist., (4), **15**, 1875, p. 279 (type locality, Surinam; type 1 ex. in Brit. Mus.). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 93, pl. 6, fig. 1 (description, synonymy). Van Lidth de Jeude, Notes Leyden Mus. 25, 1904, p. 88 (Hanie, Gonini R., Surinam).

This species is apparently confined to Dutch Guiana. I have not seen specimens.

Anolis leptoscelis Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 92, pl. 5, fig. 3 (= *A. nitens* O'Shaughnessy, non Wagler; var. locs. in Peru, i.e. Pebas and Yurimaguas).

Anolis macropus Cope, Proc. Am. Philos. Soc., **25**, Nov.7, 1885, p. 101 (type locality, Pebas, Peru; type formerly in Acad. Nat. Sci. Phila., now lost).

Anolis leptoscelis Boulenger, Zoöl. Rec., 1886, Rept. p. 13 (= *A. macropus* Cope).

Another little known species of the Amazonian Forest. I know of no recent specimens.

Anolis limifrons Cope, Proc. Acad. Nat. Sci. Phila., 1862, p. 178 (type locality, Cucuyas, [sic], Cucuyos, Veragua Prov., Panama [an abandoned mine on the Rio Santiago]; type, Acad. Nat. Sci. Phila. 7,900–7,901). Bocourt, Miss. Sci. Mex., Rept., livr. **3**, 1873, p. 65, pl. 14, fig. 20 (redescribed). Barbour, Occ. Papers, Mus. Zoöl. Univ. Mich., No. 129, 1923, p. 6 (Mt. Sapo, E. Panama). Dunn, Proc. N. Engl. Zoöl. Club, **12**, August 7, 1930, p. 19 (synonymy, diagnosis, distribution). Schmidt, Smith, Misc. Coll., **89**, 1, March 16, 1933, p. 9 (many localities, Canal Zone and Panama).

Anolis pulchripes Peters, Monatsb. Ac. Berl. Jan. or Feb. 1874, p. 739 (type locality, Chiriqui Prov., Panama; type 1 ex. in Berlin Mus.). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 53 (redescription, no specimens). Type examined by Dr. E. R. Dunn.

Anolis schiedii Garman, Proc. Boston Soc. Nat. Hist., **18**, 1876, p. 407, Panama.

Anolis rivieri Thominot, Bull. Soc. Philom. Paris, (7), **6**, 1882, p. 251 (type locality, Panama; type 1 ex. in Paris Mus.; collected by M. Rivière).

Anolis sallaei Barbour, Bull. Mus. Comp. Zoöl., **46**, 1906, p. 225 (Pearl Islands, Bay of Panama). Barbour, Occ. Papers, Mus. Zoöl. Univ. Mich., No. 129, 1923, p. 6.

Anolis rodriquezii Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 62, pl. 13, fig. 1 (type locality, Pansos, Rio Polochic, Guatemala; type in Paris Mus.; collected by Juan Rodriquez). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 49 (suspects not different from *A. fusco-auratus*, but had no material). Cope, Proc. Am. Philos. Soc., **22**, November 20, 1885, p. 276 (Nicaragua; collected by Bransford). Cope, id. loc. p. 391 (diagnosis).

Anolis trochilus Cope, Proc. Acad. Nat. Sci. Phila., 1871, p. 215 (type locality, San José, Costa Rica; type, Acad. Nat. Sci. Phila., 7,804, ♂, somewhat dried but in fine condition; collected by Van Patten). Jour. Acad. Nat. Sci. Phila., (2) **8**, 1876, p. 121 (Costa Rica and Nicaragua) id. p. 157 (Buhio, [sic.], Bohio Soldado, Panama), Proc. Am. Philos. Soc., **31**, 1897, p. 334 (Palmar and Sierpe, Costa Rica). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 50 (redescription). Günther, Biol. Cent. Amer., Rept., 1885, p. 45 (nominal mention only).

Anolis bransfordii Cope, Proc. Acad. Nat. Sci. Phila., 1874, p. 67 (type locality, Nicaragua; type in Acad. Nat. Sci. Phila., 7,890.

♂ not quite adult, soft and bleached but in good condition for study; collected by Dr. John T. Bransford, U. S. N.). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 50 (no specimens). Günther, Biol. Cent. Amer., Rept., 1885, p. 45 (nominal mention only). Cope, Proc. Am. Philos. Soc., **22**, March 27, 1885, p. 183 (Nicaragua; U. S. Nat. Mus. 13,739; collected by Moser). Cope, id. loc. p. 391 (diagnosis).

This abundant little lizard found in the dry scrub as well as in the rainforest is a most confusing species. As I have it, it is possibly composite. Dunn has seen the types of *limifrons*, *rivieri*, *pulchripes* and *rodriquezi* and declares them all the same species. However, a Mus. Comp. Zoöl. specimen from Peralta, Costa Rica and Acad. Nat. Sci. 7,890 from Machuco, Nicaragua, type of *bransfordii*, are not in agreement with each other nor with the general run of *trochilus*, *limifrons* specimens. These two are the only two specimens of the general type of *limifrons* that seem to differ considerably. They may be merely variant individuals. Of course the northern and southern specimens may also turn out to be separable races.

Anolis lindeni Ruthven, Proc. Biol. Soc. Wash., **25**, 1912, p. 163 (type locality, Santarem, Brazil; type an adult ♂, No. 8,306, Mus. Comp. Zoöl.; collected by Charles Linden).

Known from the unique type, a well preserved adult male.

Anolis liogaster Boulenger, Proc. Zoöl. Soc., London, 1905, **2**, p. 245 (type locality, Omilteme, Guerrero, Mexico; types ♂ & ♀ in Brit. Mus.; collected by Gadow).

Anolis lionotus Cope, Proc. Acad. Nat. Sci. Phila., 1861, p. 210 (type locality, Cucuyas, (sic) Cucuyos, Veragua [Cf. sub. *A. limifrons*]; type 1 ex. in Acad. Nat. Sci. Phila., No. 7,909; collected by R. W. Mitchell). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 70 (copy of original description). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 260 (Boca de la Raspadura, Colombia).

Anolis oxylophus Cope, Jour. Acad. Nat. Sci. Phila., (2), **8**, Nov. 26, 1875, p. 123, pl. 24, fig. 4, pl. 28, fig. 5 (type locality, omitted. It

was Costa Rica; types 2, U. S. Nat. Mus. Nos. 30,556–7; collected by W. M. Gabb). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 85 (redescription, no specimens). Cope, Proc. Am. Philos. Soc., **11**, November 20, 1885, p. 276 (Nicaragua, collected by Bransford).

Anolis rixii Boulenger, Proc. Zoöl. Soc. London, 1894, p. 727, pl. 48, fig. 1 (type locality, Chontales mines, Nicaragua; type 1 ♂ in Brit. Mus., No. 94–10–1–12; collected by R. A. Rix).

We have this species from Chontales, Nicaragua, as well as from several localities in Costa Rica and from western Panama to the Canal Zone. It occurs from Nicaragua to Colombia.

Anolis longicrus Roux, Zoöl. Anz., **31**, 1907, p. 762 (type locality, Surinam; ♂ cotype Neuchatel, ♀ Basle).

I have, thanks to Dr. Roux, seen a photograph of the type of this species and believe it allied to, if not identical with, *Anolis chrysolepis*.

Anolis macrolepis Boulenger, Ann. Mag. Nat. Hist., (8), **7**, 1911, p. 21 (type locality, Novita, Rio Tamana and Condoto, Choco, southwestern Colombia; 150 ft. alt.; types 1 ♀ and 2 ♂ in Brit. Mus.; collected by Merwin G. Palmer).

Another little known species of the Chocoan forest which I have never seen.

Anolis macrophallus Werner, Mit. Zoöl. Mus. Hamburg, **34**, 1917, p. 32 (type locality, San José de Guatemala; type in Hamburg Mus., fide Dr. O. Wettstein *in litt.*).

A small form apparently allied to *A. cupreus* or *A. godmani* or both and known from the type only.

Anolis maculiventris Boulenger, Proc. Zoöl. Soc. London, 1898, p. 111, pl. 11, fig. 1 (type locality, Paramba, N. W. Ecuador, 2 ex. in Brit. Mus.).

A good, valid species which we have from Dr. Spurell's Chocoan collection; Ex. Brit. Mus. in exchange.

Anolis mariarum Barbour, Proc. N. Engl. Zoöl. Club, **12**, 8 Feb. 1932, p. 100 (type locality, Sampedro, 45 km. north of Medellin, Antioquia, Colombia; type series in Mus. Comp. Zoöl., Brother Niceforo Maria leg.).

One of the series allied to *A. chloris*.

Anolis meridionalis Boettger, Zeit. Naturw., 58, 1885, p. 215, p. 437 (type locality, Paraguay; type originally in a dealer's possession, subsequently lost. Fide Mertens *in litt.*).

Anolis holotropis Boulenger, Ann. Mag. Nat. Hist., (6), **15**, 1895, p. 522 (type locality, Matto Grosso, Brazil; type 1 ♀ in Brit. Mus.; collected by C. Ternetz).

There is a fine series of this pretty little species in the Academy of Natural Sciences of Philadelphia. It was collected at Chapada, Matto Grosso, Brazil by H. H. Smith and from it we have received several specimens in exchange.

Anolis microtus Cope, Proc. Acad. Nat. Sci. Phila., 1871, p. 214 (type locality, San José, Costa Rica; type in U. S. Nat. Mus., No. 31,282; collected by Van Patten). Jour. Acad. Nat. Sci. Phila. (2), **8**, Nov. 28, 1875, p. 119, pl. 24, fig. 2 (type only). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 62 (Irazu, Costa Rica). Dunn, Proc. N. Engl. Zoöl. Club, **12**, August 7, 1930, p. 21 (diagnosis, distribution).

Another of the big rainforest forms which we have from La Palma, Costa Rica, collected with *Anolis insignis*.

Anolis nebuloides Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 74, pl. 13, fig. 10 (type locality, Putla, Oaxaca, Mexico; types 4 ex. in Paris Mus.). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 77 (Huamuchla, Mexico).

W. W. Brown has recently sent this Museum this species from Chivela, Oaxaca, Mexico. We have also a specimen from Acapulco, collected by Nelson and Goldman. (In ex. U. S. Nat. Mus.).

Anolis (Dactyloa) nebulosus (Wiegmann), Herp. Mex., 1834, p. 47 (type locality not specifically mentioned = Mexico; type in Berlin Museum).

Anolis nebulosus Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 68, pl. 15, fig. 3 (type a ♀ figured, others in Paris Museum from Colima, Azucar, Oaxaca, Cuernavaca). Cope, Proc. Am. Philos. Soc. **18**, 11 August 1879, p. 261 (Batopilas, Chihuahua). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 76, (description).

Anolis boulengerianus Thominot, Bull. Soc. Philom. (7), **11**, 1887, (types, 3 ex., Paris Mus. from Isthmus of Tehuantepec, Mexico; collected by Sumichrast).

We have this from a number of localities in Mexico as well as from the Tres. Marias Islands (Slevin leg. in exch. Calif. Acad. Sci.). Specimens taken by W. W. Brown at Cuernavaca in Morelos and Chilpancingo in Guerrero seem to be more or less intermediate with *A. nebuloides*. When the ranges of the species are completely known these forms may appear as subspecies one of the other.

Anolis (Draconura) nitens (Wagler), Syst. Ampl., 1830, p. 149 (type locality, "America;" type in Berlin Museum?). Gray, Cat. Liz. Brit. Mus., 1845, p. 207 (synonymy, diagnosis).

Anolis refulgens Duméril and Bibron, Erp. Gén., **4**, 1837, p. 91 (type from Surinam in Leyden Mus.).

Anolis (Draconura) nitens Peters, Mon. Berl. Acad., 1863, p. 142 (Costa Rica; 2 in Berlin Mus.; collected by Hoffmann). Bocourt, Miss. Sci. Mex., Rept., livr. **3**, 1874, pl. 16, fig. 25 (figured type of *A. refulgens*).

Anolis nitens Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 91 (description). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 260 (Mt. Roraima and Esmeralda near Mt. Duida, Venezuela).

Anolis nitens bondi Fowler, Proc. Acad. Nat. Sci. Phila., 1913, p. 171, pl. 10 (type locality, Cariquito, Venezuela; type No. 18,277 in Acad. Nat. Sci. Phila.).

I have not seen this species.

Anolis notopholis Boulenger, Ann. Mag. Nat. Hist., (6), **17**, 1896, p. 17 (type locality, Buenaventura, Colombia; types in Brit. Mus.; collected by W. F. H. Rosenberg).

A very distinct and peculiar species, as shown by a topotype in the Mus. Comp. Zoöl.

Anolis ortonii Cope, Proc. Acad. Nat. Sci. Phila., 1868, p. 97 (type locality, Napo or Upper Marañon [probably the latter]; types formerly in Acad. Nat. Sci. Phila., now lost). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 51 (description; Pebas, Pozuzo, Peru; Canelos, Pallatanga, Guayaquil, Ecuador). Peracca, Bol. Mus. Torino, **19**, 465, 1904, p. 3 (Gualaquiza and Rio Santiago, Oriente, Ecuador; collected by Festa). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 261 (Rio Chimate near La Paz, Rurrenabaque, Bolivia and Perené, Peru).

Anolis cyanocephalus Bocourt, Nouv. Archiv. Mus. Paris, **6**, 1870, Bull. p. 13; Miss. Sci. Mex., Rept., livr. **2**, 1873, pl. 14, fig. 7 (type locality, Cayenne [?]; type ♂ in Paris Mus. fig.).

Anolis bourieri Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 58, pl. 14, fig. 8 (type locality, Escuintla, Guatemala; type ♂ in Paris Mus. fig.).

Anolis bourieri O'Shaughnessy, Ann. Mag. Nat. Hist., (4), **15**, 1875, p. 274 (Pebas, Peru; Guayaquil, Ecuador).

Anolis bourieri O'Shaughnessy, Proc. Zoöl. Soc. London, 1881, p. 243 (Canelos & Pallatanga, Ecuador). Cope, Proc. Am. Philos. Soc. **22**, Oct. 2, 1885, p. 101 (Pebas, Peru).

A(nolis) bourierii Cope, Proc. Am. Philos. Soc., **22**, April 17, 1885, p. 391 (diagnosis).

We have a single specimen from the Rio Ucayali, Peru.

Anolis pachypus Cope, Jour. Acad. Nat. Sci. Phila., (2), **8**, 1876, p. 123, pl. 24, fig. 3 (type locality, Pico Blanco, Costa Rica; type No. 30,683 in U. S. Nat. Mus.; collected by Gabb). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 63 (redescribed, no specimens). Dunn, Proc. N. Engl. Zoöl. Club, **12**, August 7, 1930, p. 16 (important discussion of status).

Anolis tropidolepis Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 53 (type locality, Irazu Mt., Costa Rica; types several ♂♂ & ♀♀ Brit. Mus.; collected by F. D. Godman).

Anolis curtus Boulenger, Proc. Zoöl. Soc. London, 1898, p. 919, pl. 55, fig. 2 (Cerro de la Estrella, Cartago, Costa Rica; type 1 ♂ in Brit. Mus.; collected by C. F. Underwood). (Exact topotype compared with the type of *pachypus* by Miss Cochran 5/10/28).

A Costa Rican highland form.

Anolis palmeri Boulenger, Ann. Mag. Nat. Hist., (8), **1**, 1908; p. 112 (type locality, Los Mangos, S. W. Colombia; types 1 ♂ and 1 ♀ in Brit. Mus.; collected by M. G. Palmer).

Another species known from the type alone.

Anolis pentaprion Cope, Proc. Acad. Nat. Sci. Phila., 1862, p. 178 (type locality, Truando River, Colombia; type formerly (?) in U. S. Nat. Mus., now lost; collected by A. Schott of the Lt. Michler Expedition). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 64 (description, ex., Guayaquil). Schmidt, Smith. Misc. Coll., **89**, 1, March 16, 1933, p. 10 (Bohio, Panama, loc. now under Gatun Lake).

Anolis sulcifrons Cope, Scient. Bull. Phila. Mus., **1**, 1899, p. 6, pl. 2, fig. 1 (type locality, Colombia; type in Colombian Government exhibit at Chicago, 1893. The collection was apparently made near Barranquilla. Type now in the Cope Collection, Amer. Mus. Nat. Hist., No. 38, 750). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 262 (notes on type).

Anolis panamensis Boulenger, Proc. Zoöl. Soc. London, 1890, p. 81 pl. 13, fig. 2 (type locality, Panama; types 2 specimens Brit. Mus. No. 89-17-2-31).

Found from Nicaragua to Colombia. I have had this synonymy long since arranged as here presented, and Dunn confirms the equality of the last with the first name. (Dunn, Proc. N. Engl. Zoöl. Club, **12**, August 7, 1930, p. 20).

A sluggish, pale, lichen-like species not uncommon in the Canal Zone during the rainy season, excessively rare during the dry months.

Anolis peraccae Boulenger, Proc. Zoöl. Soc. London, 1898, p. 108, pl. 10, fig. 1 (type locality, Chimbo, Ecuador; types 6 ex. in Brit. Mus.; collected by W. F. H. Rosenberg). Peracca, Bol. Mus. Torino, **19**, 465, 1904, p. 3 (forests on Rio Peripa, Ecuador). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 261 (Ventura, Ecuador).

We have this species from the Rio Sapayo, northwestern Ecuador, taken by Mr. W. F. H. Rosenberg.

Anolis petersii Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 79, pl. 13, fig. 2 & pl. 15, fig. 11 (type locality, Alta Vera Paz, Guatemala; type 2 ex. in Paris Mus., No. 1,641 beta). Boulenger, Cat. Liz. Brit. Mus. **2**, 1885, p. 66 (Mexico). Dunn Proc. N. Engl. Zoöl. Club, **12**, August 7, 1930, p. 19 (diagnosis).

Anolis biporcatus Cope, Proc. Acad. Nat. Sci. Phila., 1871, p. 215 (confused comparison with *A. insignis*).

Anolis petersii bivittata Werner, Verh. Zoöl. Bot. Ges. Wien, **46**, 1898, p. 351 (type locality, Guatemala; types 2 ♂ in Munich Mus.).

Note what I have said concerning this species under the heading of *Anolis copei*.

Anolis poecilopus Cope, Proc. Acad, Nat. Sci. Phila., 1862, p. 179 (type locality, Carthagena (sic.), and the R. Truando, Colombia; types formerly in U. S. Nat. Mus., now lost; collected by A. Schott). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 84 (redescription, no specimens). Schmidt, Smith. Misc. Coll. **89**, 1, March 16, 1933, p. 9 (Cana, Panama. Notes on validity).

Anolis gaigei Barbour, Occ. Paper. Mus. Zoöl. Univ. Mich., **129**, Jan. 25, 1923, p. 6 (Records specimens from Sapo Mts., Darien).

Dr. Dunn has shown that this species, set up by Schmidt (l. c.) is the species which our Darien specimens really represent. These are the only ones in this Museum.

Anolis polylepis Peters, Monatsb. Ac. Berl., Jan. or Feb. 1874, p. 738 (type locality, Chiriqui Prov., Panama; types 12 ex. in Berlin Mus., 2 now in Mus. Comp. Zoöl.; collected by H. Ribbe).

Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 52 (redescription, no specimens). Dunn, Proc. N. Engl. Zoöl. Club, **12**, August 7, 1930, p. 20 (diagnosis, distribution).

A common form on the Volcan de Chiriqui. We have it from several stations indicating an altitudinal range of 5,000–6,000 feet.

Anolis punctatus Daudin, Hist. Nat. Rept., **4**, 1802, p. 84, pl. 48, fig. 2 (type locality, South America; type a single specimen in Paris Mus. if still in existence. "Found on Antilles, especially San Domingo."). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 57 (complete synonymy to date; description, various localities). Van Lidth de Jeude, Notes Leyden Mus., **20**, 1904, p. 88 (Upper-Nickeri R. Coppename R., Surinam). Burt. Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 261 (Kartabo, Brit. Guiana).

Anolis steinbachi Griffin, Ann. Carnegie Mus., **11**, April 1917, p. 308 (type locality, Provincia del Sara, Bolivia, type No. 988 ♀, Carnegie Museum, Pittsburg).

Anolis catenifer Ahl, Zoöl. Anz., **62**, 1925, p. 85 (type locality, Brazil, type in Berlin Mus., a ♀ from the Hänschke coll.).

It would be impossible to find a more typical *A. punctatus* than the type of *A. steinbachi;* for the figures of this specimen may be absolutely matched by any of our series from Buenavista, in the Province of Santa Cruz, Bolivia (ex. Univ. Mus. Mich.). The species evidently has a very wide range in the lowland forests.

Anolis purpurescens Cope, Bull. Phila. Mus., **1**, 1899, p. 7 (type locality, Truando R., Colombia; type 1 ex. U. S. Nat. Mus., No. 4,321, poor condition; collected by Arthur Schott).

This species is common in the deep forest on Barro Colorado Island and has been distributed under the name of *Anolis squamulatus*. Fresh material from Colombia will be necessary before this allocation of *Anolis purpurescens* can be considered settled. I have been using the name *Anolis longipes* for this species, but Dr. Dunn has very kindly informed me that the cotypes of this species now in the American Museum of Natural History are both specimens of *Anolis capito*.

Anolis rhombifer Boulenger, Proc. Zoöl. Soc., London, 1894, p. 728, pl. 48, fig. 2 (type locality, Chontales Mines, Nicaragua; types, Brit. Mus., Nos. 94-10-1-9, 10; collected by R. A. Rix).

Known from Nicaragua only.

There are no specimens in this Museum. Doctor K. P. Schmidt has examined the cotypes of *A. rhombifer* and finds that the species differs from *A. concolor* in manner as follows: in *rhombifer* the head is shorter, the frontal ridges distinctly less evident, the supraoculars only faintly keeled and the dorsal scales are uniform, whereas in *concolor* the two median dorsal scale rows are abruptly enlarged.

Anolis rosenbergii Boulenger, Ann. Mag. Nat. Hist., (6), **17**, 1896, pl. 16 (type locality, Buenaventura, Colombia; types in Brit. Mus.; collected by W. F. H. Rosenberg).

I suspect that of this species also only the types are known.

Anolis rubigenosus Bocourt, Ann. Sci. Nat. (Zoöl.), (5), **17**, 1873, art. 2 (type locality, Mexico; type in Paris Mus.). Bocourt, Miss. Sci. Mex., Rept., livr. **3**, 1874, pl. 17, bis, fig. 2 (figure of head of type).

Boulenger apparently missed this species when preparing his Catalogue of the Lizards in the British Museum. It appears from Bocourt to be valid.

Anolis salvini Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 75 (type locality, Guatemala, type 1 ex. in Brit. Mus., collected by F. D. Godman).

I know of no specimen but the unique type.

Anolis scapularis Boulenger, Ann. Mag. Nat. Hist., (8), **1**, 1908, p. 113, (type locality, Prov. Sara, E. Bolivia, 1800 ft.; type 1 ♂, Brit. Mus.; collected by J. Steinbach). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 262 (Mapiri and Tumupasa, Bolivia; Perene, Peru).

I have not seen this little lizard. It must be a most attractive species.

Anolis (Dactyloa) schedii (Wiegmann). Herp. Mex., 1934, p. 48 (type locality, Mexico, by inference; type in Berlin Mus., Bocourt speaks of the type as having no locality).

Anolis gibbiceps Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 174 (Caracas, Venez.; type in Brit. Mus.).

Anolis scheidii Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 64, pl. 14, fig. 19 (type examined in Paris; identical with specimens from Coban, Guatemala). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 52 (redescription based on type of *A. gibbiceps*, only specimen in Brit. Mus.).

Boulenger has placed *A. gibbiceps* in this synonymy. He is almost certainly wrong in so doing, but the type must be examined before the species can be reallocated or reestablished. We do not have the species.

Anolis scypheus Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 172, (type locality, Caracas, Venezuela [not given by Cope]; type 1 ♀ in Brit. Mus.). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 90 (Caracas, Venezuela, Pallatanga & Canelos, Ecuador, E. Peru). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 262 (Riobamba, San José de Sumaco and Tuvula, Ecuador).

Anolis chrysolepis Guichenot in Castlenau, Amer. Sud. Rept., p. 15, pl. 4, fig. 1 (Sarayacu, Peru), Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 101 (refers to difference in specimens from Para and Guianas). O'Shaughnessy, Proc. Zoöl. Soc. London, 1880, p. 491 (criticism).

Anolis (*Dracontura*) *chrysolepis* O'Shaughnessy, Proc. Zoöl. Soc. London, 1881, p. 241 (confused criticism).

Anolis chrysolepis O'Shaughnessy, Ann. Mag. Nat. Hist., (4), **15**, 1875, p. 278.

We have the species from Canelos and Riobamba, Ecuador.

Anolis sericeus Hallowell, Proc. Acad. Nat. Sci. Phila., **8**, 1856, p. 227 (type locality: "El Euceros le Jalapa" [sic.], El Encero de Jalapa. Vera Cruz, Mexico. Type a single specimen formerly in the Academy of Natural Sciences at Philadelphia, but now lost.)

Anolis sallaei Günther, Proc. Zoöl. Soc. London, 1859, p. 421 (type locality, Mexico; type 1 ♀ in Brit. Mus., Sallé coll.). Bocourt Miss. Sci. Mex., Rept., livr. **2**, 1875, p. 90, pl. 13, fig. 3, pl. 16, fig. 21, 21a, 21b (Dueñas and St. Augustin, Guatemala). Werner, Verh. Zoöl. bot. Ges. Wien, **46**, 1896, p. 345 (Honduras); p. 382 (Guatemala). Ruthven, Mich. Acad. Sci., **14**, 1912, p. 231 (Achotal, Vera Cruz, Mex.); Zoöl. Jahrb. **32**, 4, 1912, p. 313 (Cuatotolapam, Vera Cruz, Mex.). Dunn, Proc. N. Engl. Zoöl. Club, **12**, August 7, 1931, p. 18 (diagnosis, synonymy, distribution). Schmidt, Field. Mus. Publ. Zoöl., **12**, 16, Nov. 21, 1928, p. 195 (Devisadero, Salvador).

Anolis longicauda Hallowell, Proc. Acad. Nat. Sci. Phila., 1860, p. 481 (type locality, Nicaragua; type in Acad. Nat. Sci. Phila., dried and now unrecognizable).

Anolis jacobi Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 74, pl. 13, fig. 8 (Vera Cruz, Mex.; type Paris Mus.).

Anolis binotatus (part) Bocourt, Miss. Sci. Mex., Rept., livr. **3**, 1873, fig. 23 (La Union, Salvador).

A common, very handsome and widespread woodland species. In 1930 (Proc. N. Engl. Zoöl. Club, **12**, p. 8) Dunn confused this species with *Anolis palpebrosus*. In 1932 (Proc. Acad. Nat. Sci. Phila., **84**, p. 27) having seen the types in Berlin and London he shows how the species differ one from the other.

Anolis sminthus Dunn & Emlen, Proc. Acad. Nat. Sci. Phila., **84**, March 22, 1932, p. 26 (type locality, San Juancito, near Tegucigalpa. Honduras, alt. 6,800 ft.; type Acad. Nat. Sci. Phila., No. 19,878).

A form allied to *A. concolor* of Nicaragua and *A. altae* of Costa Rica, according to its describers.

Anolis solifer Ruthven, Occ. Papers, Mus. Zoöl. Univ. Mich., **32**, December 6, 1913, p. 4, pl. 2 (type locality, La Concepcion, Santa Marta Mts., Colombia; type Mus. Comp. Zoöl., 6,549; collected by W. W. Brown). Misc. Publ. Mus. Zoöl. Univ. Mich., **8**, 1922, p. 51.

Known from the type only. A very distinct species.

Anolis solitarius Ruthven, Occ. Papers, Mus. Zoöl. Univ. Mich., **32**, December 6, 1916, p. 2, pl. 1 (type locality, San Lorenzo, alt. 5,000 ft., Santa Marta Mts., Colombia; type Mus. Zoöl. Univ. Mich., 48,303; collected by F. M. Gaige). Misc. Publ. Mus. Zoöl. Univ. Mich., **8**, 1922, p. 58 (distribution).

We have two specimens from the forests of the Sierra Nevada de Santa Marta, Colombia.

Anolis squamulatus Peters, Monats. Ac. Berl., 1863, p. 145 (type locality, Puerto Cabello, Venezuela; types 2 ex. in Berlin Mus.). Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, pl. 14, fig. 21 (figure of head of [?] type). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 61 (redescription, no specimen).

Anolis frenatus Cope, Scient. Bull. Phila. Mus., **1**, 1899, p. 6, pl. 2, fig. 2 (type locality, "Colombia," collection of the Government of Colombia Exhibit at Chicago in 1893. Collection apparently made near Barranquilla. Type now lost.)

What I have often called by this name Dr. Dunn insists is really *A. longipes*. If this is so, I have never seen this species.

Anolis trachyderma Cope, Jour. Acad. Nat. Sci. Phila., (2), **8**, Nov. 26, 1875, p. 168 (type locality, Nauta, Peru; type 1 ex. Acad. Nat. Sci. Phila., 11,363; collected by Orton). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 87 (redescription, no specimens).

I do not know this species. It must be a most peculiar one.

Anolis transversalis A. Aug. Duméril, Cat. Method. Rept., 1851, p. 57 (type locality, Brazil; type 1 ex. in Paris Museum; collected by Castlenau and Deville). Archiv. Mus., **8**, 1856, p. 515, pl. 19, fig. 3-32 (redescription). Guichenot, in Castlenau, Voy. Amer. Sud., 1855, Rept. p. 19 (Sarayacu, Peru). Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, pl. 14, fig. 3 (type figured). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 58 (redescription, no specimens). Burt, Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 263 (Chanchamayo and Perene, Peru).

Anolis tigrinus Peters, Mon. Berl. Acad., 1863, p. 143, (type locality, Chine [?]; type ♂ in Berlin Mus.). Bocourt, Miss. Sci. Mex., Rept. livr. **2**, pl. 14, fig. 2. Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 55 (description copied, no specimens).

Scytomycterus laevis Cope, Jour. Acad. Nat. Sci. Phila., (2), **8**, Nov. 26, 1875, p. 165 (type locality, Between Moyabamba and Balsa Puerto, Huallaga R., Eastern Peru; type 1 ex. in poor condition, Acad. Nat. Sci. Phila., 11,368; collected by Orton).

Anolis laevis Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 56 (copy of original description).

Another form which we do not have.

Anolis tropidogaster Hallowell, Proc. Acad. Nat. Sci. Phila., 1856, p. 224 (type locality, Colombia; type no. 7618 in Acad. Nat. Sci., Phila., now simply a macerated skeleton).

Anolis radulinus Cope, Proc. Acad. Nat. Sci., 1862, p. 180 (type locality, Rio Truando, Colombia; types lost; collected by Lieut. Michler). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 86.

Anolis stigmosus Bocourt, Nouv. Archiv. Paris Mus., **5**, 1869, Bull. p. 43 (type locality, Rio Magdalena, Colombia; types 2 ♀ in Paris Mus., collected by Boucard). Miss. Sci. Mex., Rept. livr. **2**, pl. 15, fig. 13 (type figured). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 87 (Tanti, Ecuador, 2,000 ft.). Schmidt, Smith. Coll., **89**, 1, March 16, 1933, p. 9 (Many localities in Canal Zone).

Anolis gaigei Ruthven, Occ. Papers, Mus. Zoöl. Univ. Mich., **32**, December 6, 1916, p. 6, pl. 3 (type locality, San Lorenzo, Santa Marta Mts., Colombia, alt. 2,700 ft.; type Mus. Zoöl. Univ. Mich. No. 48,304; collected by F. M. Gaige). Misc. Publ. Mus. Zoöl. Univ. Mich. **8**, 1922, p. 58 (distribution). Barbour, Occ. Papers Mus. Zoöl. Univ. Mich., 129, January 25, 1923, p. 6 (Sapo Mts., E. Panama).

I thought I had gotten to the bottom of the confusion as to the name for this common form so widespread in Panama and Colombia, but Dr. Dunn tells me that possibly some of the published records of *Anolis limifrons* may belong here.

Anolis tropidonotus Peters, Mon. Berl. Acad., 1863, p. 135 (type locality, Huanuco [sic], probably Huatusco, State of Vera Cruz, Mexico; types 6 ex. in Berlin Mus.; collected by Hille). Ann. Mag. Nat. Hist., (4), **4**, 1869, p. 273 (argument vs. O'Shaughnessy who considers this sp. *Norops auratus*). Bocourt, Miss. Sci. Mex., Rept., livr. **2**, 1873, p. 103, pl. 13, fig. 6, pl. 16, fig. 30 (specimen from Orizaba; ♀ cotype figured). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 83 (synonymy, description, localities, Oaxaca). Günther, Biol. Cent. Amer. Rept., October 1885, p. 51 (no new information).

Norops auratus O'Shaughnessy, Ann. Mag. Nat. Hist., (4), **3**, 1869, p. 188 (confused *N. auratus* with *A. tropidonotus*). l c., (4) **4**, 1869, p. 274 (continues to argue for his error).

Norops tropidonotus O'Shaughnessy, Ann. Mag. Nat. Hist., (4), **15**, 1875, p. 277 (recognizes the "well marked species" but refers it to Norops).

One of the commonest Mexican species. We have great series from Vera Cruz, various localities in Honduras and we have a few from Nicaragua.

Anolis uniformis Cope, Proc. Am. Philos. Soc., **22**, 1885, p. 392 (type locality, Guatemala [many specimens], cotype, U. S. Nat. Mus. 24,859 Yucatan; also cotypes, Guatemala, U. S. Nat. Mus. 24,734–48, 50 and 6,774 (6 ex.); one cotype Mus. Comp. Zoöl. 10,933 [ex. U. S. Nat. Mus. 24,749]; collected by Henry Hague & A. Schott).

Anolis metallicus Bocourt, Ann. Sci. Nat. (Zoöl.) (5), **17**, 1872, art. 2; Miss. Sci. Mex., Rept., livr. **2**, 1873, pl. 17, bis, fig. 1.

A very common species in the highlands of Guatemala from about 5,000 to 10,000 feet. There is a cotype in the Museum as well as a large series of specimens collected by Mr. A. W. Anthony.

Anolis ustus ustus (Cope) Proc. Acad. Nat. Sci. Phila., 1864, p. 172 (type locality, Belize, Brit. Hond.; types 2 ♂ in Brit. Mus.). Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 73 (Belize & Yucatan). Barbour & Cole, Bull. Mus. Comp. Zoöl., **50**, 1906, p. 148 (Chichen Itza, Yucatan). Barbour, Proc. N. Engl. Zoöl. Club, **12**, 8 Feb. 1932, p. 98 (present form of name).

We have the species only from Chichen Itza, Yucatan and have received no specimens in recent collections.

Anolis ustus verae-pacis Barbour, Proc. N. Engl. Zoöl. Club, **12**, 8 Feb., 1932, p. 98 (type locality, Hacienda Chimoxan, Dept. of Alta Vera Paz, 60 miles N. E. of Coban, Guatemala; type series in Mus. Comp. Zoöl.; A. W. Anthony leg.).

A race of *A. u. ustus* from the Vera Paz rain forest.

Anolis utowanae Barbour, Copeia, No. 1, **12**, Apr. 1932, p. 11 (type locality, 10 miles north of Mazatlan, Sinaloa, Mexico; type in Mus. Comp. Zoöl., T. Barbour leg.).

A species apparently related to *A. baccatus* from the dry desert areas of coastal Sinaloa.

Anolis ventrimaculatus Boulenger, Ann. Mag. Nat. Hist., (8), **7**, 1911, p. 20 (type locality, Rio San Juan, Choco, southwestern Colombia; types: ♀ et pull. in Brit. Mus.; collected by Merwin G. Palmer). Burt., Bull. Amer. Mus. Nat. Hist., **61**, June 11, 1931, p. 263 (Boca de la Raspadura and Rio Quesado near Rio Atrato, Colombia).

I have not seen specimens of this species which seems to be allied to *Anolis gemmosus* and *A. maculiventris*.

Anolis williamsi Bocourt, Nouv. Archiv. Mus., **6**, 1870, bull., p. 16; Miss. Sci. Mex., Rept., livr. **2**, pl. 13, fig. 9 (type locality, Bahia, Brazil; type in Paris Mus.).

Anolis sallaei (part) Boulenger, Cat. Liz. Brit. Mus., **2**, 1885, p. 79 (*A. williamsi* wrongly placed in synonymy of *sallaei*).

I have not seen this species.

Addenda

Since this paper was written I have learned of four additional species which are important as coming from areas from which no Anoles have previously been known. They are:

Anolis nasofrontalis Amaral, Mem. Inst. Butantan, **7**, 1932, p. 58 (type locality: State of Espiritu Santo, Brazil; types nos. 440 and 440 A in Reptile Collection of the Museu Paulista).

Near *A. transversalis*.

Anolis pseudotigrinus Amaral, loc. cit., p. 60 (type locality, Rio Doce valley, State of Espiritu Santo, Brazil; type no. 721 B in Reptile Collection of the Museu Paulista).

Apparently near *A. transversalis*.

Anolis transfasciatus Amaral loc. cit. p. 60 (type locality, State of Espiritu Santo, Brazil; type no. 432 in Reptile Collection of the Museu Paulista).

Apparently allied to *A. fusco-auratus*.

Anolis garbei Amaral loc. cit., p. 62 (type locality, Monte Cristo, Rio Tapajos, Para, Brazil; type no. 706 in Reptile Collection of the Museu Paulista).

Closely related to *A. leptoscelis* from the Upper Amazon.

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No. 5. — *Neotropical Ants Collected by Dr. Elisabeth Skwarra and Others*

By William Morton Wheeler

In a period of a few weeks during 1929 Dr. Elisabeth Skwarra amassed a large number of Formicidæ in the states of Vera Cruz and Morelos, Mexico, for the most part in myrmecophytes, and generously permitted me to study the whole collection. Many of the specimens belonged, of course, to well-known species and were easily identified and as promptly as possible returned to her, but several were obviously new to science or of dubious status and had to be retained for further examination. The present paper contains descriptions of this material. Pressure of other work unfortunately delayed its preparation. I apologize to Dr. Skwarra for the long delay which has unduly postponed the publication of her own much more interesting results on the ecological relations of the ants to the many myrmecophytes which she observed and collected in Mexico. To the species of Formicidæ which she obtained I have added a number collected by myself and others during earlier visits to the Neotropical Region.

Family FORMICIDÆ

Subfamily DORYLINÆ

Eciton (Acamatus) sumichrasti Norton

Two workers (No. 113) taken by Dr. Skwarra at Mirador, Vera Cruz, apparently preying on a colony of *Azteca alfari* Emery, which was nesting in a *Cecropia mexicana*.

Owing to the fact that Mayr (1877) mentioned this species as occurring in Texas, I have for many years confused it with an unusually roughly sculptured form of *E. schmitti* Emery, which occurs also in Mexico. After examining Dr. Skwarra's specimens of the true *sumichrasti* I seriously doubt its occurrence north of the border of Mexico or indeed in the northern states of that republic. I here redescribe the insect, because the previous descriptions by Norton, Mayr and Emery are rather meager.

Worker. Length nearly 4 mm.

Differing from *E. schmitti* Emery, mainly in the shape of the head and postpetiole and in sculpture. Head, excluding the mandibles, nearly one and one-half times as long as broad, slightly broader in front than behind, with anteriorly rounded sides, the posterior corners

decidedly larger and longer and more produced backward than in *schmitti*, and terminating in sharp points which are turned slightly outward. The posterior border of the head is therefore deeply excised. Mandibles rather large, their external borders straight, their long terminal borders with numerous subequal denticles. Frontal carinæ lobular anteriorly, closely approximated. Antennæ slightly more slender than in *schmitti;* scapes somewhat longer but dilated in the same manner at their tips; funicular joints 1–6 distinctly longer than broad, 7–10 as broad as long. Thorax and pedicel much as in *schmitti*, but the postpetiole is nearly as high as long and from above more strongly trapezoidal, that is, narrower in front, where it is even narrower than the petiole, and broader behind, its dorsal surface strongly convex.

Much more coarsely sculptured than *schmitti*. Head, thorax and pedicel subopaque, densely, sharply and finely punctate, or reticulate and in addition coarsely and regularly, reticulately rugose, or foveolate; mesosterna merely densely punctate; mandibles and gaster shining, the mandibles coarsely shagreened at the base, very finely striate, with coarse, sparse punctures apically; the gaster finely and superficially shagreened, with regular, sparse, piligerous punctures. Legs, including coxæ, sharply and densely punctate, appearing finely squamulose in certain lights. Under a high magnification all the punctures on the body appear as minute shining points.

Pilosity much as in *schmitti*, pale yellow, coarse, bristly, of uneven length, erect and moderately abundant on the body. As in *schmitti* there are two very long erect hairs near the anterior border of the pronotum and a few others on the occiput and anterior surfaces of the fore coxæ. Hairs on the antennæ and legs also rather long but somewhat more oblique.

Head, thorax and pedicel dark brownish red, almost black; mandibles, antennæ, legs and gaster paler and more reddish.

Subfamily PONERINÆ

Neoponera lineaticeps Mayr

This striking and beautiful species is represented by a number of specimens taken by Dr. Skwarra from four colonies (Nos. 299, 300, 496, 593) at Mirador, Vera Cruz, in *Tillandsia streptophylla. N. lineaticeps* is rare in collections and seems to be rather local. It was originally described from Mexico and has been recorded by Emery from Costa Rica.

Neoponera crenata Roger

Numerous workers and two females taken by Dr. Skwarra at Mirador from nine colonies. Eight of these (Nos. 187, 193, 199, 218, 477, 556, 661, 747) were nesting in *Tillandsia streptophylla* and one (60) in *T. dasyliriifolia*. This ant frequently nests also in hollow twigs. A considerable number of specimens from various parts of its range, which extends from Mexico to Northern Argentina, show much variation in size, sculpture and coloration and indicate need of revision of the species. *N. stipitum* Forel, of which I possess three cotype specimens, seems to be only a subspecies of *crenata*. The var. *moesta* Mayr deserves subspecific rank. Dr. Skwarra's specimens are mostly very dark, with brown or dark brown, instead of yellow legs, as in the typical form of the species, which was originally described by F. Smith as *pallipes*.

Subfamily CERAPACHYINÆ

Acanthostichus skwarræ sp. nov.

Worker. Length about 4.2 mm.

Small and slender, resembling *A. brevicornis* Emery. Head similar, but somewhat shorter, though distinctly longer than broad, very slightly broader in front than behind, posterior border broadly excised, posterior angles narrow as in *brevicornis*, but the frontal carinæ thicker and longer, extending as far back as the middle of the head. Antennæ very much like those of *brevicornis*, scapes not reaching the median transverse diameter of the head, three and one-half times as broad as long, abruptly narrower at the base. Mandibles broad, with blunt tips, differing from those of all the other described species of the genus in having the external borders distinctly concave, instead of convex. Thorax very narrow, broader in front than behind, distinctly constricted laterally in the mesoëpinotal region, less flattened dorsally than in *brevicornis*, *kirbyi*, *serratulus* and *quadratus*. Base of epinotum longer than broad and longer than the steeply sloping declivity, with somewhat rounded sides. Humeral angles and margination on the sides of the thorax rather blunt, less distinct even than in *brevicornis*. Petiolar node from above nearly one and one-half times as long as broad, narrowed anteriorly, its straight sides, and the anterior border especially, bluntly marginate. Postpetiole also trapezoidal, longer than broad, much narrower in front than behind, its sides straight, its ventral portion very convex and protruding, as in the other species.

Gastric segments narrow. Legs stout, their femora and tibiæ distinctly incrassated.

Smooth and shining; dorsal surface of head, especially laterally, anterior and lateral borders of thoracic segments, anterior border of petiole and dorsal surface of postpetiole and gaster with a few large, very sparse, elongate, piligerous punctures or foveolæ. Neck, epinotal declivity and anterior surface of petiolar node subopaque, punctate-rugulose, the rugules on the declivity and petiolar node longitudinal and radiating upward. Legs, especially the tibiæ, with numerous small piligerous punctures.

Hairs pale yellowish, erect, very sparse and not very long on the body, shorter and more oblique on the legs; dense and numerous on the extensor surfaces of the middle and hind tibiæ.

Head and thorax reddish castaneous; abdomen paler; legs yellow; clypeus dark brown; antennæ slightly paler than the head; tips of funiculi pale yellowish.

A single specimen (No. 34) from Tamarindo, State of Vera Cruz, found running on the ground.

This is the first Acanthostichus to be described from North America. Six species have been recorded from South America, one of them, *fuscipennis* (from Pará, Brazil) from male specimens only. Emery describes and figures this insect as differing from the male of *serratulus* in having only one instead of two complete cubital cells in the fore wing. I find that of three specimens of the undescribed male of *quadratus* Emery from Brazil, in my collection, two have two complete cubital cells, while one is precisely like the male of *fuscipennis* in lacking the vein between the two cells. The latter character, therefore, seems to be of little specific importance and I am inclined to believe that Emery's *fuscipennis* may be the male of *brevicornis*. The six species of *Acanthostichus* now known from worker specimens may be separated by means of the following key:

1. External borders of mandibles concave; Length 4.2 mm. Mexico ..... *skwarræ* sp. nov.
   External borders of mandibles convex 2
2. Scapes unusually broad, being only one and one-half times as long as broad. Length 4.5–7 mm. Paraguay ..... *laticornis* Forel
   Scapes narrower, about three and one-half times as long as broad . 3
3. Head with straight, parallel sides and sharp posterior corners. Length 3.5—5.5 mm. Cayenne ..... *brevicornis* Emery
   Head with more rounded sides and posterior corners; sides of thorax more sharply marginate 4

4. Petiole from above square, as broad as long. Length 5.5–8 mm. Brazil ..... *quadratus* Emery
   Petiole longer than broad, trapezoidal 5
5. Smaller species (maxima 5.5 mm.). Head only slightly longer than broad. Brazil ..... *serratulus* F. Smith
   Larger species (5–6.5 mm.). Head distinctly longer. Frontal carinæ more approximated. Brazil and Paraguay . . *kirbyi* Emery

Subfamily MYRMICINÆ

Pheidole vasliti Pergande var. hirtula Forel

Two soldiers from Cuernavaca, Morelos (No. 796), nesting "under a stone."

Pheidole skwarræ sp. nov.

Soldier. Length 4 mm.

Belonging to the *biconstricta* group and related to *Ph. opaca* Mayr. Head large, one and one-fourth times as long as broad, broader in front than at the narrow posterior corners, with evenly rounded sides and very deeply and angularly excised posterior border. Occipital furrow deep, extending forward to the middle of the head. Eyes rather large, convex, situated about twice their length from the anterior corners of the head. Mandibles robust, convex, with two strong apical teeth. Antennæ long and slender; scapes terete, but slightly enlarged near their tips, reaching to the posterior corners of the head; funiculi long, all their joints much longer than broad, the but slightly thickened club distinctly shorter than the remainder of the funiculus, its two basal joints together much longer than the terminal joint. Clypeus rather short, strongly carinate in the middle, its anterior border with median and lateral sinuations, its posterior border concave at the antennal foveæ, which are deep. Frontal carinæ short, subparallel; frontal area large, impressed, semicircular, with five equidistant carinulæ. Thorax small, slender, less than half as broad as the head through the pronotum, which is as long as broad, including the neck; its dorsal surface and humeri evenly rounded; mesonotum with a prominent median torus, which is bluntly angular in profile; mesoëpinotal constriction pronounced; epinotum long, its base straight and horizontal in profile, with a pair of longitudinal ridges which are continued back onto the bases of the spines. These are acute, longer than broad at their bases, but shorter than their distance apart and directed upward and backward. Epinotal declivity shorter than the

base, sloping. Petiole small and narrow, fully twice as long as broad, strongly pedunculate, the node short and high, with rounded, entire superior border. Postpetiole somewhat broader than long, less than twice as broad as the petiolar node, narrower in front than behind, with distinctly conulate sides. Gaster sub-triangular, broader behind than in front, the large first segment with rather straight sides converging to the postpetiolar insertion. Legs long and slender.

Opaque; mandibles and clypeus shining, the former evenly, sparsely and coarsely punctate, the latter punctate-rugulose in the middle and longitudinally rugose on the sides. Body, including gaster and appendages finely and densely punctate throughout, head also longitudinally rugulose, the rugules connected by reticulations on the front, the occipital lobes with coarse, shallow, piligerous punctures or foveolæ; middle of pronotum and torus of mesonotum reticulate-rugulose; upper surface of gaster and postpetiole sparsely and indistinctly foveolate.

Hairs yellowish white, moderately abundant on the head, gaster and pronotum, sparser on the petiole and postpetiole, obtuse or even dilated and flattened at their tips, almost squamate-clavate, especially on the head and pronotum; longer and pointed on the gaster, shorter and pointed on the legs, oblique and more numerous on the tibiæ, scapes and funiculi.

Dark brown; scapes and legs paler brown; mandibles and antennal foveæ yellowish brown; clypeus and apical borders of mandibles blackish.

Worker. Length 2.5 mm.

Head nearly one and one-third times as long as broad, subelliptical, distinctly but not very strongly constricted at the occipital border, which has a raised collar. Eyes very convex, almost hemispherical, at the middle of the sides. Mandibles with straight external borders, the terminal borders with a pair of apical teeth and an even row of several basal denticles. Clypeus projecting, carinate, its anterior border with distinct median and lateral sinuations. Scapes extending nearly half their length beyond the occipital border. Thorax, pedicel, gaster and legs resembling the corresponding parts of the soldier.

Opaque and very finely punctate like the soldier but lacking the rugosity; even the mandibles and clypeus are opaque, but somewhat smoother, owing to the fineness of the punctures.

Pilosity and color very much as in the soldier, but the former sparser on the head, thorax and pedicel (partly rubbed off?). Mandibles paler, yellowish; clypeus and mandibular teeth brown.

Female. Length nearly 6 mm.

Head subrectangular, excluding the mandibles somewhat broader than long and nearly as broad in front as behind, with straight, transverse posterior border, the cheeks somewhat concave owing to the turning outward of the sharp anterior corners of the head. Eyes large and convex, as long as their distance from these corners. Mandibles, clypeus, frontal area and frontal carinæ as in the soldier. Antennal scapes stouter, but extending more than a third their length beyond the posterior border of the head. Thorax as broad as the head through the eyes, more than twice as long as broad; mesonotum flattened above, slightly longer than broad; epinotum sloping, with stout, blunt spines. Petiole above with long, straight, flattened anterior slope, the node inclined backward and concave posteriorly, its superior border thick and rounded, very feebly emarginate in the middle. Postpetiole three times as broad as long, its sides acutely conulate. Gaster subquadrate, the very large first segment with straight, transverse anterior border.

Sculpture like that of the soldier, but coarser. Mandibles coarsely punctate-striate; rugules of clypeus and head coarser, posteriorly more reticulate and less longitudinal; pronotum transversely, middle of mesonotum longitudinally rugulose.

Pilosity as in the soldier, but less abundant on the head; the gaster in addition to the long erect hairs with short, regularly arranged, appressed hairs.

Black, with dark brown femora and paler and more reddish brown funiculi, tibiæ and tarsi. Wings distinctly infuscated; veins and pterostigma dark brown.

Described from one soldier, one female and two workers taken from a single colony (No. 803) nesting under a stone at Cuernavaca, Morelos.

This is a striking species easily distinguished from any of the described forms of the *biconstricta* group of Pheidole.

Pheidole punctatissima napæa subsp. nov.

Soldier. Length 2.3 mm.

Decidedly smaller than the soldier of the typical *punctatissima* Mayr; head smaller, more nearly quadrate, with less rounded lateral borders; mesial borders of scrobe-like depressions more sharply indicated. Humeral tubercles of pronotum less prominent and more rounded. Cheeks and sides of front more strongly longitudinally

rugose and less reticulate. Clypeus opaque, finely and densely punctate behind, like the head. Mandibles, scapes, first gastric segment and femora dark brown; gula, clypeus, anterior portion of head, thorax and pedicel black; remainder of dorsal portion of head somewhat darker and more brownish yellow than in the typical form of the species. Obtuse pilosity of the body somewhat shorter.

Worker. Length 1.5 mm.

Smaller than the worker of the typical *punctatissima*, with somewhat smaller and more slender epinotal spines. Rugules on the cheeks much less distinct. Color darker brown, with darker femora and distinctly infuscated scapes and funiculi.

One soldier and three workers (51a) taken by Dr. Skwarra at Mirador, Vera Cruz, running on the bark of a guava.

PHEIDOLE FLORIDANA TILLANDSIARUM subsp. nov.

Soldier. Length 2–2.3 mm.

Distinctly smaller than the soldier of the typical *floridana* Emery, with shorter and more rectangular head, which is not longer than broad, without the mandibles. Torus of mesonotum smaller and more acute in profile; epinotal spines shorter and more slender. Rugæ of the clypeus and head decidedly coarser and on the latter extending much further back so that only a small portion of the occipital lobes is smooth and shining. Thorax and petiole also more sharply rugulose-punctate or reticulate and less shining. Gaster smooth and shining throughout as in the typical *floridana*. Color darker, being deep ferruginous, the appendages and gaster more brownish yellow, the dental margin of the mandibles and anterior border of clypeus blackish.

Worker. Length 1.3–1.5 mm.

Not larger than the worker of *floridana* but with somewhat shorter head and darker coloration as in the soldier. The dense punctulation of the head and thorax is somewhat coarser and deeper.

Described from a number of soldiers and workers (Nos. 201 and 218), taken by Dr. Skwarra at Mirador, Vera Cruz, nesting in *Tillandsia streptophylla*.

PHEIDOLE FLORIDANA ÆCHMEÆ subsp. nov.

Soldier. Length about 2.3 mm.

Resembling the subspecies *tillandsiarum* but more robust, with distinctly larger head and broader thorax, the occipital excision quite as deep but more sinuately rounded in the middle, the frontal area

larger and less clearly defined. Clypeus flat, distinctly carinate in the middle. Epinotum broader than long, its base in profile shorter than the declivity. Nearly the whole of the posterior third of the head shining and without rugæ, but conspicuously, sparsely and obliquely foveolate. Slightly deeper ferruginous than *tillandsiarum*, with the occipital lobes darker, the apical half of the gaster dark brown, the base and anal region yellow. Pilosity similar but distinctly more abundant, especially on the head.

Worker. Length about 1.5 mm.

Very similar to the worker of *tillandsiarum* but the antennal scapes longer, extending fully twice their greatest diameter beyond the posterior border of the head. Color of head, thorax and pedicel somewhat darker and more brownish.

A single soldier and three workers from Camaron, near Mirador, Vera Cruz (No. 472), found by Dr. Skwarra in *Æchmea bracteata*.

This and the preceding subspecies are quite distinct from any of the described forms of *floridana* (*floridana* sens. str., *deplanata* Pergande, *ares* Forel, *autowiensis* Forel, *stomachosa* Wheeler), of all of which I possess cotype specimens.

Pheidole tragica sp. nov.

Soldier. Length nearly 3 mm.

Belonging to the *flavens* group. Head large, subquadrate, slightly broader in front than behind, with straight sides, feebly concave cheeks, pronounced anterior corners and deeply, angularly excised posterior border; vertex somewhat depressed in the region of the occipital groove, which is deep and extends forward to the middle of the head. There are no traces of scrobe-like depressions. Eyes moderately large and convex, situated less than twice their length from the anterior corners of the head. Mandibles very convex, with two coarse apical teeth. Clypeus smooth and ecarinate in the middle, its anterior border with a median but no lateral sinuations. Frontal area large, subtriangular, smooth, not deeply impressed; frontal carinæ straight, posteriorly diverging, only half as long as the antennal scapes, which are somewhat flattened at the base and reach half the distance between their insertions and the borders of the occipital lobes. Funicular joints 2–8 subequal, longer than broad; club shorter and stouter than the remainder of the funiculus, its enlarged terminal joint nearly as long as the two preceding, subequal joints together. Thorax stout; pronotum with rather acute but not prominent humeri, forming with

the mesonotum a subhemispherical mass, the mesonotum with a small transverse ridge, or torus, descending to the deep mesoëpinotal constriction; epinotum as broad as long, with subequal base and declivity, the former in profile horizontal, the latter sloping, the spines longer than their basal width, shorter than their distance apart, acute, directed upward, backward and slightly outward. Petiole about one and one-half times as long as broad, nearly parallel-sided, the node narrow, anteroposteriorly compressed, with long, concave anterior and short, abrupt posterior declivity, the superior border blunt, rounded and entire. Postpetiole subtrapezoidal, broader than long and than the petiole and broadest at the anterior border, where it is produced on each side as a prominent angle. Gaster much smaller than the head, broadly elliptical and dorsoventrally compressed. Femora distinctly incrassated.

Shining; mandibles smooth, with sparse, coarse, piligerous punctures; anterior border of clypeus with a few transverse rugæ, sides longitudinally rugose; anterior half of head sharply longitudinally rugose, the rugæ on the cheeks connected by indistinct reticulations; posterior half of head smooth and shining, with large, scattered piligerous punctures or foveolæ, the occipital excision finely reticulate and transversely rugulose. Thorax and ventral portions of petiole densely punctate, the pro- and mesonotum smooth in the middle, with a few longitudinal rugules; base of epinotum with a few short longitudinal rugæ anteriorly; node of petiole, postpetiole, gaster, legs and scapes smooth and shining, with sparse piligerous punctures.

Hairs yellowish, rather abundant, long, erect or suberect, pointed and of unequal length on the body, shorter and more oblique on the appendages; anterior surfaces of scapes with a few long erect hairs.

Piceous black; mandibles, except their terminal borders, the cheeks and the tarsi brownish yellow; gula, legs and bases of funiculi dark brown.

Worker. Length 1.6 mm.

Head subrectangular, as long as broad, with rounded sides and feebly emarginate posterior border. Mandibles with straight external borders, two larger apical and four smaller basal teeth. Clypeus distinctly carinate, its anterior border medially sinuate. Antennæ slender; scapes extending about one-fifth their length beyond the posterior border of the head. Eyes a little in front of the middle of its sides. Thorax and petiole resembling those of the soldier, the small postpetiole rounded, broader behind than in front, without anterolateral angles. Legs more slender.

Sculpture like that of the soldier, except that the head is smooth and shining in the middle, finely and superficially reticulate behind and delicately, sparsely and longitudinally rugulose on the sides. Thorax and petiole uniformly and densely punctate, the pronotum dorsally somewhat rugulose.

Pilosity sparser than in the soldier, the hairs on the thorax and pedicel obtuse, those on the head reclinate.

Dark piceous brown or black, with brown legs and antennæ; mandibles and tarsi yellowish.

A single soldier and three workers (No. A39) taken by Dr. Skwarra at Pedregal, near Mexico City.

Pheidole sagana sp. nov.

Soldier. Length 2.5–2.8 mm.

Belonging to the *flavens* group and related to *Ph. dimidiata* Emery. Head moderately large, slightly longer than broad, broader behind than in front, with nearly straight, anteriorly converging sides, the posterior corners rather narrowly rounded, the posterior border broadly, deeply and sinuately excised. Eyes small, rather flat, situated twice their length from the anterior corners of the head. Mandibles large, convex, with two large apical and two smaller basal teeth. Teeth on the mentum well-developed, acute. Clypeus short, flat and sharply carinate, its anterior border sinuate in the middle and less deeply on each side. Antennal scapes curved but not flattened at the base, their tips reaching about half the distance between their insertions and the posterior corners of the head; funicular joints 2–8 as broad as long; clubs swollen, as long as the remainder of the funiculus, terminal joint large, pointed, as long as the two preceding joints together. Frontal area subtriangular, impressed, with median carinula; frontal carinæ strongly diverging behind; as long as the scapes and forming the mesial borders of flattened, somewhat scrobe-like areas. Pronotum short and broad, with prominent, subangular humeri; mesonotum anteriorly flattened and subtriangular, separated by a transverse swelling, or torus from the posterior portion, which slopes more steeply to the deep and rather long mesoëpinotal constriction. Epinotum as broad as long, its base in profile straight and horizontal, as long as the sloping declivity; spines slender, acute, longer than broad at the base and shorter than their distance apart, directed backward and somewhat upward. Petiole slender, twice as long as broad, its peduncle parallel-sided, its node small, transversely conical.

Postpetiole broader than the petiolar node, slightly broader than long, subtrapezoidal, broadest at the anterior corners which are rounded and not produced. Gaster smaller than the head, broadly elliptical, dorsoventrally compressed. Femora distinctly incrassated; tibiæ clavate.

Shining; mandibles small, with scattered piligerous punctures; clypeus smooth in the middle, longitudinally rugose on the sides; anterior two-thirds of head sharply longitudinally rugose, except the anterior half of the narrow scrobe-like areas, which are reticulate rugulose; posterior third of head smooth and shining, with scattered piligerous punctures like those on the mandibles. Sides of thorax, whole epinotum and petiole, except the summit of the node, more opaque, finely and densely punctate; pro-and mesonotum more shining above, irregularly and loosely rugulose, the former anteriorly with several transverse rugæ. Postpetiole superficially reticulate above, with several short longitudinal sulci. Gaster and legs smooth, with fine, sparse, piligerous punctures; antennal scapes reticulate.

Hairs yellowish, bristly, pointed, long and erect, rather sparse on the posterior border of the head, the thorax and abdomen; shorter and oblique on the appendages; scapes with a few long erect hairs on their flexor borders.

Deep castaneous brown; appendages and base of first gastric segment very slightly paler; mandibles, except their terminal borders, front, cheeks, neck, tips of scapes and basal funicular joints reddish yellow.

Worker. Length 1.3–1.5 mm.

Head subrectangular, scarcely longer than broad, with feebly rounded sides and medially emarginate posterior border. Eyes moderately convex, near the middle of the sides. Mandibles with straight external borders, the terminal borders with two large apical teeth and four or five rather indistinct basal denticles. Clypeus moderately convex, carinate, its anterior border with feeble median and deeper lateral sinuations. Frontal area distinct, not impressed; frontal carinæ fully half as long as the scapes, continued back beyond the middle of the head and bounding distinct scrobe-like areas. Antennal scapes extending slightly beyond the posterior border of the head. Thorax resembling that of the soldier; pronotum distinctly flattened above, with acute humeral angles; mesonotum rounded, sloping, without distinct torus. Epinotum about as broad as long, somewhat widened behind the base, in profile straight, distinctly longer than the declivity; spines resembling those of the soldier but

smaller. Petiole very slender, nearly three times as long as broad, with small, subconical node. Postpetiole only slightly broader than the petiole, rounded subquadrate, nearly as long as broad. Gaster subrectangular, a little broader behind than in front, the anterior border straight and transverse forming distinct angles with the sides.

Shining; mandibles and median portion of the clypeus smooth, the former with coarse, scattered punctures. Frontal area reticulate; front smooth and shining, its sides and the sides of the head with sparse, interrupted, longitudinal rugæ, the scrobal areas between finely reticulate-rugulose. A similar but more pronounced sculpture covers the thorax and pedicel; upper surfaces of the petiolar and postpetiolar nodes smooth and shining, as are also the gaster and legs.

Pilosity like that of the soldier but shorter. Color dark brown; the thorax, pedicel, legs and base of first gastric segment paler; mandibles, tarsi, tips of scapes and basal joints of funiculi pale yellow.

Described from eight soldiers and eight workers from three colonies (Nos. 149, 150, 518) taken by Dr. Skwarra at Mirador, Vera Cruz, in *Tillandsia streptophylla*.

Crematogaster (Orthocrema) sculpturata Pergande

Worker. Length 2.2–2.4 mm.

Head subcircular, as broad as long, with convex sides, rounded posterior corners and short, convex posterior border, the eyes round and convex, placed just behind the middle of the sides. Mandibles narrow, with four small, subequal teeth. Clypeus convex, with four longitudinal carinæ, the median pair longer and converging anteriorly to the straight, entire anterior border. Frontal area large, triangular not very distinctly bounded posteriorly. Frontal carinæ subparallel, much farther apart than their distance from the lateral borders of the head. Antennæ rather long; scapes curved at the base, their tips extending somewhat beyond the posterior border of the head; funiculi with 2-jointed club; joints 2–8 small, subequal, the second joint distinctly longer than broad, 3–8 very nearly as broad as long; basal joint of club nearly twice as long as broad, about half as long as the more swollen terminal joint. Thorax shaped as in *C. curvispinosa* Mayr, rather stout, broad through the pronotum, strongly constricted in the mesoëpinotal region, with broad epinotum; promesonotum as broad as long, the pronotum with prominent rounded humeri, the promesonotal suture absent; mesonotum with a pair of prominent longitudinal carinæ which are subdentate anteriorly and extend

posteriorly to the bases of epinotal spines; general surface of the mesonotum sloping posteriorly to the sharp constriction; epinotum without the spines twice as broad as long, its short base and much longer sloping declivity meeting at a distinct transverse ridge, the spines like those of *C. curvispinosa*, stout and flattened at the base, acute apically, nearly as long as their distance apart at the base, spreading laterally, curved inward and directed upward and backward. Petiole shaped as in *curvispinosa*, somewhat flattened above, as broad as long, with straight, parallel sides and semicircularly rounded anterior border, the posterior corners produced as distinct, blunt teeth, which are as long as broad at their bases. Postpetiole ovoidal, somewhat broader than long, convex above, without median furrow. Gaster large, acutely pointed behind and with the postpetiolar insertion rather far back, the inferior, anterior border straight and transverse. Legs slender.

Shining; mandibles smooth, sparsely punctate; clypeus smooth, except for the carinæ, its lateral wings transversely, cheeks longitudinally and more coarsely striated. Antennal scapes striate. Front, vertex and occiput very smooth and shining, with very sparse punctures; sides of front with fine rugules, space between these and the eyes densely punctate, or finely reticulate-rugulose. Promesonotum sharply, coarsely and somewhat longitudinally reticulate-rugose, the meshes of unequal size and distinctly asymmetrical on the two sides. Base of epinotum with about 6 short, parallel, longitudinal rugules, becoming reticulate posteriorly, bases of spines rugulose; posterior portions of sides of pronotum and declivity of epinotum very smooth and shining, neck and remainder of sides of thorax densely and evenly punctate, as are also the ventral portions of the petiole and postpetiole, though more finely; dorsal surface of these segments shining, that of the petiole finely longitudinally sulcate. Gaster smooth and shining, with sparse, regular, piligerous punctures.

Hairs white, stiff, erect and pointed, very regularly arranged, sparse on head and thorax, longer on the head and gaster than on the thorax and pedicel, where they are microscopically serrate. Anterior borders of scapes with four or five long erect hairs; otherwise the appendages have numerous short, appressed hairs; they are more oblique on the funiculi. Pubescence pale, long and very sparse, visible on the head and gaster.

Castaneous brown; head behind and posterior portion of gaster darker; mandibles, bases of scapes, trochanters, and tarsi brownish yellow.

Tepic, Mexico (Eisen and Vaslit)

I have redescribed this species from a cotype specimen in my collection, because Pergande's description is rather meager and because I am introducing below two subspecies and an allied species. It is very closely related to *C. currispinosa* of Brazil. I have not seen specimens of this species, but Mayr's description and figure of the type from Rio Janeiro agree well with *sculpturata*, except in color.

Crematogaster (Orthocrema) sculpturata phytœca subsp. nov.

Worker. Differing from the typical species as follows: epinotal spines decidedly more slender, less flattened and more tapering, in profile more erect and recurved; teeth at the posterior corners of the postpetiole stouter and more acute; gaster more voluminous. Shining frontal and vertical area of head more extensive; spaces between the coarse rugæ on the pronotum more or less reticulate-rugulose especially at the sides; base of epinotum more irregularly rugulose, the declivity and the postpetiole subopaque and very finely and superficially punctate. Color jet black or deep piceous black, with brown mandibles and antennæ, which often have the distal portion of the scape and the club black or dark brown; trochanters and tarsi whitish yellow, the last joint of the latter brown. Pilosity like that of the typical *sculpturata*, but the appressed hairs on the legs seem to be less numerous.

Female. Length 3.5–4 mm.

Head much more subrectangular than in the worker, distinctly broader than long and slightly broader behind than in front; with nearly straight or feebly sinuate posterior border. Eyes elliptical, nearly one third as long as the sides of the head; antennal scapes scarcely reaching beyond its posterior border. Thorax of the usual shape, more than twice as long as broad; the anteriorly convex mesonotum fully one and one half times as long as broad; epinotum similar to that of the worker, but the spines are much shorter and though distinctly longer than broad at their bases, variable in thickness. Petiole and gaster like those of the worker, the former somewhat longer than broad, with well-developed peduncle, the latter larger and especially longer in proportion to its width; postpetiole also decidedly larger and broader, with very bluntly subconulate sides.

Clypeus and head, except the occipital surface, sharply, but rather finely longitudinally rugose, the rugæ fewer and more delicate on the

front and vertex. Mesonotum and scutellum coarsely and sparsely punctate and also longitudinally rugulose, the rugules on the former denser at the sides and behind; base of epinotum regularly, longitudinally rugose, declivity and pro- and mesopleuræ nearly smooth.

Pilosity and color as in the worker, but the stiff obtuse hairs on the thorax are more numerous and irregularly arranged. Wing-membranes distinctly brownish; veins and pterostigma darker brown.

Male. Length 2–2.5 mm.

Head through the very large, convex, anteriorly placed eyes nearly as long as broad, semicircular behind, with prominent ocelli; cheeks short and straight. Mandibles small and slender, their tips obscurely tridentate. Clypeus short and broad, moderately convex, its anterior border nearly straight, entire. Scapes slightly more than twice as long as broad; first funicular joint broader, globular; terminal joint long, slender, with tapering point; remaining joints much shorter and stouter, though distinctly longer than broad. Mesonotum broader than long, subtriangular, narrowed and very convex anteriorly where it overarches the small pronotum. Epinotum short and small, unarmed, in profile with subequal, indistinctly separated, rounded base and declivity. Petiole small, anteriorly narrowed, its posterodorsal surface convex. Postpetiole somewhat broader than the petiole, broader than long, rounded and subnodiform above. Gaster shaped somewhat as in the worker; genitalia large and protruding. Legs slender.

Shining, with small sparse, piligerous punctures; mesonotum and scutellum longitudinally striate, the latter more coarsely.

Pilosity white, rather delicate, sparse and moderately long on the body; shorter, more abundant and oblique on the appendages, more nearly erect on the antennæ than on the legs.

Piceous brown; mandibles, mouthparts, antennæ, legs and genitalia pale brownish yellow; wings paler than in the female, whitish; veins and pterostigma pale brown.

Described from numerous specimens representing colonies taken by Dr. Skwarra in the following localities and plants:

Mirador (type-locality), in *Tillandsia streptophylla* (Nos. 213, 519, 550, 606); in *T. dasyliriifolia* (362); in *T. Balbisiana* (620, 651); in *Conostegia xalapensis* (209a, 209b); in internodes of *Cecropia Schiedeana* (253); in hollow stems (564).

Tamarindo; in thorns of *Acacia sphærocephala.*

Camaron; in *T. Balbesiana* (675, 688); in *T. pruinosa* (628a); in pseudobulbs of *Schomburgkia tibicinis* (479).

There is among the material from Mirador (209a) a single ergato-

morphic female measuring nearly 3 mm. Its head is like that of the normal female in size and shape, but the eyes and ocelli are much smaller. The thorax is like that of the worker but larger and more robust with small, sharply delimited mesonotum of the female type, and broad, short, flat, acute, epinotal spines. Petiole, postpetiole and gaster also as in the worker but much larger. The mesonotum and base of the epinotum are longitudinally rugulose, the former very finely, the latter coarsely and regularly. Pilosity as in the normal worker. Tibiæ and antennæ brownish yellow like the tarsi, the antennal club deeply infuscated. In other respects the color is like that of normal females and workers.

Crematogaster (Orthocrema) sculpturata accola subsp. nov.

Worker. Differing from the two preceding forms in having the head more subrectangular, and in larger specimens distinctly broader than long, and in the mesonotal carinæ, which are much more prominent, with larger blunt anterior teeth, which are connected by a distinct transverse ridge or crest, so that the mesonotum rises anteriorly above the posterior border of the pronotum. The epinotal spines are like those of the typical *sculpturata*, but even broader and flatter in some specimens, with short and more rapidly tapering, acute tips. The teeth of the petiole are prominent, subacute and longer than broad at their bases. The sculpture is also peculiar, the head and thorax being sharply, regularly and finely reticulate. On the head this reticulation is overlaid by longitudinal rugules, even on the front and vertex, so that the whole surface is subopaque and without a smooth, polished median area like that of *sculpturata* and *phytœca*. The very strong network of rugæ is present on the pronotum as in these forms. Postpetiole and sides and ventral portions of the petiole sharply and densely punctate. Pilosity and coloration as in *phytœca*.

Described from eleven workers taken by Dr. Skwarra from four colonies at Mirador, two of them (595 and 662) nesting in *Tillandsia streptophylla* and two (13 and 104) in *Conostegia xalapensis*.

Crematogaster (Orthocrema) agnita sp. nov.

Worker. Length 2–2.8 mm.

Closely related to *sculpturata* but clearly distinct. Head subrectangular, in the largest individuals broader than long, structurally in other respects as in *sculpturata*, except that the clypeus has four longitudinal carinæ or rugæ on each side. Thorax, petiole and post-

petiole very similar, but the epinotal spines are shorter, straight, not spreading laterally but subparallel and directed only backward and upward. Carinæ of the mesonotum sharp but not dentate anteriorly. Posterior teeth of the petiole distinct, acute, shorter than their width at the base.

Sculpture similar to that of the subspecies *accola*, but the front and vertex more shining, without rugules but superficially reticulate. Rugæ on the pronotum sharp but less coarse than in *sculpturata* and its subspecies; mesonotum merely finely reticulate and the same is true of the upper surface of the petiole. Postpetiole with a similar sculpture and with traces of longitudinal impressed lines or sulci. Gaster superficially reticulate and not very shining; antennal scapes striate as in *sculpturata* and its subspecies.

Pilosity much as in these forms, but the hairs are yellowish on the body, coarser, more obtuse and somewhat shorter, distinctly more abundant on the gaster. The long, erect hairs on the anterior borders of the scapes of *sculpturata* and its subspecies are lacking.

Dull yellowish brown or brownish yellow, with paler and more yellow legs and antennæ; head sometimes darker behind; gaster, except at its base, castaneous, with the posterior borders of the segments yellowish.

Female (deälated). Length nearly 5 mm.

Head resembling that of the worker, but the larger eyes are at the middle of the sides and fully one third as long. The epinotal spines are stout and acute, longer than broad at their bases, the petiole not longer than broad and the denticles at the corners of its straight and transverse posterior border minute. Postpetiole longer in proportion to its length than in the female of *phytæca*, rounded and not subconulate laterally.

Finely and densely shagreened, with the exception of the front, vertex, scutellum, legs and sides of the pro- and mesothorax, which are smooth and more shining. Dorsal surface of body sparsely and coarsely punctate. Mandibles and scapes longitudinally striate; cheeks and sides of front longitudinally rugose; sides of epinotum somewhat concentrically rugose.

Pilosity like that of the worker but more abundant and less regularly arranged on the head and thorax; appendages with short, more or less oblique hairs or pubescence.

Brownish yellow; head often slightly darker; gaster reddish brown, with yellowish posterior borders to the segments.

Described from numerous workers and a single female which I took

from hollow twigs Dec. 12, 1911 at Zacapa, an uncommonly arid locality in Guatemala.

Procryptocerus striatus scabriusculus Emery

Workers from seven colonies all taken in hollow stems at Mirador (270a, 276, 420, 398, 709, 335a, 435).

Strumigenys (Cephaloxys) skwarræ sp. nov.

Worker. Length: 1.5–1.7 mm.

Closely related to *S. clypeata* Roger of the United States but quite distinct. Form and proportions of the head and clypeus as in that species. Antennal scapes broader and more dilated beyond their slender bases; second funicular joint distinctly longer than broad, third as long as broad. Mandibles longer, and more gradually tapering than in *clypeata*, on their internal ventral borders with a broad lamella, which is bluntly subdentate at the middle, beyond the anterior border of the clypeus; the teeth at the tip about 10 in number, spiniform, crowded and of unequal length. Thorax of the usual shape, in profile evenly and feebly arcuate; humeri rounded; pronotum without median carina, with promesonotal suture obsolete and replaced by a distinct semicircular impression; mesoëpinotal suture distinct; epinotal spines slender and acute, directed backward, each with a broad spongiform lamella extending along its whole posterior border and down the side of the epinotal declivity. Petiolar and postpetiolar nodes transversely elliptical, the latter one and one-half times as broad as the former, with well-developed spongiform masses on their ventral and lateral surfaces.

Mandibles somewhat shining, very finely punctate; head, thorax and petiole opaque, densely and evenly reticulate-rugulose, the clypeus more finely; gaster and exposed dorsal surface of postpetiolar node smooth and shining, the former with the basal third of the first segment loosely striate. Legs and scapes opaque, very finely reticulate-rugulose.

Hairs white; curved and clavate-squamate on the clypeus, scapes, dorsal surface of head, thorax, pedicel and gaster, most abundant on the head, decidedly longer and sparser on the pedicel and gaster. Those forming a row on the anterior borders of the clypeus and a series of about 10 on the anterior borders of the scapes are curved forward. Hairs on the ventral surface of the gaster sparse and of ordinary structure.

Yellowish ferruginous, middle portion of gaster and borders of petiolar and postpetiolar nodes dark brown.

Described from 15 specimens representing four colonies, all taken by Dr. Skwarra in *Tillandsia streptophylla* in two localities: Tlacocintla (type locality; 487 and 494) and Mirador (153 and 290).

Sericomyrmex aztecus Forel

Two workers, one from Mirador (477), found dead in nest of *Pheidole punctatissima* in pseudobulb of *Schomburgkia tibicinis*, and one from Tlacocintla (529) running on ground.

Subfamily DOLICHODERINÆ

Iridomyrmex pruinosus Roger

Three workers (No. 84) taken by Dr. Skwarra under a stone at Remutadero, Mexico, are smaller than Cuban specimens of the typical form and have the gaster pale yellow, except at the tip. They probably represent a variety transitional to the widely distributed var. *analis* Ern. André.

Tapinoma ramulorum Emery

I have taken this species frequently at San Jose, Costa Rica, nesting in dry twigs of various trees. Emery's specimens were found in the same locality in dry twigs of the "tuete" (*Vernonia brachiata* Bentham). In addition to a new variety of *T. inrectum* Forel, which I regard as a subspecies of *ramulorum*, Dr. Skwarra has discovered two other forms and I am able to add a subspecies from Costa Rica.

The examination of this material shows that *ramulorum* and at least two of its subspecies have distinctly dimorphic females. One of them is of the usual type, with well-developed wings, the other a microgyne distinguished by the peculiar shape of its head, its less robust thorax and minute wings, with greatly reduced venation. Most of my specimens are deälated, but one microgyne of *inrectum* var. *subnigrum* var. nov. retains a fore wing and one of *ramulorum* (sens. str.) a hind wing. The two types of female of the typical *ramulorum* may be distinguished as follows:

Macropterous female. Length 3.6–3.8 mm.

Head without the mandibles scarcely longer than broad, broader behind than in front, with straight posterior border and rather con-

vex sides. Antennæ stout, scapes, extending about one and one-half times their greatest diameter beyond the posterior border of the head. Eyes rather large and convex, more than one fourth as long as the sides of the head. Thorax twice as long as broad and nearly as broad as the head through the eyes; mesonotum and scutellum flattened, the former fully as broad as long, the latter about one and one-half times as broad as long; base of epinotum in profile short, about one-third as long as the sloping declivity. Thorax with sparse, pale, erect hairs on its dorsal surface. Gastric segments with grayish yellow borders not sharply marked off from the dark brown basal portions. Scapes of antennæ dark brown. (Twelve deälated specimens).

Micropterous female. Length 3.–3.3. mm.

Head smaller, distinctly longer than broad, sub-oblong, with straight, subparallel sides and straight posterior border, which is not surpassed by the antennal scapes. Eyes and ocelli distinctly smaller than in the macropterous female, the former only one-fourth as long as the sides of the head. Thorax smaller and narrower, more than twice as long as broad; mesonotum and scutellum also distinctly smaller and narrower; epinotum evenly rounded, without distinct base and declivity. Gaster proportionally smaller and narrower than in the macropterous female. Hind wing elliptical, not longer than the head, with a single median vein. Erect hairs absent on thorax. Color paler brown than in the macropterous female; gaster yellow, with a broad brown band across each segment. Scapes pale yellow, like the tibiæ. (Six specimens, all completely deälated except the one bearing a hind wing).

Tapinoma ramulorum var. satullum var. nov.

Worker. Differing from the typical form of the species in its decidedly darker color, the head, thorax, gaster, median portions of femora and in some specimens also the distal portions of the antennal scapes being much darker brown, almost black. Outer border and base of mandibles black as in the typical *ramulorum*.

Specimens from five colonies collected at Mirador (type-locality): two from *Tillandsia streptophylla* (Nos. 147, 325), one from internodes of *Cecropia mexicana* (176), one from a hollow twig of coffee (294 a), one from under the leaf-base of Musa (270); and a single colony (479) taken at Camaron in a pseudobulb of *Schomburgkia tibicinis*. Two males from Mirador (325) agree with Emery's description of the male of the typical *ramulorum*, except that their wings have complete discoidal cells.

Tapinoma ramulorum toltecum subsp. nov.

Worker. Very similar in size and coloration to the var. *satullum* but the scapes show no traces of infuscation and the surface of the head and thorax is more opaque and more distinctly punctulate. The scapes and funiculi are decidedly shorter, the former extending not more than their greatest diameter beyond the posterior border of the head and the latter with all the joints shorter, the second being nearly twice as broad as long, the remaining joints except the last, only slightly longer than broad. In the typical *ramulorum* the second funicular joint is as long as broad, the succeeding joints fully one and one-third times as long as broad. The legs of *toltecum* are also shorter and the body somewhat stouter.

Described from nine specimens taken by Dr. Skwarra at Mirador (No. 41) in *Tillandsia Balbisiana.*

Tapinoma ramulorum inrectum Forel

This subspecies seems to be widely distributed in Middle America. I have taken the workers in the cauline swellings of *Cordia alliodora* on Barro Colorado Island, Panama (Aug. 2, 1924) and in dead twigs at Escuintla, Guatemala (Dec. 30, 1911), and Dr. A. Petrunkevitch has sent me specimens which he found "nesting on the leaf of a tree", presumably in a carton nest, at La Buena Ventura, Chiapas, Mexico, Aug. 13, 1909. All these specimens agree closely with Forel's description of the types from the Forest of Pirris, Costa Rica. The antennal scapes extend nearly one-third their length beyond the posterior border of the head and the second funicular joint is longer than broad. The thorax is somewhat more slender than in the preceding forms of *ramulorum* and the legs somewhat longer. The thorax is brown, the head darker brown, the gaster paler and more yellowish, nonfasciate, the mandibles and antennæ pale yellow throughout, the legs pale yellow, with the femora brown in the middle.

Tapinoma ramulorum annellatum subsp. nov.

Worker. Length 2–2.3 mm.

Differing from the workers of the preceding forms as follows: Body and especially the head and thorax densely punctate and opaque, the gaster paler than in the typical *ramulorum,* dull brownish yellow, with a pale brown transverse band on the middle of each segment;

femora pale brown in the middle and the dark portion of the mandibles reduced to a triangular brown spot at the external corner of the base. The antennal scapes are as long as in the typical *ramulorum* but the funiculi are stouter, with shorter joints, the second being distinctly broader than long.

Macropterous female. Length 3.2–3.5 mm.; wings nearly 4 mm.

Smaller and much paler than the macropterous female of the typical *ramulorum*. Head small, without the mandibles fully as broad as long and shaped as in *ramulorum*. Thorax larger, much broader than the head, decidedly less than twice as long as broad; pronotum as broad as long, scutellum twice as broad as long. Thorax and gaster pale brown, the head blackish only posterodorsally, the mandibles, clypeus, cheeks, gula, scapes and legs pale yellow, the funiculi beyond the first joint and the median portions of the femora brownish. Posterior borders of gastric segments yellowish. Wings subopaque, grayish, iridescent; veins and pterostigma brownish yellow. Head as well as the thorax with pale, erect hairs above.

Micropterous female (deälated). Length 3 mm.

Head suboblong, longer than broad, with straight subparallel sides and posterior border. Antennal scapes not quite reaching the latter; funicular joints, except the first and last, broader than long. Eyes and ocelli distinctly smaller than in the macropterous female. Thorax much smaller and narrower, narrower than the head, and fully twice as long as broad; mesonotum one and one-third times as long as broad, narrowed behind; scutellum small, nearly as long as broad; epinotum longer than in the macropterous female. Color as in that form but the body is darker brown and the fasciæ on the gaster are more pronounced; mandibles blackish externally at the base. Head and thorax without erect hairs.

Described from a dozen workers, one micropterous and three macropterous females which I found in dead twigs at Cartago, Costa Rica, Dec. 6, 1911.

TAPINOMA RAMULORUM INRECTUM Forel var. SUBNIGRUM var. nov.

Worker. Length 1.7–2 mm.

Differing from the typical *inrectum* in color, the body being deep piceous brown, the head and gaster often black; scapes and distal portions of funiculi sometimes brownish; median portions of femora dark brown; remainder of appendages and the petiole pale, yellowish white; mandibles somewhat brownish.

Macropterous female (deälated). Length 2 mm.

Smaller than the macropterous females of the typical *ramulorum* and the subsp. *annellatum*, but the head is of the same shape. Antennal scapes reaching to its posterior border; joints 2–10 of the funiculi as broad as long. Thorax slightly narrower than the head, twice as long as broad; mesonotum as broad as long, scutellum broader than long; epinotum sloping and rounded as in the worker. Dorsal surface of thorax with short, erect hairs. Color much like that of the worker.

Micropterous female. Length 1.8 mm.

Head smaller, somewhat narrower and more rectangular than in the macropterous female but distinctly broader behind than in front; eyes and ocelli smaller, funicular joints shorter. Thorax smaller and narrower, very distinctly narrower than the head; mesonotum much smaller but broader than long; scutellum proportionally longer. Anterior wing only as long as the head plus the mandibles, elliptical, with three stout longitudinal veins and a stout costa. Thorax not distinctly hairy above. Sculpture and color as in the macropterous female.

This variety is represented in Dr. Skwarra's material by numerous workers, a macropterous and a micropterous female from seven colonies: one from Camaron (No. 402), taken from a hole left by a broken branch, and six from Mirador (type locality), taken in the following situations: No. 504 in reed; 452 in a stick, 339 in *Tillandsia fasciculata;* 293 in *T. Valenzuelana;* 611b in *T. streptophylla* and 295 in *Conostegia xalapensis.*

The genus Tapinoma appears to be well represented in tropical America. I append descriptions of three undescribed species and a subspecies which have been standing for some years in my collection.

Tapinoma panamense sp. nov.

Worker. Length 1–1.2 mm.

Head subrectangular, longer than broad, as broad in front as behind, with very feebly convex sides, straight posterior border and rounded posterior corners. Eyes small, flat, placed about one and one-half times their length from the anterior corners of the head. Mandibles narrow, with oblique apical borders armed with six teeth, the first, second and fourth of which from the tip are large, the others minute. Frontal carinæ short, parallel, farther apart than their distance from the sides of the head. Clypeus convex and rounded in the middle, its anterior border straight and entire. Frontal area and groove absent. Antennal scapes not reaching to the posterior corners of the head by

a distance equal to their greatest diameter; first funicular joint nearly one and one-half times as long as broad, second small and short, broader than long, remaining joints, except the last, all broader than long but gradually increasing distally in length and thickness. Thorax small, feebly but distinctly impressed at the mesoëpinotal suture, otherwise slightly convex in dorsal outline; base of epinotum straight, forming a distinct obtuse angle with the declivity which is decidedly longer. Seen from above the pronotum is nearly twice as broad as long, the mesonotum is subcircular and about as long as broad, the epinotum longer than broad and laterally compressed. Petiole very small and flat, elliptical, its node represented by a low semicircular swelling at the anterior end, and completely concealed under the large first segment of the elliptical gaster. Legs of the usual shape.

Shining, very finely and indistinctly punctulate.

Hairs and pubescence pale yellow, the former very sparse, distinct only on the mandibles, clypeus and gaster; the pubescence fine and rather dense, slightly obscuring the shining surface, rather long and oblique on the scapes.

Pale brownish yellow; legs scarcely paler; mandibular teeth reddish.

Female (deälated). Length 1.8 mm.

Head much as in the worker, but the posterior corners less rounded and the posterior border feebly sinuate in the middle, the eyes larger and more convex, only about half their length from the anterior corners of the clypeus. Scapes shorter, extending to about two-thirds the distance between the eyes and the posterior corners of the head. Thorax slightly narrower than the head, elongate subelliptical, depressed above; pronotum very short and transverse; mesonotum as long as broad, rounded anteriorly; epinotum short, with very short base passing gradually into the long sloping declivity. Petiole as in the worker. Gaster more than three times as long as broad, parallel-sided, first segment covering the petiole and provided with a very distinct impression for its accommodation.

Subopaque and more densely punctulate than the worker; pilosity and pubescence very similar; head and thorax pale yellowish brown, gaster dark brown; mandibles, antennæ, legs and broad margins of the gastric segments brownish yellow.

Male. Length about .8 mm.

Head subrectangular, longer than broad, somewhat narrowed behind. Eyes flattened, as long as about half the length of its sides. Mandibles rather well-developed, overlapping, with very minutely denticulate apical borders. Clypeus with straight, entire anterior

border. Antennal scapes reaching to the posterior corners of the head; basal funicular joints slightly, terminal joints considerably longer than broad. Thorax as broad as the head. Petiole very much as in the worker. Gaster short.

Sculpture and pilosity as in the worker. Color pale sordid yellow. Wings grayish, pubescent, rather opaque, with pale brownish veins.

Specimens from a single colony which I found nesting in a cauline swelling of *Cordia alliodora* on Barro Colorado Island, Panama. This very small species is evidently quite distinct from *ramulorum*, *atriceps* Emery, *heyeri* Forel and *littorale* Wheeler.

Tapinoma fulvum sp. nov.

Worker. Length 3–3.3 mm.

Head nearly as broad as long, broader behind than in front, with distinctly and broadly concave posterior border; sides convex behind; cheeks straight or slightly concave. Eyes moderately large, convex, shorter than their distance from the corners of the clypeus, which is large and broad, somewhat flattened in the middle, its anterior border with a feebly sinuate but not projecting median area, separated on each side by a minute notch from the straight antero-lateral border. Frontal carinæ well-developed, farther apart than their distance from the lateral borders, arcuate and posteriorly diverging outward towards the middle of the eyes. Frontal area obsolete. Antennæ long and rather slender; scapes reaching nearly one-fourth their length beyond the posterior border of the head; funiculi thickened as usual towards the tip; first joint fully three times as long as broad; joints 2–10 subequal, nearly one and one-half times as long as broad, terminal joint rather acutely pointed, as long as the two preceding joints together. Mandibles stout and convex, decussating when closed, their terminal borders broad, with 5 or 6 larger apical teeth and 6 or 7 basal denticles. Thorax stout but much narrower than the head; pronotum broader than long, convex dorsally and laterally; mesonotum nearly one and one-half times as long as broad, rounded and convex in front where it rises distinctly above the pronotum, concave behind and descending to the unusually deep mesoëpinotal impression with its prominent spiracles; epinotum longer than broad, also with prominent spiracles; its base convex and rising obliquely and abruptly upward and backward from the impression and curving into the straight, sloping declivity, which is fully twice as long as the base. Petiole regularly elliptical, flat above, with thickened anterior border representing the vestigial

node, ventral surface convex. Gaster large, with pointed tip, its anterior segment overlying and concealing the petiole and with a concave area for its reception. Legs moderately long.

Opaque throughout, very finely, densely and indistinctly punctulate and irregularly shagreened; mandibles also with sparse, coarser punctures.

Hairs on mandibles rather long, white and subappressed, on pronotum and gaster somewhat brownish, long, sparse and erect, arising from minute dark brown dot-like insertions, shorter on the epinotum. Pubescence glistening white, short, subappressed, most distinct on the cheeks, vertex, epinotum, gaster and appendages but not concealing the surface.

Rich fulvous yellow; petiole, gaster and legs paler yellow, the gaster with an anteriorly ill-defined pale brown band near the posterior border of each segment; mandibular teeth deep reddish brown.

Described from numerous specimens taken from under a flat carton shed on the trunk of a sapling in company with coccids, on Barro Colorado Island, Panama, June 21, 1924.

Tapinoma fulvum sublucidum subsp. nov.

Worker. Differing from the preceding form in having the head slightly narrower, with less convex sides and the anterior portion of the mesonotum somewhat less projecting above the posterior portion of the pronotum. The sculpture, too, is different, the surface of the mandibles, body and appendages, being distinctly smoother and somewhat shining or lustrous, owing to the more superficial punctulation. Color as in the typical *fulvum* but the thorax is somewhat paler than the head, which is often brownish posteriorly and the tips of the scapes on their inner surfaces and the femora towards their tips are faintly tinged with brown. The pale brown bands on the gaster are also somewhat more distinct.

Numerous specimens from two colonies on Barro Colorado Island (July 1924). These were also in flat carton sheds with coccids on the bark of living trees.

Tapinoma amazonæ sp. nov.

Worker. Length 2.5–3 mm.

Head slightly longer than broad, somewhat broader behind than in front, with moderately, evenly convex sides and straight, transverse

border. Eyes rather large and convex, as long as their distance from the anterior corners of the head. Clypeus convex in the middle, its anterior border rounded and entire in the middle and slightly sinuate on each side; its posterior suture rather indistinct. Frontal area and groove absent; frontal carinæ short, subparallel, slightly farther apart than their distance from the lateral borders of the head. Mandibles stout, convex, their oblique terminal borders with about 10 or 11 teeth, the first, second and fourth from the tip large, the others minute, subequal denticles. Antennæ rather stout, scapes extending nearly one fourth their length beyond the posterior border of the head; funicular joints 2–4 one and one-half times as long as broad, joints 5–10 shorter but distinctly longer than broad, last joint as long as the two preceding joints together. Thorax rather short, its dorsal outline in profile straight and horizontal in the middle; promesonotal suture impressed; mesoëpinotal impression deeper and acute; seen from above the pronotum is short, one and one-half times as broad as long, with convex humeri, mesonotum somewhat longer than broad, not rising above the pronotum; base of the latter convex, very short, not more than a fourth as long as the straight, flat, sloping declivity, which from behind is semicircularly rounded above with straight ventrally diverging sides. Petiole elliptical, narrow, twice as long as broad, flattened above, with only a vestige of a node at its anterior end. Gaster large, not pointed posteriorly, first segment overlying and concealing the petiole. Legs moderately long.

Shining and very finely and evenly punctulate or reticulate; mandibles smoother, sparsely and coarsely punctate.

Hairs and pubescence yellowish; the former present only on the mandibles and clypeus, the latter short but dilute on the body, most distinct on the gaster, thorax and sides of head but not concealing the surface, shorter on the appendages, dense on the tibiæ.

Brown, head darker and more blackish, especially behind; mandibles, mouthparts, sides of clypeus, antennæ and legs, including the coxæ, brownish yellow.

Described from a number of workers taken many years ago by Prof. C. F. Baker at Pará, Brazil.

This species is quite distinct from *T. atriceps* Mayr in size, shape of head, coloration, etc., and is much more like our common North American *T. sessile* Say, but the head is shorter and the shape of the thorax and the coloration are quite different.

Subfamily FORMICINÆ

Myrmelachista Roger

Emery, in the Genera Insectorum (1921), has associated this genus, founded by Roger seventy years ago, with the Australian Stigmacros in his tribe Myrmelachistini among the Alloformicinæ, the most primitive section of the great subfamily Formicinæ. Ethologically, at least, this association appears to be rather artificial, because the species of Myrmelachista are all exquisitely arboreal, nesting in tenuous galleries in dead twigs or in the cavities of myrmecophytes or epiphytes, whereas the species of Stigmacros live in rather dry soil under stones or very rarely under bark, and therefore behave more like the species of Acantholepis, which Forel regarded as their closest allies. In 1886 Forel divided Myrmelachista into two subgenera, namely Myrmelachista *sens. str.* (worker and female with 9-jointed, male with 10-jointed antennæ) and Decamera Roger (worker and female with 10-jointed, male with 11-jointed antennæ). Until 1927, when Menozzi described a species (*plebecula*) of Myrmelachista *sens. str.* from Costa Rica, this subdivision of the genus seemed also to have a geographical basis, since Myrmelachista *sens. str.*, which includes the genotype (*kraatzi* Roger), was supposed to be confined to the West Indies, the subgenus Decamera to the continental portion of the Neotropical Region. Dr. Skwarra has now discovered several forms of Myrmelachista *sens. str.* in Mexico, and I am adding others which have long been standing in my collection, from Porto Rico, Costa Rica, British Guiana and northern Brazil. It still remains true, however, that the species of this subgenus inhabit countries around the Caribbean sea and the Gulf of Mexico, while the Decamera species are for the most part confined to South America and especially to Brazil, Chili and Argentina.

The species of Myrmelachista *sens. str.* are poorer in plastic characters than those of Decamera. Moreover, the workers seem to be distinctly though feebly polymorphic, since the larger individuals have the head proportionally larger and broader and the border of the petiolar scale more deeply sinuate or excised. The male genitalia appear to furnish more valuable characters, but unfortunately the males of only three of the species of Myrmelachista *sens. str.* are known (see Figs. 1–3). I insert a key which may aid in the identification of the workers of this subgenus.

1. Antennal scapes with erect or suberect hairs 2
   Antennal scapes without such hairs 11
2. Hairs on scapes conspicuously long and confined to their anterior surfaces 3
   Hairs on scapes shorter, more generally distributed 5
3. Petiolar border distinctly excised; head red, clouded with brown only on the occiput. Length 2.3 mm. St. Vincent . . *ambigua* Forel
   Petiolar border entire or feebly sinuate; head largely black or dark brown 4
4. Length 1.75–2.3 mm. Second funicular joint broader than long. Virgin Islands, Porto Rico, Santo Domingo . . *ramulorum* Wheeler
   Length 2.3–2.6 mm. Larger and stouter; second funicular joint longer than broad. Mona Island and Porto Rico . . . . . var. *fortior* var. nov.
5. Antennal clubs not infuscated 6
   Antennal clubs more or less infuscated 8
6. Thorax and gaster black 7
   Thorax and gaster castaneous. Length 1.5–2.5 mm. Cuba . . . . . *rogeri* Ern. André
7. Head largely red; petiolar border deeply excised. Length 1.75–2.5 mm. Cuba . . . . . var. *rubriceps* Mann
   Only the anterior border of head red; petiolar border feebly excised. Cuba . . . . . var. *manni* var. nov.
8. Sides of head rather convex; base of epinotum longer than the declivity. Length 2.3–2.5 mm. Costa Rica . . . . . *costaricensis* var. nov.
   Sides of head straight; base and declivity of epinotum subequal . . 9
9. Larger forms (2–2.5 mm.); head, thorax and antennal clubs black. Mexico . . . . . *skwarræ* sp. nov.
   Smaller forms (1.5–1.75 mm.) head and thorax not black; antennal clubs fuscous 10
10. Head small; head, thorax and petiole piceous brown. Mexico . . . . . var. *picea* var. nov.
    Head larger; head, thorax and petiole yellowish red. Mexico . . . . . var. *lacta* var. nov.
11. Fore tarsi enlarged; petiolar scale oval; color reddish yellow, with dark brown gaster and pale yellow antennæ and tibiæ. Length 2 mm. Cuba . . . . . *kraatzi* Roger
    Fore tarsi not enlarged; petiolar scale not oval 12
12. Head red 13
    Head castaneous or black 14

13. Petiolar scale broader than high, with convex sides, broadest in the middle; erect hairs absent on thorax; gaster brown. Length 2 mm. Costa Rica..... *plebecula* Menozzi
    Much smaller (1.2 mm.); petiolar scale narrow, with nearly straight sides, broadest above; erect hairs present on thorax; gaster black. Brazil..... *brevicornis* sp. nov.
14. Pronotum yellow or reddish yellow, contrasting with remainder of thorax. Length 1.5–1.75 mm. Mexico..... *amicta* sp. nov.
    Pronotum piceous, black, castaneous or brownish red, concolorous with remainder of thorax. Length 1.3–2 mm. British Guiana.. ..... *guyanensis* sp. nov.

Myrmelachista ramulorum Wheeler

This form, of which I described (1908) all three castes from Culebra Island and Porto Rico, and which has since been recorded by Mann from St. Thomas and by Menozzi from Santo Domingo, I now regard as an independent species and not as a subspecies of *ambigua* Forel. Judging from Forel's description which was drawn from a single specimen of this species from the Island of St. Vincent, the worker of *ramulorum* is more slender, with longer and deeper mesoëpinotal constriction and more deeply emarginate petiolar scale. The antennal scapes reach nearly halfway between the eyes and the posterior corners of the head. The clypeal border bears a minute denticle in the middle. In the male the second funicular joint is distinctly longer than broad and joints 3–5 are very nearly as long as broad. The mandibles are bidentate, with the basal tooth distinctly angular. The genitalia (Fig. 1) resemble those of *skwarræ* sp. nov. described below.

Myrmelachista ramulorum fortior subsp. nov.

Worker. Length 2.3–2.6 mm.

Differing from the typical form in being decidedly larger and more robust; head larger and broader; joints 2–5 of the funiculi decidedly longer, the second distinctly longer than broad, the third and fourth as long as broad. Petiolar scale as in the typical form, with entire or very feebly and broadly sinuate superior border. In profile this border is decidedly thicker and blunter; the posterior pedunculate extension of the petiole well-developed as in the typical form.

Erect hairs on the body, scapes and tibiæ even more numerous and longer. Coloration more vivid, the mandibles and head being deep red,

the latter blackish behind, the thorax and appendages of a more reddish yellow tint than in the typical *ramulorum*.

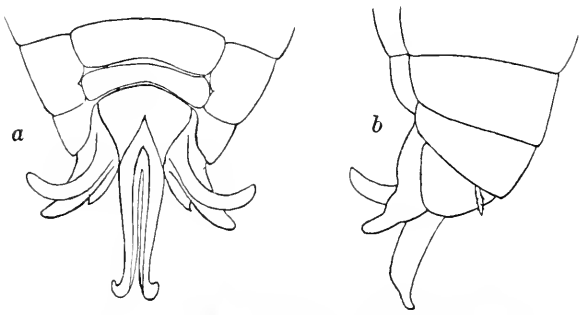

Fig. 1. Genitalia of male *Myrmelachista ramulorum* Wheeler; *a*, ventral, *b*, lateral aspect.

Described from nine specimens taken by Dr. F. E. Lutz, seven from Mona Island (type-locality) and two from Porto Rico, without more precise locality.

Myrmelachista rogeri Ernest André

Dr. Mann describes the worker of the typical form of this species from Sactia (Oriente), Cuba as "black with the anterior margin of the head and mandibles reddish and the antennæ and tarsi brown," whereas André gives the coloration as "deep castaneous, almost black; mandibles and anterior portion of the head more reddish; antennæ, articulations of the legs and tarsi sordid yellow." Dr. W.S. Creighton has recently sent a number of specimens from the vicinity of Cienfuegos, Cuba, which seem to approach the typical form as described by André more closely than Mann's specimens. I therefore regard the latter as representing a distinct variety, which may be called *manni* var. nov. The following is a description of the worker and female from Creighton's specimens:

Worker. Length 1.5–2.5 mm.

Head subrectangular, only slightly longer than broad, slightly narrower in front than behind, with nearly straight, subparallel sides and straight or feebly concave posterior border. Mandibles stout and convex. Eyes small, flat, at the middle of the sides of the head. Cly-

peus convex, almost subcarinate in the middle, its anterior border with a distinct median denticle. Frontal area and groove indistinct. Antennæ short; scapes distinctly flattened, their tips reaching to the posterior third of the sides of the head; club stout, as long as the remainder of the funiculus; joints 2–5 small, broader than long, the two basal joints of the club nearly as long as broad, together somewhat shorter than the swollen terminal joint. Promesonotum convex, hemispherical; mesoëpinotal impression pronounced; epinotum rather low, with straight and subequal base and declivity, meeting at a distinct obtuse angle. Petiolar scale small, subquadrate from behind, with more or less distinctly excised superior border; in profile short, cuneate, strongly compressed and acute above.

Very smooth and shining, with sparse piligerous punctures; mandibles longitudinally punctate-striate.

Hairs yellowish, sparse, suberect, partially subappressed on the head; rather numerous and suberect on the scapes, both on the anterior and posterior surfaces. Pubescence absent.

Castaneous brown; mandibles and more or less of the anterior portion of the head paler and more reddish; posterior borders of gastric segments, antennæ, tarsi, knees and in some specimens also the tibiæ brownish yellow.

Female (undescribed; deälated). Length 3.2–4.3 mm.

Head longer and more sharply rectangular than in the worker, fully one and one-fourth times as long as broad, with straight parallel sides and straight posterior border. Mandibles 5-toothed, the median and basal tooth minute. Thorax elongate, distinctly depressed; mesonotum longer than broad; epinotum low, without an angle between the long, straight, horizontal base and the short, rounded declivity. Petiole thicker than in the worker, with blunt, straight and transverse superior border.

Mandibles and clypeus coarsely punctate, the latter finely striate on the sides; sculpture of the other parts and the pilosity as in the worker.

Color decidedly paler, reddish; the mesonotum, scutellum, legs and antennæ brownish yellow.

Described from sixteen workers and five females taken by Dr. W. S. Creighton at San Blas, near Cienfuegos, Cuba. Mann's var. *rubriceps* from Pinares, Cuba differs from the above in its more deeply excised petiolar scale and in color, being black, with brownish red head, mandibles and antennæ and brown tarsi.

MYRMELACHISTA SKWARRÆ sp. nov.

Worker. Length 2–2.5 mm.

Head large, rectangular, as broad as long, slightly narrower in front than behind, with straight sides and posterior border, flattened dorsally and ventrally. Eyes small, flat, near the middle of the sides of the head. Mandibles convex, 5-toothed, the median tooth small. Clypeus convex, its anterior border with a minute, acute, median denticle. Frontal carinæ short, subparallel, somewhat farther apart than their distance from the lateral borders of the head. Antennæ rather stout; scapes extending a distance equal to their greatest diameter beyond the posterior orbits; first funicular joint large, fully twice as long as broad; joints 2–5 small, the second nearly as long as broad, 3–5 much shorter; club stout, its two basal joints as long as broad, together shorter than the swollen terminal joint. Thorax short and stout though considerably narrower than the head; promesonotum convex, subhemispherical; mesonotum transversely rounded-rectangular, one and one-half times as broad as long; mesoëpinotal constriction short and shallow dorsally, pronounced laterally; epinotum lower and shorter than the promesonotum, somewhat longer than wide, narrowed anteriorly, with rounded sides; base and declivity subequal in profile, the former feebly convex, the latter sloping and somewhat concave posteriorly. Petiole rather short, as high as long; scale scarcely inclined forward, narrow, with rather thin, acute, very feebly sinuate superior border. Gaster large, oval; first segment rounded anteriorly, the tip pointed. Legs rather stout, fore femora distinctly enlarged.

Smooth and shining, with sparse piligerous punctures. Mandibles obscurely punctate-striate; clypeus, anterior borders of cheeks and neck reticulate.

Hairs glistening white, bristly, moderately long on the head, thorax and gaster, partly erect and partly shorter and appressed. Scapes and funiculi with numerous erect or suberect hairs, legs with short, sparse suberect hairs.

Black; neck, tips of coxæ, trochanters, bases and tips of femora, tibiæ, scapes and basal joints of funiculi brownish yellow or yellowish brown; mandibles, mouthparts and anterior borders of cheeks reddish brown.

Female. Length 3–4 mm.

Slender; head rectangular, one and one-third times as long as broad, flattened above and below, with rounded posterior corners, straight

subparallel sides and feebly sinuate posterior border. Mandibles large and convex, with strong teeth. Clypeus convex, its anterior border with a small median tooth. Eyes rather small, flat, a little in front of the middle of the sides of the head; ocelli small, widely separated. Antennæ as in the worker, but scapes reaching only to the posterior orbits. Thorax elongate oval, about two and one-third times as long as broad, broader than the head; mesonotum very flat above, decidedly longer than broad; epinotum small and short, feebly rounded in profile, without distinct base and declivity. Petiole broader than in the worker, scale more inclined forward, with the superior border transverse, straight and entire or feebly sinuate in the middle. Gaster large, elongate-elliptical, fully as long as the remainder of the body. Legs rather stout, with somewhat enlarged femora. Wings long, measuring 4 mm., with well-developed venation; marginal cell closed; discoidal cell absent.

Sculpture, pilosity and color as in the worker, but mandibles and cheeks more distinctly punctate-rugulose. Wing-membranes faintly brownish; veins and pterostigma pale brown.

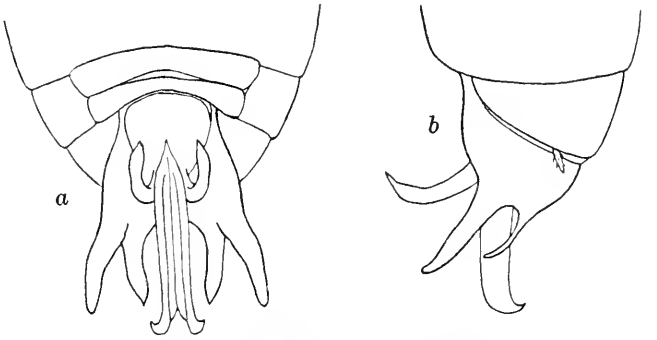

Fig. 2. Genitalia of male *Myrmelachista skwarræ* sp. nov.; *a*, ventral, *b*, lateral aspect.

Male. Length 2.5–2.7 mm.

Head through the eyes broader than long, convex and semicircularly rounded behind, with short, slightly convex, anteriorly converging cheeks. Eyes large and prominent; ocelli moderately large. Mandibles narrow, geniculate at the base, bidentate apically, the terminal tooth small and acute, the basal tooth in the form of a rounded lobe. Clypeus very convex, its anterior border rounded, without distinct median

denticle. Antennæ 10-jointed; scapes fully six times as long as broad; first funicular joint large, twice as long as broad; joints 2–5 small, the second as long as broad; 3–5 broader than long, the three basal joints of the club not longer than broad, subequal, together longer than the somewhat broader terminal joint. Thorax robust, much broader than the head, oval, less than twice as long as broad; mesonotum as broad as long, dorsally flattened, anteriorly convex and projecting above the very short pronotum; epinotum small, shaped like that of the female. Petiolar scale like that of the worker but inclined more forward, its superior border thicker, when seen from behind straight, transverse and entire. Gaster elliptical; genitalia very large and exserted (Fig. 2). Legs slender. Wings broad.

Sculpture, pilosity and color as in the worker and female, but the pilosity less conspicuous and the body more piceous black; antennal clubs less infuscated; mandibles subopaque, densely punctate. Wings slightly paler than in the female, but their veins and pterostigma of the same color.

Described from numerous workers, seven females and six males (762) taken by Dr. Skwarra at Cuautla, Morelos (type-locality) in *Tillandsia circinata*, a number of workers belonging to several colonies (770, 771, 772, 777, 783a and 786) taken at Cuernavaca, Morelos in the same plant, and several workers (Z 208a) at Mirador, Vera Cruz in *T. Valenzuelana*.

Myrmelachista skwarræ picea subsp. nov.

Worker. Length 1.5–1.75 mm.

Differing from the typical form in its distinctly smaller size, its relatively smaller head and in having the head, thorax and petiole piceous brown, with darker brown gaster and the borders of its segments yellowish.

Mandibles, cheeks and clypeus reddish; antennæ and legs paler, brownish yellow, with the clubs of the former either slightly or not at all infuscated and the infuscation of the legs confined to the femora. Petiolar scale more compressed above, with more acute and somewhat more deeply sinuate superior border. Hairs on the body shorter and sparser, more appressed on the legs, but distinct and suberect on the antennal scapes and funiculi.

Several workers taken by Dr. Skwarra at Cuernavaca, Morelos (772, 773, 774 and 787) nesting in *Tillandsia circinata*.

Myrmelachista skwarræ læta subsp. nov.

Worker. Length 1.5–1.75 mm.

Not larger than the preceding species but with the head broader and shaped as in the typical *skwarræ*, though somewhat less sharply rectangular, the sides being slightly more convex and the posterior border distinctly sinuate. Petiolar scale from behind more rectangular, with compressed, acute, straight or feebly sinuate superior border. Sculpture and pilosity as in the typical *skwarræ*. Head, thorax and petiole rather bright yellowish red; gaster dark brown, with the posterior borders of the segments yellowish; head darker red posteriorly; appendages yellow; clubs of antennæ darker red, not infuscated; femora sometimes faintly infuscated in the middle.

Described from five workers (40) taken by Dr. Skwarra at Mirador Vera Cruz (type locality) in *Tillandsia Balbisiana*, and one worker (762) taken at Cuautla, Morelos in *T. circinata*.

Myrmelachista amicta sp. nov.

Worker. Length 1.5–1.75 mm.

Head moderately large, subrectangular, as broad as long, with straight posterior border and nearly straight sides. Eyes flat, near the middle of the sides. Mandibles broad, very convex, 5-toothed, the median tooth very small. Clypeus convex, its anterior border with a minute median denticle. Antennæ 9-jointed; rather short; scapes extending slightly beyond the posterior orbits; first joint rather narrow, fully twice as long as broad; joints 2–5 small; second joint nearly as long as broad; 3–5 much shorter; two basal joints of the large club distinctly longer than broad, together shorter than the swollen terminal joint. Thorax short but narrower than in *skwarræ*, with more pronounced mesoëpinotal constriction; promesonotum convex, subhemispherical, considerably larger than the epinotum; mesonotum subelliptical, less than one and one-half times as broad as long; epinotum lower than the promesonotum, not longer than broad, subcuboidal, with subequal base and declivity, meeting at a distinct angle, the declivity less sloping than in *skwarræ*. Petiole short, its scale only slightly inclined forward, decidedly thinner than in *skwarræ*, subrectangular from behind, with sharp, distinctly emarginate superior border. Gaster ovoidal, its first segment rounded anteriorly, its tip rather long and pointed. Legs rather slender, fore femora somewhat enlarged.

Smooth and shining, with fine, very sparse, piligerous punctures on the body; mandibles and clypeus superficially reticulate-punctate.

Hairs glistening white, much sparser and shorter than in *skwarræ*, numerous but appressed on the scapes and legs, more suberect on the funiculi.

Deep castaneous; mandibles, anterior portion of head and upper surface of pronotum red or yellowish red; femora dark brown except at their bases and tips, which, like the tibiæ, tarsi and antennæ are yellow; last joint of antennal clubs feebly infuscated.

Described from 16 workers (618) taken by Dr. Skwarra at Mirador, Vera Cruz in *Tillandsia Balbisiana* and three (296) from the hollow stem of a composite.

Myrmelachista costaricensis sp. nov.

Worker. Length 2.3–2.5 mm.

Head moderately large, subrectangular, very slightly longer than broad and slightly narrower in front than behind, with feebly concave posterior border. Eyes rather small, flat, near the middle of the sides. Mandibles convex, 5-toothed, the second, third and fifth tooth very small. Clypeus convex, its anterior border somewhat angularly produced, with a small acute median denticle. Antennæ short; scapes slender, reaching a distance equal to their greatest diameter beyond the posterior orbits; second funicular joint nearly as long as broad; joints 3–5 subequal, decidedly broader than long; club moderately large, much longer than the remainder of the funiculus, the two basal joints as broad as long, together distinctly shorter than the more swollen terminal joint. Thorax rather slender, with deep lateral and shallower dorsal mesoëpinotal constriction. Pro- and mesonotum subspherical, broader, but very slightly longer than the epinotum, which is longer than broad and distinctly narrowed anteriorly; mesonotum transversely rounded-rectangular, less than twice as broad as long. In profile the promesonotum is higher and more convex than the epinotum, which has a feebly convex base and a decidedly shorter sloping, concave declivity. Petiole short, without posterior peduncle, its scale cuneiform in profile, slightly inclined forward, broadest above, with nearly straight, ventrally converging sides, its summit acute, in large specimens distinctly, in small ones feebly excised. Gaster large, oval; anterior border of first segment rounded, the tip pointed. Legs short, fore and hind femora somewhat thickened.

Smooth and shining, with very fine, sparse, piligerous punctures; mandibles indistinctly punctate-striate.

Hairs pale yellowish, rather coarse and bristly, erect, sparse and rather long on the head, thorax and abdomen; head also with shorter, sparse appressed hairs on the dorsal surface; scapes, funiculi and legs with numerous short, erect or suberect hairs.

Head red, thorax yellow above, with brown or blackish pleuræ; gaster dark brown, with the posterior borders of the segments yellowish; palpi, antennæ and legs paler yellow; antennal clubs and femora distinctly infuscated.

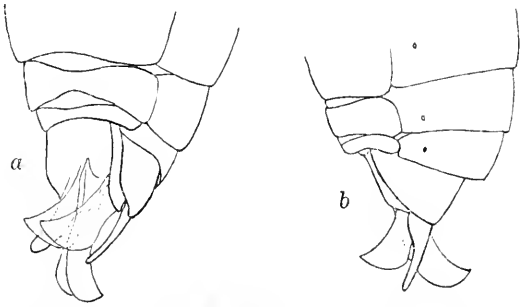

Fig. 3. Genitalia of male *Myrmelachista costaricensis* sp. nov.; *a*, ventrolateral, *b*, lateral aspect.

Male. Length 1.8–2.3 mm.

Head through the eyes somewhat broader than long, semicircularly rounded behind, with short, straight, anteriorly converging cheeks. Eyes and ocelli large and prominent. Clypeus like that of the worker, but with only an indistinct trace of the median denticle. Mandibles narrow, somewhat broadened apically, bidentate, the apical tooth acute, the basal short and blunt. Antennæ 10-jointed; scapes fully 5 times as long as broad; first funicular joint nearly twice as long as broad; joints 2–5 small, nearly as long as broad; club very distinctly 4-jointed, the 3 basal joints subequal, longer than broad, together much longer than the somewhat more swollen terminal joint. Thorax large, broader than the head; mesonotum large, subcircular, as broad as long, very convex in front, flattened behind. Epinotum small, lower than the mesonotum, shaped somewhat as in the worker. Petiolar scale lower and thicker, its summit much less acute, from behind straight, transverse and entire. Gaster shaped as in the worker; genitalia large and exserted (Fig. 3). Legs long and slender.

Wings longer than the body, with well-developed pterostigma and closed marginal cell; discoidal cell lacking.

Smooth and shining; mandibles subopaque, finely and densely punctate.

Pilosity pale, shorter and less abundant than in the worker.

Head deep castaneous, clypeus, mandibles, and scapes somewhat paler; funiculi, thorax, petiole, venter, legs and genitalia brownish yellow; femora and tibiæ somewhat darker; dorsum of gaster brown, paler than the head; wings colorless, with very pale yellow veins and pterostigma.

Described from 16 workers and 12 males which I found living in a species of Tillandsia at Alajuela, Costa Rica, Nov. 28, 1911.

This species is closely related to Menozzi's *plebecula* from Costa Rica, but the latter is described as having shorter antennal scapes, the second funicular joint is longer than broad, the petiolar scale of a different shape, being broader than high, with rounded sides. Apparently, also, *plebecula* is less pilose and the pleuræ are not black or dark brown.

Myrmelachista guyanensis sp. nov.

Worker. Length 1.3–2 mm.

Head subrectangular, rather flat, slightly longer than broad and slightly narrower in front than behind, with feebly concave posterior and feebly convex lateral borders. Eyes small, flat, slightly in front of the middle of the sides. Mandibles stout, convex, 5-toothed, the median tooth minute. Clypeus convex in the middle, its anterior border sinuate on each side, rounded, projecting and crenulate in the middle and sometimes bearing two closely approximated denticles in the position of the single denticle of other species. Frontal area rather distinct, flat and triangular. Antennæ short; scapes curved and somewhat flattened at the base, extending about twice their greatest diameter beyond the posterior orbits; joints 2–5 of the funiculus subequal, strongly transverse, two basal joints of club subequal, together somewhat shorter than the terminal joint. Thorax of the usual shape but rather depressed above; mesoëpinotal constriction short and rather feeble in profile, deep on the sides; metaëpinotal suture distinct but the metanotal spiracles not projecting; base of epinotum flattened, straight in profile, longer than the very sloping declivity. Petiole with distinct posterior peduncle; scale slightly inclined forward, narrow below, widening above, with slightly convex sides and feebly but

distinctly excised, though blunt superior border, so that in profile it is nearly as thick above as below.

Very smooth and shining, minutely and sparsely punctate; mandibles finely punctate-reticulate at the tips; metanotum more opaque, reticulate-rugulose.

Erect hairs and pubescence pale, whitish; the former very scarce, confined to the clypeus and posterior borders of the gastric segments; the latter sparse, appressed, moderately long on the head, thorax and gaster, very short and dilute on the legs and antennæ.

Castaneous brown; thorax alone or both head and thorax sometimes paler and more reddish brown; cheeks and clypeus yellowish brown; mandibles, antennæ, tibiæ, articulations of legs, sutures of thorax and posterior borders of gastric segments brownish yellow; mandibular teeth black; antennal clubs slightly darker than the bases of the funiculi but not infuscated.

Female. Length 3–3.3 mm.

Head like that of the worker in being distinctly narrower anteriorly, but suboblong, one and one-fourth times as long as broad, with straight sides and posterior border. Eyes larger, flat, placed more anteriorly; ocelli small, widely separated. Anterior clypeal border broader, less projecting and more nearly straight, crenulate or with two minute, closely approximated median denticles. Thorax broader than the head, twice as long as broad, much flattened, especially in the region of the mesonotum, which is large, subhexagonal, as broad as long; epinotum low, its dorsal surface very feebly convex, sloping, without distinct base and declivity. Petiolar scale thicker, stouter, with entire, much more obtuse superior border than in the worker. Gaster elongate-elliptical, as long as the remainder of the body. Wings long, with one long cubital cell and no discoidal cell.

Sculpture, pilosity and color as in the worker, but the mesonotum and scutellum pale brown or brownish yellow. Wings colorless, with pale yellow veins and pterostigma.

Described from numerous workers and five females which I took at Kartabo, British Guiana, inhabiting tenuous, anastomosing galleries in dead twigs and branches.

Myrmelachista brevicornis sp. nov.

Worker. Length 1.2 mm.

Resembling *guianensis* in the shape of the head, but the mandibles are smaller, much less convex, with smaller and more nearly subequal

teeth and distinctly shorter antennæ. The scapes scarcely extend beyond the posterior orbits of the small, flat eyes; joints 2–5 of the funiculi even shorter than in *guyanensis* and the two basal joints of the clubs broader than long and together much shorter than the large, swollen terminal joint. Thorax like that of *guyanensis* but the mesonotum less depressed, more distinctly elevated above the epinotum; the petiolar scale narrower, with straight subparallel sides and only feebly sinuate superior border; posterior peduncle scarcely developed.

Sculpture and pilosity as in *guyanensis* but there are a few short, erect hairs on the thorax and the pubescence on the tibiæ and scapes is longer and somewhat oblique.

Head, thorax and petiole rather bright yellowish-red; gaster black; antennæ and legs reddish-yellow; mandibular teeth reddish.

Two specimens from Santarem, Brazil, received many years ago from Staudinger and Bang-Haas. These specimens had passed through Emery's hands but he had refrained from describing them.

Myrmelachista (Decamera) mexicana sp. nov.

Worker. Length 1.5–2 mm.

Head small, convex above and behind, rounded subrectangular, distinctly longer than broad, scarcely broader behind than in front, with rather convex sides and straight posterior borders. Eyes flat, at the middle of the sides. Clypeus moderately convex, almost subcarinate, its rounded anterior border with a small, acute median tooth. Frontal carinæ short, straight, parallel, nearly as far apart as their distance from the lateral borders of the head. Mandibles convex, 5-toothed. Scapes of the 10-jointed antennæ reaching half way between the posterior orbits and the rounded posterior corners of the head; first funicular joint fully twice as long as broad; joints 2–6 small, the second as long as broad, 3–6 slightly broader than long; club large, its two basal joints subequal, longer than broad, together nearly as long as the decidedly more swollen terminal joint. Thorax slender, narrower than the head, hour-glass shaped, with the mesoëpinotal constriction deep both dorsally and laterally; promesonotum oval, broader and somewhat larger than the epinotum; mesonotum as long as broad, broader in front than behind; metaëpinotal suture distinct, metanotal spiracles large and prominent, epinotum in profile evenly rounded, without differentiated base and declivity, somewhat lower than the promesonotum, the posterior portion of the declivity slightly concave. Petiole small, narrow, much longer than high, with long

posterior peduncle; scale thick, strongly inclined forward, the very blunt summit of the scale strongly rounded and entire when seen from behind. Gaster small, elliptical, with pointed tip. Legs slender, only the fore femora slightly enlarged.

Smooth and shining, with small, sparse, piligerous punctures; mandibles punctate-striate; clypeus obscurely striate; upper surface of epinotum reticulate.

Pilosity glistening white, sparse, bristly, erect or subereet on the body; shorter and more abundant on the appendages, erect on the scapes, conspicuous on the funiculi, more oblique on the legs.

Deep castaneous; mandibles and clypeus reddish; pronotum, trochanters and tarsi paler, more yellowish brown.

Female (deälated). Length nearly 4 mm.

Long and slender. Head strongly rectangular, one and one-third times as long as broad, convex above, slightly broader behind than in front, with straight sides and posterior border. Eyes rather large, nearly flat, in front of the middle of the sides; ocelli small, widely separated. Mandibles very convex, with stout teeth. Clypeus convex, with a stout, blunt upturned tooth at the middle of its anterior border. Thorax from above elliptical, nearly two and one-half times as long as broad, somewhat broader than the head; mesonotum flat, subcircular, as long as broad; epinotum small, sloping, scarcely convex in profile, without distinct base and declivity. Petiole as in the worker, but the node with more broadly rounded superior border. Gaster large, elongate elliptical.

Sculpture, pilosity and color as in the worker, except that the mandibles are red and the thorax is deep castaneous throughout.

Male. Length 1.5–2 mm.

Head through the eyes distinctly broader than long, convex and subcircular behind, cheeks short, straight and converging anteriorly. Mandibles narrow, edentate, pointed at their tips and strongly geniculate at their bases. Eyes large; ocelli very small and widely separated. Clypeus short, its anterior border with a very minute median denticle. Antennæ 11-jointed, slender; scapes about eight times as long as broad; first funicular joint somewhat swollen, pyriform, nearly twice as long as broad; second joint as long as broad; joints 3–6 slightly broader than long; 8–9 as broad as long, together as long as the last joint of the rather indistinct 4-jointed club. Thorax long, broader than the head; pronotum small; mesonotum elliptical, longer than broad, flattened posteriorly, very convex anteriorly; epinotum small and sloping as in the female; mesosterna long but flattened. Petiole

short, without posterior peduncle; scale low, thick, nodiform, with rounded summit. Gaster elliptical; genitalia small but exserted (Fig. 4). Legs slender. Fore wings broad, with well developed pterostigma and closed marginal cell; cubital and discoidal veins imperfect, discoidal cell absent.

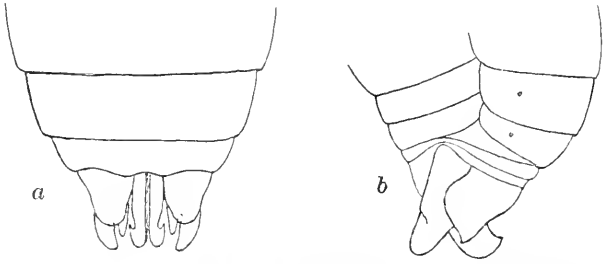

Fig. 4. Genitalia of male *Myrmelachista* (*Decamera*) *mexicana* sp. nov.; *a*, dorsal, *b*, lateral aspect.

Sculpture and pilosity much as in the worker; head, thorax and petiole somewhat paler, more piceous or reddish brown; gaster darker; mandibles, antennæ, legs and genitalia brownish or sordid yellow. Wings colorless, with pale yellow veins and pterostigma.

Described from four workers, one female and seven males (No. 296), taken by Dr. Skwarra at Mirador, Vera Cruz in hollow twigs.

Myrmelachista (Decamera) schumanni Emery var. cordincola var. nov.

Worker. Length 1.5–3 mm.

Averaging somewhat larger than the typical *schumanni* and differing in color. Brownish yellow, with the head and gaster brown, the latter usually darker than the former, the bases of the gastric segments paler than their posterior borders which are edged with black. Mandibles and anterior portion of head paler and more yellowish than the posterior portion. Antennæ and legs yellow, the clubs of the former and in some specimens also the median part of the femora somewhat infuscated. Superior border of petiolar scale entire, its anterior surface distinctly convex, its posterior surface nearly flat.

Described from numerous specimens taken by Dr. W. M. Mann at Osunto, Bolivia in cauline swellings of *Cordia hispidissima*.

Myrmelachista (Decamera) zeledoni Emery

Male (undescribed). Length 2.4 mm.

Head without the mandibles decidedly broader than long, broad and semicircularly rounded behind, with large eyes and prominent ocelli, much narrowed in front, with straight, anteriorly converging cheeks. Mandibles well developed, with two large teeth. Clypeus very convex

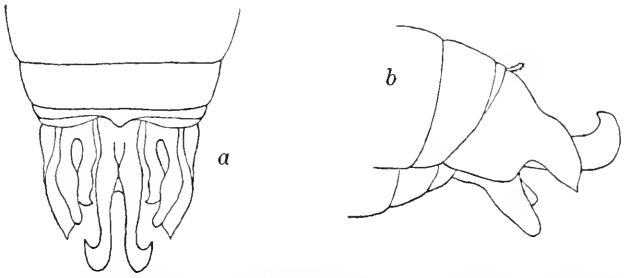

Fig. 5. Genitalia of male *Myrmelachista* (*Decamera*) *zeledoni* Emery; *a*, ventral, *b*, lateral aspect.

but not carinate in the middle, its anterior border broadly rounded and projecting. Antennæ 11-jointed, long; scapes reaching to the posterior ocelli; first funicular joint small, as broad as long; remaining joints decidedly longer than broad. Thorax robust, broader than the head; mesonotum broader than long, convex and hemispherically rounded anteriorly; epinotum small, scarcely convex, sloping, without differentiated base and declivity. Petiole small, nodiform, conical in profile, with blunt, entire, convex and rounded superior border. Gaster rather large, with large, exserted genitalia. (Fig. 5). Legs long and slender. Wings long, with a single elongate cubital and no discoidal cell.

Smooth and shining; pilosity consisting of a few short, erect hairs on the clypeus, thorax and gaster; pubescence undeveloped. Brown; head, mesopleuræ and outer genital valves darker, castaneous; mandibles, clypeus, antennæ and legs brownish yellow; sagittæ whitish; wings grayish, with pale brown veins and pterostigma.

In 1911 I found this species to be rather common in dead twigs at San Jose, Alajuela and Cartago, Costa Rica. Emery's type material came from the same region. He records a smoother variety, *thiemei*, of this species from Venezuela and Peru.

Myrmelachista (Decamera) ulei Forel

Six workers collected by Dr. J. C. Bradley at Perené, Peru (July 1, 1920) agree perfectly with a cotype received many years ago from Professor Forel. Ule discovered the species in the swelling of the flower-stalk of a Melastomaceous plant (*Pterocladon sprucei* Hooker) at Cerro de Escaler, 1200 m., Peru. Bradley's specimens were probably taken in a similar situation.

Myrmelachista (Decamera) donisthorpei sp. nov.

Worker. Length about 1.3 mm.

Head subrectangular, convex dorsally, as broad as long and nearly as broad in front as behind, with feebly convex sides and posterior border. Eyes rather flat, at the middle of the sides. Mandibles moderately convex, 5-toothed, the third and fifth tooth small. Clypeus broad, convex in the middle, anterior border transverse, nearly straight, without median denticle. Frontal area large, flat, subtriangular, with indistinct posterior boundary. Antennæ rather long; scapes reaching nearly to the posterior border of the head; funicular joints 2–6 small, slightly broader than long, except the second, which is as long as broad; two basal joints of club longer than broad, together shorter than the terminal joint. Thorax rather robust, of the usual hour-glass shape, the mesoëpinotal constriction short but deep, both dorsally and laterally; promesonotum large, convex and hemispherical, considerably elevated above the epinotum; metanotum short, with prominent spiracles, without posterior suture; epinotum in profile with feebly convex, horizontal base, distinctly shorter than the straight and sloping declivity. Petiole stout, posteriorly pedunculate; scale strongly inclined forward, very thick, nodiform, as thick at the summit, which is rounded and entire, as at the base. Gaster of the usual shape. Legs long and slender, fore femora distinctly enlarged.

Smooth and shining, minutely and sparsely punctate; mandibles delicately reticulate-punctate.

Hairs rather abundant, yellow, of uneven length, bristly, long on the body, shorter on the appendages, appressed on the femora, suberect and conspicuous on the tibiæ, especially on the tarsi, funiculi and anterior surfaces of the scapes.

Pale yellow; mandibles reddish; vertex and middle of occiput with a large pale brown spot; gaster piceous or blackish.

A single specimen, taken by the Oxford University Expedition (1929) on Morabelli Creek, Essequibo River, British Guiana and

sent me for identification by Mr. Horace Donisthorpe. It is deposited in the British Museum together with a deälated female from the same locality and apparently belonging to the same species. This specimen unfortunately lacks the anterior half of the head. It is deep castaneous, with black gaster and yellow legs. Both body and legs are rather densely clothed with erect or suberect, coarse, yellow hairs, of uneven length. Petiolar scale or node broad and very thick, with transverse, somewhat sinuate superior border.

Myrmelachista (Decamera) flavida sp. nov.

Worker. Length 1.3–1.5 mm.

Head flattened, subrectangular, about one sixth longer than broad, slightly narrower in front than behind, with nearly straight sides and slightly sinuate posterior border. Eyes flat, slightly in front of the middle of the sides. Mandibles moderately convex, somewhat geniculate at the base, 5-toothed, the third and fifth tooth minute. Clypeus convex in the middle, its anterior border sinuate on each side, broadly rounded in the middle, somewhat projecting and armed with a distinct denticle. Frontal area distinct, flat, triangular. Antennal scapes curved at the base, extending to about half the distance between their insertions and the posterior corners of the head; funicular joints 2–6 small, subequal, much broader than long; two basal joints of club slightly broader than long, together much shorter than the swollen terminal joint. Thorax slender, hour-glass shaped; pro- and mesonotum together forming an ovoidal mass, convex dorsally and laterally; mesoëpinotal constriction deep and rather long; metanotal spiracles prominent, posterior metanotal suture obsolete. Epinotum seen from above ovoidal but smaller than the promesonotum; base in profile nearly straight, horizontal, decidedly longer than the somewhat concave, sloping declivity. Petiole as long as high, slightly peduncular posteriorly, the scale small, thick, nodiform, inclined forward, its upper border rounded, seen from behind straight and entire. Gaster of the usual shape. Legs moderately long, fore femora slightly thickened.

Smooth and shining; mandibles delicately reticulate-punctate at their tips; thoracic constriction and metanotum subopaque, reticulately and on the sides longitudinally rugulose.

Pilosity delicate, yellowish, short and very meager; only a few scattered erect hairs on the clypeus, upper surface of the head, thorax and gaster. Pubescence very dilute, appressed, scarcely visible, except on the antennæ, tibiæ and posterior surface of the head.

Yellow; gaster and legs slightly paler than the head and thorax; borders and teeth of mandibles, anterior margin of clypeus and the frontal carinæ reddish.

Described from six specimens which I collected at Kartabo, British Guiana, nesting in dead stems of a low Rubiaceous weed, *Borreria verticillata* L.

M. flavida is closely related to *nodigera* Mayr, *bambusarum* Forel and *bruchi* Santschi, but is, I believe, quite distinct.

Brachymyrmex gagates sp. nov.

Worker. Length 2–2.5 mm.

Head rounded subrectangular and dorsally convex as in the other species of the genus; posterior border straight, with a slight median sinuation. Eyes rather large, flattened, a little behind the middle of the sides and less than twice their length from the anterior corners. Ocelli distinct. Mandibles small, with oblique 5-toothed terminal borders, the median tooth minute. Clypeus large, convex but ecarinate in the middle, its anterior border broadly rounded and projecting, concealing the closed mandibles. Frontal area subtriangular, not very sharply defined; frontal groove represented anteriorly as an indistinct longitudinal ridge but concave just in front of the anterior ocellus. Antennal scapes extending fully one-fourth their length beyond the posterior corners of the head; second funicular joint one and one-half times as long as broad, a little more than half as long as the first joint; joints 3–7 more than one and one-half times as long as broad, terminal joint as long as the two preceding subequal joints together. Thorax with strong and distinctly impressed promesonotal suture, interrupting the dorsal outline, and deep mesoëpinotal impression; metaëpinotal suture distinct, the prominent metanotal spiracles small, separated by more than five times their diameter. Pronotum broad and rounded, mesonotum less than twice as broad as long, very convex, projecting above the pronotum; metaëpinotum slightly longer than broad, trapezoidal, distinctly broader behind than in front; base and declivity of epinotum in profile straight and subequal, the former horizontal, the latter sloping, forming together a rounded but distinct obtuse angle. Petiolar scale small, thin and very narrow, its anterior surface concave above, its posterior surface feebly convex. Gaster voluminous, pointed posteriorly, its large first segment overlying the petiole and provided with a deep groove for

its accommodation. Legs stout, fore femora distinctly enlarged and somewhat compressed.

Very shining and very finely and superficially reticulate; basal half of mandibles obscurely striatopunctate; sides of thorax less shining than the dorsal surface; metapleuræ subopaque, finely and densely punctate.

Hairs reddish or brownish, pubescence whitish; the former sparse, erect and pointed, in several rows on the gastric segments, absent on the appendages. Pubescence short, distinct, appressed and dilute on the posterior portion of the head; absent on the thorax and abdomen; abundant and subappressed on the appendages, somewhat longer on the antennæ than on the legs.

Jet black; clypeus, tips of mandibles and insertions of antennæ red; sides of head, antennæ and legs dark brown; funiculi sometimes more reddish; tarsal joints beyond the metatarsi pale yellow; trochanters and neck yellowish brown.

Described from a dozen specimens (No. 607) taken by Dr. Skwarra at Mirador, Vera Cruz, in *Tillandsia streptophylla*. This species seems to be quite distinct from any of those included in Santschi's monograph of Brachymyrmex (1923). It runs to *incisus* Forel in his table, but typical specimens of this form from Panama in my collection show that it differs from *gagates* in having a narrower head, much less prominent mesonotum, indistinct and unimpressed promesonotal suture, shorter funicular joints, much paler coloration, etc.

Camponotus (Myrmaphlenus) cressoni Ern. André

Three major and three minor workers (No. 279) taken by Dr. Skwarra at Mirador, Vera Cruz in dead stems of Heliocarpus, lying on the ground.

Camponotus (Myrmobrachys) phytophilus sp. nov.

Worker major. Length 4.5–5.3 mm.

Head rounded subrectangular, as broad as long, slightly broader behind than in front, with moderately convex sides and cheeks, rounded posterior corners and straight posterior border. Eyes rather large and flat, nearly three times their length from the anterior corners of the head. Mandibles convex, stout, with five strong teeth. Clypeus subrectangular, somewhat longer than broad, convex but not carinate in the middle, its anterior border with a rather deep median sinuation

flanked on each side by a broad, blunt tooth-like projection. Cheeks large, projecting slightly beyond the anterior border of the clypeus. Frontal carinæ rather closely approximated in front, strongly diverging and subparallel behind; frontal groove distinct. Antennæ slender; scapes curved at the base, enlarging towards their tips, which extend about twice their greatest diameter beyond the posterior border of the head. Thorax short, with strong, impressed promesonotal suture; in profile evenly arcuate throughout, since the epinotum is low, sloping and rounded, usually with only a faint suggestion of an angle between the base and declivity. Pronotum, without the neck, nearly twice as broad as long, flattened above, with bluntly submarginate sides and rounded humeri; mesonotum nearly as broad as long, rounded on the sides and anteriorly, where it is slightly elevated above the pronotum at the suture; epinotum narrow, longer than broad, subrectangular from above and rounded from side to side. Petiolar scale thick, nodiform in profile, nearly as thick above as below, convex in front and flattened behind; seen from behind rather narrow, broader at the superior border, which is straight and transverse, than below. Gaster broadly elliptical; legs stout.

Subopaque; head and thorax densely punctate; mandibles and posterior corners of head smoother and more shining; gaster and legs slightly more shining than the thorax; anterior half of head more coarsely punctate than the posterior half; clypeus, cheeks and front also with sparse, shallow, piligerous foveolæ; petiole and gaster finely, sharply and transversely shagreened; mandibles, legs and scapes superficially shagreened, the mandibles also coarsely and sparsely punctate.

Hairs snow-white, coarse, erect and rather abundant; short, stubby and obtuse on the clypeus, front and cheeks, longer and more pointed on the occiput, thoracic dorsum and gaster, conspicuously long and numerous on the epinotum; short and oblique on the femora and scapes; abundant and almost squamiform on the tibiæ.

Black; femora dark brown; scapes, first funicular joint, tibiæ and tarsi more reddish.

Worker. Length 3–3.5 mm.

Head trapezoidal, longer than broad, with straight somewhat flattened, anteriorly converging sides and feebly convex posterior border, without a distinct ridge from the posterior corners to the eyes, which are large and very near the latter. Mandibles small, less convex than in the major worker. Clypeus subcarinate. Antennal scapes nearly straight, extending half their length beyond the posterior border of the head. Thorax like that of the major but less convexly arcuate.

Sculpture and pilosity as in the major. Black; legs deep piceous brown or black; tips of mandibles, basal two thirds of antennal scapes and tarsi paler, more yellowish brown.

Female (deälated). Length 5.5–6 mm.

Head resembling that of the minor worker in shape, but larger, with larger, more convex eyes. Clypeus feebly and evenly convex, ecarinate. Thorax narrower than the head, elongate oval, three times as long as broad; mesonotum longer than broad, epinotum short, the base convex and rounded, passing with an even curve into the longer, straight and nearly perpendicular declivity. Petiole like that of the worker forms but even thicker and more nodiform.

Surface of body, especially the occiput, thorax and gaster smoother and more shining; pilosity like that of the major but more abundant, longer on the head. Black; mandibles entirely or only at their tips deep red, as are also the scapes, first funicular joint and tarsi.

Male. Length 3.2 mm..

Head through the large, convex eyes as broad as long, broad and semicircularly rounded behind; ocelli prominent; cheeks slightly concave, subparallel. Mandibles slender, gradually widened at their tips which bear an acute terminal denticle. Clypeus subcarinate. First funicular joint enlarged, pyriform; terminal joints short. Thorax broader than the head, about two and one-half times as long as broad. Mesonotum large, somewhat longer than broad; epinotum in profile evenly rounded, without distinct base and declivity. Petiole much as in the worker minor but somewhat lower, as thick above as below, the superior surface straight and transverse. Gaster small and narrow; legs slender.

Sculpture and pilosity as in the female, but the hairs on the head are long, pointed, and of more uneven length. Black, including the mandibles; legs dark brown; tarsi and funiculi somewhat paler. Wings white, with pale yellow veins and pterostigma.

Described from many workers, two females and a male taken from numerous colonies by Dr. Skwarra at Cuernavaca, Morelos (type-locality) in *Tillandsia circinata* (Nos. 765a, 775, 776, 781, 834, 839a, 842, 848, 849, 855, 856, 866, 870, 871, 876) and Mirador, Vera Cruz in *Tillandsia streptophylla* (187a) and in stems of *Ricinus communis* (718).

Minor workers of this species which I collected at Cuernavaca in 1900, attending Membracids on a tall Umbelliferous plant, were identified and recorded by Forel (Ann. Soc. Ent. Belge 1901) as "*Camponotus mina* Forel", but I find that they represent quite a distinct species, now that Dr. Skwarra has discovered the major

worker. *C. mina* is much larger, with differently shaped head, epinotum and petiole and different coloration of legs and antennæ, pale borders to the gastric segments, etc.

Camponotus (Myrmobrachys) striatus F. Smith

Three minor workers taken by Dr. Skwarra at Camaron, Vera Cruz, in spines of *Acacia sphærocephala*.

Camponotus (Manniella) linnæi Forel

In 1870 Mayr described from Colombia a minor worker of Camponotus as *angulatus*, but as this name was preoccupied, it was changed by Forel in 1886 to *linnæi*. He later described in the Biologia Centrali-Americana (1899) a subspecies *muticus*, also from a minor worker. Emery (Genera Insectorum 1925) placed the species in the subgenus Myrmeurynota. I have repeatedly taken *linnæi* in various neotropical localities, always nesting in dead twigs, and have noticed that a colony consists of only one or two dozen minor workers and a few soldiers. The worker caste is therefore strongly dimorphic as in the species of *Colobopsis*. From the fact that I have never found a female in any of the colonies I infer that this caste is, perhaps, functionally replaced by the soldier. This remarkable, hitherto undescribed phase shows very clearly that *linnæi* belongs to the subgenus Manniella, and is closely related to *C. championi* Forel, a species which should, therefore, be removed from the subgenus Myrmobrachys, where it was placed by Emery, and also assigned to Manniella. Among the specimens of *linnæi* before me three different forms may be distinguished: the typical form, one closely related to if not the same as Forel's *muticus*, and an undescribed form from British Guiana.

Camponotus (Manniella) linnæi (typical)

Soldier (undescribed). Length about 6 mm.

Head large, very slightly longer than broad, high and rounded posteriorly, with straight, subparallel sides, large swollen cheeks, broadly and distinctly convex posterior corners; in profile obliquely truncated and flattened anteriorly as far back as the antennal insertions, much as in some species of *Colobopsis*, but with the lateral borders of the truncation rounded, or submarginate. Mandibles short, stout, with five subequal teeth. Eyes large, broadly elliptical, not very convex, near the posterior corners of the head. Clypeus trapezoidal, one and two-thirds times as long as broad, nearly twice

as broad in front as behind, with straight sides, flat or slightly concave surface and sharp, narrow median carina, the anterior border rounded, very finely crenulate, not projecting as far forward as the anterior borders of the cheeks. Their truncated portions at the sides of the clypeus distinctly concave and confluently foveolate much as in *C.* (*Mannicella*) *ulcerosus* Wheeler. Frontal area minute, transversely trapezoidal; frontal carinæ strongly diverging and straight posteriorly, bordering deep scrobe-like grooves, or backward prolongations of the antennal foveæ, which are nearly half as long as the scapes; frontal groove distinct, continued back to the level of the middle of the eyes. Antennæ slender; scapes strongly curved and somewhat flattened at the base, somewhat thickened apically, extending fully twice their greatest diameter beyond the posterior border of the head. Thorax short, its dorsal outline regularly and moderately arcuate, interrupted only at the impressed promesonotal and mesoëpinotal sutures. Pronotum, without the neck, more than twice as broad as long, flattened above, sharply marginate on the sides, with blunt humeral angles and feebly bisinuate anterior border. Mesonotum from above narrower than the pronotum, rounded-subhexagonal; epinotum higher than long, its base from above subtriangular, nearly as broad as long, decidedly shorter than the straight or slightly concave and rather steep declivity with which it forms a very distinct obtuse angle. Petiolar scale rather broad, its superior border acute, semicircularly rounded, its sides straight, ventrally converging, its anterior surface convex in profile, its posterior surface flat, with a median perpendicular impression. Gaster elliptical, its first segment anteriorly truncated and distinctly submarginate on the sides. Legs rather stout; fore femora enlarged; hind tibiæ slightly compressed, without spinules on their flexor surfaces.

Nearly opaque, except the legs, scapes, posterior corners of the head, neck, sutures of thorax, petiole and median portion of epinotal declivity, which are distinctly shining. Head and thorax densely punctulate; mandibles more finely, with larger, sparser punctures; petiole and middle of epinotal declivity transversely shagreened; gaster densely and microscopically, scapes and legs indistinctly punctulate.

Hairs whitish; absent on the truncated surface of the head; very short, erect, stout and clavate on the mandibles and cheeks; numerous, somewhat larger and mostly obtuse on the front and vertex; much longer, pointed and sparse on the thorax, petiole and gaster. Occiput and dorsal surface of thorax and gaster also with coarse, sparse, appressed, subsquamiform hairs, or long pubescence, which is easily

rubbed off. Legs and antennæ with very short, fine appressed pubescence; the scapes also with a few long, erect hairs on their anterior surfaces and tips.

Black; mandibles and head pale ivory yellow; posterior half of sides reddish; mandibular teeth, posterior portion of gula, frontal area, deepest portions of antennal scrobes, a short line at the anterior end of each lateral clypeal suture, and a large transverse area of the occiput bounded anteriorly by an irregular line connecting the posterior orbits and these with the posterior corners of the head, black. Sutures surrounding the clypeus reddish. Gastric segments with broad, sharply defined and somewhat satiny, milk white posterior and lateral borders, both on the dorsal and ventral sides. Antennal scapes yellow, the funiculi more ferruginous red; femora dark brown or even black; tibiæ and tarsi dark red.

Worker minor. Length 4–4.5 mm.

Head small, trapezoidal, somewhat longer than broad, with straight, compressed, anteriorly converging sides, feebly convex posterior border and large, convex, posteriorly placed eyes connected with the posterior corners by distinct ridges; anterior surface not truncated, of the usual shape. Clypeus carinate, anteriorly broader than long. Mandibles less convex than in the soldier, frontal carinæ less approximated anteriorly; scrobe-like grooves absent. Thorax and petiole shaped much as in the soldier, but the pronotum is longer in proportion to its width, even more sharply marginate laterally and with more pronounced, slightly upturned anterior corners.

Sculpture like that of the soldier, but posterior corners of the head opaque and finely punctulate like the remainder of the surface. Pilosity similar, but the long erect hairs are less numerous, the appressed pubescence more conspicuous, the hairs on the clypeus and cheeks obtuse but longer than in the soldier. Color the same, but the whole head is black, except the mandibles and anterior borders of the cheeks, which are brownish yellow. Legs darker than in the soldier; femora more frequently black, the tibiæ and tarsi deep red; gastric segments conspicuously bordered with white as in the soldier.

Male (undescribed). Length nearly 5 mm.

Head of the usual form; mandibles with oblique, edentate terminal borders; clypeus small, subcarinate. Thorax robust, broader than the head; mesonotum as broad as long; epinotum with short, convex base rounding into the longer straight and sloping declivity. Petiole low, nodiform, nearly twice as broad as long, thick below, with rather sharp, broadly rounded, entire superior border.

Smooth and lustrous; head more opaque posteriorly. Pilosity very sparse, erect, distinct on the head, scutellum and gaster, very short and inconspicuous on the mesonotum; pubescence undeveloped; scapes and legs naked. Deep castaneous brown, appendages and thoracic sutures somewhat paler; posterior portion of head black; mandibles, anterior borders of cheeks and genitalia yellow; posterior borders of gastric segments narrowly brownish yellow; wings somewhat yellowish, with resin-yellow veins and brown pterostigma.

This form was originally described from Colombia. The preceding description was drawn from a number of specimens which I collected during 1911, 1912 and 1924 in dead twigs at Gatuncillo, Monte Lirio and Barro Colorado Island in the Canal Zone, Panama.

Camponotus (Manniella) linnæi maccus subsp. nov.

Soldier. Differing from the soldier of the typical *linnæi* in the following characters: punctulation of the head and thorax somewhat coarser and the surface somewhat less opaque and more lustrous; front and sides of head sparsely but distinctly foveolate; posterior half of sides of head more deeply red; the black occipital area more extensive, reaching forward to the posterior ends of the frontal carinæ and becoming confluent with the black in the scrobal grooves. Legs uniformly red; scapes yellow; funiculi ferruginous, paler than the legs.

Worker. Very similar to the worker of the typical *linnæi* but the antennal scapes are slightly longer, more slender and more yellowish and the legs are decidedly paler, being brownish red throughout, the white borders of the gastric segments slightly broader and more conspicuous.

Described from four soldiers and numerous workers taken by myself in hollow twigs at Kartabo and on Kaow Island, in the Mazaruni River, British Guiana.

Camponotus (Manniella) linnæi comœdus subsp. nov.

Soldier. Differing from the soldier of the typical *linnæi* in having the epinotum thicker above, with the base more rounded and not forming so distinct an angle with the declivity in profile. The petiolar scale is also thicker, more convex behind and with less acute superior border. The front is covered with shallow, reddish foveolæ, and the paler portions of the head are distinctly duller and more brownish ivory yellow, the funiculi are yellow only at the base and the legs are paler, yellowish ferruginous or red, in some specimens with slightly

brownish femora. The long, appressed squamiform pubescence seems to be coarser and more abundant.

Worker. Differing from the worker of the typical *linnæi* in the somewhat less developed anterior angles of the pronotum, the thicker and blunter epinotal angle and petiolar scale and the more abundant pubescence. The legs, though darker than those of the soldier are paler than those of the typical *linnæi* worker.

Described from three soldiers and three workers (No. 473) taken by Dr. Skwarra at Camaron, Vera Cruz (type-locality) in a pseudobulb of *Schomburgkia tibicinis*, a soldier and numerous workers taken by myself in hollow twigs at Escuintla and Patulul, Guatemala, and a single worker taken at Izalco, Salvador by Frederick Knab.

As previously stated, this subspecies may be synonymous with the subsp. *muticus*, but since Forel's description is based only on workers from Costa Rica (Tonduz) and Santa Marta, Colombia (Forel), the introduction of a new name seems preferable to the risk of a dubious identification.

C. championi Forel from the states of Vera Cruz and Tabasco, Mexico, and the Volcan de Chiriqui, Panama, is certainly closely related to *linnæi*, but differs in coloration and in the shape of the pronotum and epinotum. Forel's Fig. 21a must be erroneous, because it shows the head of the soldier as greatly and quite asymmetrically (!) narrowed anteriorly, whereas the description, apart from unimportant details, agrees closely with the head of *linnæi*.

Camponotus (Colobopsis) cerberulus Emery

This species was described by Emery in 1920 from a winged female taken in the state of Michoacan, Mexico. The description agrees so closely with a lot of females and males which I took at night in Texas Pass, Dragon Mts., Arizona on July 20, 1917, that I regard them as conspecific. I have received specimens of the same sexes also from Sabino Basin, Santa Catalina Mts. and Black Dike Prospect, Sierritas in the same state. Moreover, I believe that three specimens (No. V13b) taken by Dr. Skwarra from spines of *Acacia spharocephala* on the sand dunes near Vera Cruz, represent the hitherto unknown soldier of *cerberulus*. I therefore append descriptions of this caste and of the male.

Soldier (undescribed). Length 5 mm.

Head proportionally larger and broader than in the female, but very distinctly longer than broad, parallel-sided anteriorly (in one specimen

expanded at the sharp edge of the anterior truncation). Eyes flattened, fully twice their length from the border of the truncation. Antennal scapes extending a distance equal to their greatest diameter beyond the posterior corners of the head. Mandibles thick and flat, with five stout, subequal teeth. Clypeus one and two-thirds times as long as broad, narrowed in front, the portion behind and bordering the truncation nearly four times as broad as long; frontal area minute, transverse, impressed; frontal carinæ straight, strongly diverging behind; frontal groove very delicate anteriorly but terminating on the vertex as a strong, elongate impression. Thorax stout, narrower than the head; in profile impressed at the promesonotal and more deeply and widely at the mesoëpinotal suture; the mesonotum convex, distinctly higher than the pro- and epinotum; pronotum from above very broad, convex and semicircularly rounded anteriorly, somewhat less than twice as broad as long; promesonotal suture semicircularly arcuate; mesonotum broadly, transversely elliptical; epinotum as long as broad, rounded-subcuboidal, its base in profile short, feebly convex, somewhat more than half as long as the rather steep, inferiorly concave declivity. Petiolar scale low, thick and nodiform, slightly more than twice as broad as long, nearly as thick above as below, with flattened anterior and posterior surfaces, the thick, transverse superior border strongly impressed in the middle behind. Gaster elongate elliptical. Fore femora inerassated.

Shining and extremely finely shagreened, except the mandibles and anterior two-fifths of the head which are opaque, the former finely punctate-rugulose, the latter foveolate-reticulate.

Hairs white, short, erect, extremely sparse on the posterior portion of the head, absent on the thorax, petiole and appendages. Mandibles and lateral borders of cephalic truncation with very short, stiff, blunt hairs. Pubescence dilute, very short and fine, visible only on the legs and antennæ.

Deep piceous brown or black; mandibles, truncated surface and about two-fifths of the head surrounding it, tips of scapes, funiculi, tarsi and sutures of the thorax, petiole and legs, red.

Male (undescribed). Length 3 mm.

Head through the eyes broader than long, its posterior border straight in the middle, convex on the sides. Eyes large and convex, ocelli prominent and widely separated. Cheeks rather short, converging anteriorly. Mandibles small, narrow, with acute apical tooth. Clypeus convex and subcarinate in the middle. Antennæ slender, with enlarged, pyriform first funicular joint and short terminal joints. Thorax

nearly as broad as the head through the eyes; mesonotum large, high and convex anteriorly, nearly as broad as long; epinotum small, rounded, without distinct base or declivity. Petiolar node lower, narrower than in the soldier, thick and rounded above in profile, without median impression behind. Gaster and legs slender.

Smooth and shining throughout. Pilosity very meager, confined to vertex, posterior portion and tip of gaster; pubescence very fine and sparse on the appendages.

Brown; head black behind; tarsi, mandibles and thoracic sutures yellowish. Wings clear, iridescent, with very pale yellowish veins and pterostigma.

Camponotus (Colobopsis) etiolatus Wheeler

In 1904 I described (Bull. Amer. Mus. Nat. Hist. **20**, p. 150) all four castes of this ant from specimens which I collected in live-oak galls in Texas as a mere variety of *abditus*, a species described by Forel (Biol. Centr. Amer. 1899, p. 158) from a single female taken by Champion in Guatemala. Dr. Skwarra has now taken the four castes of this species in Mexico. From their examination I conclude that the Texan form deserves to rank as a distinct though closely allied species. I therefore confine the following account mainly to a comparison of the soldier, worker, female and male with the corresponding castes of *etiolatus*.

Camponotus (Colobopsis) abditus Forel

Soldier (undescribed). Length 5–6 mm.

Head distinctly larger and proportionally longer than in *etiolatus*, the truncated surface less circular and more transversely elliptical, the portion of the clypeus behind the truncation fully twice as long in proportion to its width. Meso- and epinotum more compressed laterally, the base of the latter less convex, the declivity usually less concave. Petiolar scale thicker, impressed in the middle behind. Sculpture of the truncation and adjacent portion of the head decidedly finer, the foveolæ on the cheeks more distinct and less confluent, and these regions lacking the numerous, blunt, erect hairs of *etiolatus*. Color of posterior portion of head, of the thorax, petiole and appendages more sordid brownish yellow and less reddish yellow than in *etiolatus*, and the vertex, thoracic dorsum and summit of petiole more or less clouded with brown. Gastric segments with darker, broader and less clearly defined fasciæ and usually lacking the yellow margins

of *etiolatus*. In most cases the whole gaster is castaneous brown except the bases of the first and second segments.

Worker (undescribed). Length 3.5–4 mm.

Head distinctly larger, broader and more convex behind than in *etiolatus;* antennal scapes shorter; epinotum more compressed laterally. Petiolar scale more subelliptical from behind, with shorter, more deeply sinuate superior border. Sordid brownish yellow, with posterior portion of head, petiole and thoracic dorsum extensively clouded with brown; gaster castaneous or dark brown throughout, or more rarely with the bases of the first and second segments yellow.

Female (deälated). Length 7–7.5 mm.

Larger than the female of *etiolatus*. Head like that of the soldier, larger and broader than in the female of that species; scapes shorter, extending only a distance equal to their greatest diameter beyond the posterior corners of the head (in *etiolatus* two or three times as far); posterior border of truncation more pronounced, its sculpture finer and the cheeks, as in the soldier, with erect hairs. Petiole less thickened than in *etiolatus*. Coloration as in the soldier.

Male (undescribed). Length 4–4.5 mm.

Very similar in form to the male of *etiolatus* but distinctly different in coloration. Head, thorax and appendages pale sordid yellow; ocellar region and gaster dark brown. In *etiolatus* the head, thorax, gaster, and femora are brown and only the tibiæ, tarsi, antennæ and thoracic sutures are yellow. In *abditus* the wings are whitish, the veins and pterostigma very pale yellow; in *etiolatus* these structures are resin yellow, the pterostigma sometimes brown.

Specimens from 11 colonies taken by Dr. Skwarra at Fortin (No. 373) in stems of *Acacia pennatula* and Mirador (Nos. 14, 224, 274, 428, 431, 433, 435, 452, 458, 565a) in hollow stems and twigs of *Heliocarpus appendiculatus* Turcz, *Conostegia xalapensis* and several undetermined plants.

Camponotus (Colobopsis) triton sp. nov.

Female. Length 6.3 mm.

Head about one fourth longer than broad, with straight, parallel sides and broadly rounded anterior and posterior corners; posterior border broadly convex; the anterior truncation, which has a very blunt border both laterally and posteriorly, extending back to the posterior fourth of the clypeus. Eyes large, moderately convex, distant less than half their length from the posterior, and fully twice their length from

the anterior corners of the head. Mandibles 6-toothed, stout, flattened, with moderately convex external borders. Clypeus flattened anteriorly, convex posteriorly, ecarinate, suboblong, nearly one fourth longer than broad, slightly broader behind than in front, its anterior and lateral borders crenulate, its posterior border notched in the middle. Frontal area absent; frontal groove distinct, extending back to the anterior ocellus; frontal carinæ straight, widely separated and diverging, reaching beyond the median level of the eyes. Antennal scapes rather stout, curved at the base, their tips reaching nearly one third their length beyond the posterior corners. Thorax broader than the head, elongate-elliptical, nearly two and one-half times as long as broad; mesonotum somewhat longer than broad; epinotum short and convex, without differentiated base and declivity. Petiolar scale low, nodiform, nearly twice as broad as long, rounded anteriorly, posteriorly, laterally and dorsally. Gaster elongate-elliptical. Legs rather slender.

Shining and very finely shagreened; mandibles and anterior half of head more opaque, sharply and regularly reticulate-rugose; the mandibles also finely punctate between the meshes.

Pilosity yellow, short, erect, absent on the thorax and petiole, sparse on the gaster; mandibles and anterior half of head with numerous short, erect, blunt and clavate hairs. Pubescence pale, short, appressed, visible only on the legs and antennæ.

Yellow; gaster paler, more whitish yellow than the thorax, petiole and legs, fifth segment entirely and fourth except at the base, deep castaneous. Head, mandibles and antennæ reddish yellow, with the occipital region paler and of the same color as the thorax. Insertions of wings with a small black spot. Wings whitish, with very pale, whitish yellow veins and pterostigma.

A single specimen taken at Fresh Creek, Andros Island, Bahamas by Dr. W. M. Mann. I have described this species from a female, because its coloration is so striking that it can be very readily recognized.

Camponotus (Colobopsis) cordincola sp. nov.

Soldier. Length 5–5.5 mm.

Head very regularly oblong, with rectangular anterior and posterior corners, fully one third longer than broad without the mandibles; in profile higher in front than behind, obliquely truncated as far back as the beginning of the frontal carinæ, the truncation concave and bluntly rounded (not marginate) on the sides. Mandibles 6-toothed, as broad as long, flattened above, with very convex external borders.

Cheeks somewhat swollen dorsally, with straight, transverse, anterior borders projecting beyond the clypeus, which is flat and ecarinate, suboblong, about one fourth longer than broad, slightly narrower in front than behind, with a short median groove at the posterior end and feebly trilobulate anterior border. Frontal area large, trapezoidal; frontal groove distinct, extending back to a shallow pit on the vertex; frontal carinæ pronounced, diverging, parallel behind and continued back as far as the median level of the eyes. Eyes small, flat, distant only slightly more than their greatest diameter from the posterior, and three times this diameter from the anterior corners of the head. Antennæ slender; scapes inserted at the middle of the frontal carinæ, curved, somewhat enlarged at their tips which reach the posterior corners of the head. Thorax stout, not much longer than the head and mandibles, with evenly but not strongly arcuate dorsal outline, interrupted only by the pronounced promesonotal and mesoëpinotal sutures; metanotum clearly indicated but bounded behind by a transverse groove instead of a suture; epinotum strongly compressed laterally, in profile with feebly and evenly convex base, rounding into the shorter, rather steep, concave declivity. Petiolar scale rather small, somewhat more than twice as broad as long, its anterior surface convex, its posterior surface flat, its superior border thick, blunt, broadly rounded and feebly impressed or sinuate in the middle. Gaster elongate-elliptical. Legs rather stout; fore femora incrassated.

Shining and finely shagreened; mandibles and head, except its posterior fourth, more opaque and more coarsely shagreened; mandibles also finely punctate; cheeks with somewhat larger, shallow and not very conspicuous punctures.

Hairs yellow, short, erect and sparse, only on the dorsal surface of the head, thorax, petiolar border and borders of the gastric segments. Pubescence very fine, short, appressed, visible only on the antennæ, tibiæ and tarsi.

Head reddish yellow, mandibles red with black teeth; frontal carinæ, anterior margins of cheeks, anterior and lateral margins of clypeus and the frontal carinæ deep red. Thorax, gaster and appendages yellow, the thorax somewhat darker; each gastric segment above, except at its base and posterior border, brown.

Described from three specimens which I took from a cauline swelling of *Cordia alliodora* on Barro Colorado Island, Panama.

I have placed this species in the subgenus Colobopsis though it resembles in the shape of its head certain species which Emery has assigned to his subgenus Pseudocolobopsis.

Camponotus (Myrmocladœcus) rectangularis Emery

The typical form of this species was described by Emery as long ago as 1890 from workers collected in Costa Rica. There are several subspecies and varieties, all of which can be recognized among the material in my collection. None of the forms is common, probably because they all live in rather small colonies in dead twigs or epiphytic Tillandsias and forage singly on the foliage of trees and shrubs. The paler species are, perhaps, nocturnal.

The typical *rectangularis* is rich yellowish or testaceous, with the mandibles, anterior part of head and posterior borders of the gastric segments yellow; the tibiæ and tarsi red, the antennal funiculi beyond the first joint infuscated. I have seen workers of this form from the following localities: British Honduras: Manatee (J. D. Johnson) and Belize; Nicaragua: Chinandega (C. F. Baker); Guatemala: Patulul (Wheeler). It has been recorded also from Bugaba, Panama (Champion) and, as previously stated, from Costa Rica (Liberia and Bagaces (Alfaro); Surubres, near San Mateo (Biolley)). The various subspecies and varieties may be readily distinguished by means of the following key:

1. Posterior border of base of epinotum distinctly less sharply marginate than its sides; mesonotum and base of epinotum indistinctly or very finely reticulate 2
   Posterior border of base of epinotum as sharply marginate as its sides; mesonotum and base of epinotum more sharply reticulate 6
2. Thorax and gaster concolorous 3
   Gaster much darker than thorax 5
3. Thorax and gaster not black 4
   Thorax and gaster black. Mexico ..... subsp. *rubroniger* Forel var. *willowsi* Wheeler
4. Head, thorax, petiole and gaster yellowish ferruginous. Central America ..... *rectangularis* Emery, typical
   Head, thorax, petiole and gaster sordid brown. Peru ..... var. *sordidatus* var. nov.
5. Thorax darker red posteriorly, gaster black throughout. Mexico ..... subsp. *rubroniger* Forel, typical
   Thorax not darker posteriorly, base of gaster red. Guatemala ..... var. *aulicus* Wheeler
6. Legs with conspicuous, suberect hairs. Trinidad and British Guiana ..... subsp. *setipes* Forel
   Legs without such hairs. British Guiana .. var. *ligatus* var. nov.

Camponotus (Myrmocladœcus) rectangularis Emery var. sordidatus var. nov.

Worker. Differing from the typical form of the species in color, the body and femora being of a rather pale, sordid brown, the tibiæ, tarsi and scapes darker brown, the mandibles and anterior portion of the head dull brownish white. The pubescence on the tibiæ is slightly coarser and less appressed; the base of the epinotum distinctly broader than long.

Described from fifteen workers taken by Dr. J. C. Bradley at Perene, Peru.

Camponotus (Myrmocladœcus) rectangularis rubroniger Forel

Worker. Differing from the preceding forms in sculpture, pilosity and color. Mesonotum and base of epinotum somewhat more distinctly reticulate; erect hairs absent on the thoracic dorsum and few or absent on the top of the head. Pubescence short, pale, appressed and rather sparse, longest on the gaster, coarser and sparser on the tibiæ. Head, thorax and petiole deep red, the meso- and metanotum darker than the pronotum; mandibles and anterior portion of head yellow; scapes deeper red than the posterior portion of the head; legs dark red, the middle and hind pairs more blackish than the anterior pair.

Female (undescribed). Length nearly 9 mm.

Robust; head, without the mandibles, broader than long, proportionally much broader behind than in the worker major; scapes extending fully one fourth their length beyond the posterior corners of the head. Thorax of the usual structure in Camponotus females, not broader than the head; scutellum and posterior portion of mesonotum very flat, the latter scarcely broader than long. Epinotum with moderately convex base, rounding into the longer, rather concave declivity. Petiolar border broad and acute, emarginate in the middle. Gaster broadly elliptical. Fore wings measuring a little over 8 mm.

Subopaque, rather smooth, very finely shagreened; thorax without reticulate sculpture. Legs sparsely punctate. Pilosity as in the worker, but mesonotum with a few erect hairs. Color like that of the worker; parapsidal furrows, their borders and the middle or whole of the epino-

tum, black. Wings distinctly yellowish, with resin yellow veins and brown pterostigma.

Male (undescribed). Length 5 mm.

Head through the large, convex eyes as broad as long, broadly rounded behind, narrowed in front, the cheeks slightly concave, anteriorly converging, nearly as long as the eyes. Mandibles spatulate, with pointed tips, but otherwise edentate. Thorax much broader than head; mesonotum large, as broad as long, very convex anteriorly; scutellum convex, epinotum small, rounded, sloping, without distinct base and declivity. Petiole low, transverse, thick ventrally, its anterior surface bevelled above, its posterior face flat, its superior border entire and rather sharp. Gaster broad. Legs long and slender.

Sculpture like that of the female. Hairs white, few in number on head, absent on thorax and petiole, rather long and abundant on terminal gastric segments. Black; mandibles, wing-insertions and portions of genitalia brownish yellow. Wings paler than in the female, yellowish only along the anterior border; veins also paler; pterostigma brown.

This form was originally described from La Union, Salvador (Champion). In 1900 I took it at Cuernavaca, Morelos, Mexico in Tillandsias growing on acacias and guavas, in parabiosis with colonies of Cryptocerus and Crematogaster. More recently Dr. Skwarra secured many colonies in the same locality (Nos. 764, 784a, 814, 829, 830, 862, 863) nesting in *Tillandsia circinata* and *T. streptophylla*.

Camponotus (Myrmocladœcus) rectangularis rubroniger var. aulicus Wheeler

Worker. Resembling the typical *rubroniger*, but the head, thorax and petiole more vivid red, the base of the first gastric segment of the same color and each gastric segment reddish posteriorly, with the extreme border golden yellow. Appendages, especially the tibiæ and tarsi, somewhat darker red than the head and thorax; cheeks, clypeus and mandibles more yellowish, the funiculi beyond the first joint blackish as in the other forms of the species. Dorsal surface of gaster with the same short pubescence and pile as in the typical *rectangularis* and the subsp. *rubroniger*.

Described from sixteen specimens which I extracted from a hollow twig at Zacapa, Guatemala, Dec. 13, 1911.

Camponotus (Myrmocladœcus) rectangularis rubroniger var. willowsi var. nov.

Worker. Differing from the typical form of the species and its var. *rubroniger* in coloration, being deep black, with the exception of the posterior borders of the gastric segments and terminal tarsal joints, which are reddish, and the head, antennal scapes and first funicular joint, which are bright yellowish red. Cheeks, clypeus and mandibles yellow, mandibular teeth reddish. Dorsal surface of gaster less opaque and more glossy than in *rectangularis* and *rubroniger*, with distinctly longer and denser pubescence and even shorter hairs.

Two specimens from Acapulco, Mexico, one taken by Mr. M. Willows, Jr. and one by Frederick Knab.

Camponotus (Myrmocladœcus) rectangularis setipes Forel

Worker. Of the same color as the typical *rectangularis* but differing in having the straight posterior border of the base of the epinotum more sharply marginate, the base itself, which is distinctly broader than long, and the mesonotum distinctly more coarsely reticulate-rugulose, the hairs on the dorsal surface of the body much more numerous and the legs and especially the tibiæ with long, sparse, bristly suberect hairs.

Two workers from St. Augustine and Cumuto, Trinidad (P. J. Darlington) and several from the Wenamu River, British Guiana (W. J. Lavarre).

This form was described as a variety but deserves to rank as a subspecies.

Camponotus (Myrmocladœcus) rectangularis setipes var. ligatus var. nov.

Worker. Precisely like the typical *setipes*, but the long pilosity on the legs is replaced by very short, subappressed hairs or coarse pubescence, which, however, is distinctly longer than in the typical *rectangularis*.

Seven specimens from British Guiana, five from Kartabo, type-locality (Wheeler), one from Bartica (W. Beebe), and one from Tumatumari (F. E. Lutz).

Camponotus (Myrmocladœcus) latangulus Roger

Although this species was described from Surinam as long ago as 1863 it is infrequently mentioned in the literature, probably because it has been taken only occasionally in sweepings. Two colonies which I found in British Guiana were nesting in dead branches. One of them contained a number of specimens of the hitherto unknown female.

Female (undescribed). Length 8–9 mm.

Head trapezoidal, as broad as long, narrowed anteriorly, with straight sides and posterior border and nearly rectangular posterior corners. Antennal scapes extending somewhat more than their greatest diameter beyond the posterior corners of the head. Thorax slightly broader than the head, with pro- and mesonotum of the usual shape in female Camponoti; epinotum with sharply differentiated base and declivity, the former nearly twice as broad as long, broader anteriorly than posteriorly, strongly convex, with a shallow median groove, its posterior border distinctly emarginate in the middle and rather sharp, forming an acute angle with the concave and rather steep declivity, much as in the worker. Petiole not truncated above as in the worker, but cuneate as in most Camponoti, with only anterior and posterior surfaces, the former convex and perpendicular, the latter flat and sloping, the superior border broadly rounded, acute and entire, or occasionally emarginate in the middle. Gaster elongate elliptical. Wings rather short, measuring slightly more than 7 mm.

Sculpture, pilosity and color as in the worker, but the vertex with a large, brown, butterfly-shaped spot and each gastric segment posteriorly with a broad brown fascia sharply marked off from the yellow border of the segment but anteriorly shading into the yellowish ferruginous basal portion. Knees, tibiæ and tarsi of middle and hind legs darker brown than in the worker. Wings yellow, with deep resin yellow veins and pterostigma.

A number of workers and females from Kalocoon, Kartabo and Bartica, British Guiana (Wheeler). I have recorded the species also from Port of Spain, Trinidad (R. Thaxter) and have received specimens from San Antonio del Rio Cotuhe and La Chorrera, Putumayo Distr., Peru (J. C. Bradley). Goeldi took it at Pará, in Northern Brazil, Jelski in Cayenne, and Emery records it from Bolivia. It seems, therefore, to have a rather circumscribed range and to be confined to South America.

Camponotus (Myrmocladœcus) tripartitus Mayr

Six workers from Petropolis, Brazil (Thomas Borgmeier) agree closely with Mayr's description of the types from Santa Catharina, in the same country.

Camponotus (Myrmocladœcus) bidens Mayr

I have taken numerous colonies of this species from dead twigs in the following localities in Panama: Frijoles, Corozal, Red Tank, Gatuncillo, Mandingo, Mt. Hope and Barro Colorado Island.

The deälated *female* (undescribed) measures nearly 7 mm. and is long and slender. Head slightly longer than broad, subtrapezoidal, nearly as wide in front as behind, with straight sides and distinctly convex posterior border. Eyes large, moderately convex, distant nearly one and one-half times their length from the anterior corners of the head. Mandibles convex, 6-toothed. Clypeus very convex and rounded in the middle, depressed on the sides, its anterior border sinuate medially and on each side. Antennal scapes extending nearly twice their greatest diameter beyond the posterior border of the head. Thorax elongate-elliptical, more than twice as long as broad, narrower than the head; mesonotum longer than broad; epinotum with very convex, backwardly sloping base, forming a distinct angle in profile with the longer, perpendicular, slightly concave declivity. Petiolar scale thick, transverse, broader than the posterior part of the epinotum, with very blunt, rounded superior border and convex anterior and posterior surfaces. Gaster elongate-elliptical, parallel-sided in the middle, as long as the remainder of the body.

Subopaque, finely and indistinctly shagreened; scutellum, epinotum, petiole and bases of gastric segments more shining; mandibles, cheeks and clypeus punctate; mesonotum with a few coarse punctures along the parapsidal furrows. Hairs whitish, short, erect and rather sparse, confined to the head, thorax, abdomen, tips of scapes and femora. Pubescence short, dilute and appressed, distinct on the gaster and legs. Black, like the worker; mandibles, antennæ, wing-insertions, trochanters, bases of tibiæ and terminal tarsal joints, red.

Forel has based a subspecies, *repressus*, of this ant on minor workers from Pará and Bahia, Brazil. They differ from the typical *bidens* in having the pro- and mesonotum narrower, the epinotal teeth shorter, the petiole narrower and less thick, the gaster subopaque and very finely striated instead of finely punctulate-reticulate, with larger, sparse, elongate punctures.

Camponotus (Myrmocladœcus) mucronatus Emery

Emery described this ant from Alajuela, Costa Rica. I have taken it in the same locality. The major workers of my topotypes and one given me by Forel and taken by Touduz from some other Costa Rican locality, agree in lacking erect hairs on the cheeks and clypeus. Since, moreover, Emery says nothing about such hairs in his specimens, I infer that they are absent in the typical form of *mucronatus*.

Camponotus (Myrmocladœcus) mucronatus hirsutinasus subsp. nov.

Worker major. Length 6.3–6.7 mm.

Averaging distinctly larger than the major of the typical *mucronatus*, with longer petiolar spine, more extensively red cheeks, longer, denser erect hairs on the thoracic dorsum, much longer, appressed pubescence on the posterior half of the head and conspicuous, short, stout, erect, obtuse, white hairs on the cheeks and clypeus.

Worker minor. Length 5–5.5 mm.

Also averaging somewhat larger than the minor of the typical form, with the pubescence and pilosity on the head similar to those of the major, though the pubescence is even more abundant and the blunt, erect hairs are less numerous on the clypeus than on the cheeks. Spines of the thorax and petiole fully as well developed as in the typical *mucronatus*.

Described from many specimens taken from a number of colonies which I collected during December 1911 in Zacapa (type-locality), Quirigua, Escuintla, Patulul and Panajachel, Guatemala. Dr. Skwarra has sent me three workers of the same subspecies from San Francisco, on the Rio de Carlos, Mexico. Most of the Guatemalan colonies were nesting in dead twigs but at Escuintla a few of them were found inhabiting the large, expanded thorns of an Acacia allied to *A. bursaria*.

Camponotus (Myrmocladœcus) mucronatus santschii Forel

Forel described this subspecies from the Santa Marta region of Colombia. It differs from the typical *mucronatus* in having the base of the epinotum distinctly convex anteriorly, so that the mesoëpinotal impression appears more pronounced. The median spine of the petiole is longer, especially in the worker major, the occiput and gaster are in part shining and more feebly sculptured, the pubescence is some-

what more developed and the head entirely black. I assign to this subspecies a single minor worker which I took at Bella Vista, Panama. The following is a third, very handsome subspecies of *mucronatus:*

Camponotus (Myrmocladœcus) mucronatus formaster subsp. nov.

Worker major. Length 5 mm.

Smaller than the subsp. *hirsutinasus;* very similar in structure and sculpture, but the epinotal and petiolar spines distinctly shorter and less acute, the mesoëpinotal impression deeper, the pilosity on the vertex and thorax less abundant and finer and shorter on the gaster; there are no erect hairs on the clypeus and cheeks, which are quite naked; the appressed pubescence on the vertex and occiput very short and delicate. Color very different from that of the preceding forms, being yellowish red, with the mandibular teeth, the sides and more or less of the posterior portion of the pronotal dorsum, the meso- and epinotum, except the spines of the latter, and the petiole, except its spine and ventral portion, black. Hairs and pubescence somewhat paler and less golden than in the other subspecies.

Worker minor. Length 3.5 mm.

Very similar to the major, but the epinotal and petiolar spines are longer and less of the anterior portion of the pronotum is red.

Described from two major and four minor workers which I found nesting in a dead twig at Patulul, Guatemala, Jan. 7, 1912.

Camponotus (Myrmocladœcus) sanctæ-fidei Dalla Torre

This interesting ant is imperfectly known and has a confused taxonomic history. In 1870, Mayr erroneously referred the type specimens, which were minima workers from Santa Fe de Bogota, Colombia, to *latangulus* Roger, a very different species. Later (1887) he discovered his error but fell into another by describing the specimens under the name *quadrilaterus,* which happened to be preoccupied by *quadrilaterus* Roger (1863), itself a synonym of an Indian ant, *C.* (*Tanœmyrmex*) *compressus* Latreille (1787). Dalla Torre (1892) therefore proposed a new name, *sanctæ-fidei* for Mayr's Colombian species. It seems to be widely distributed in Central and South America. From the literature and the specimens before me at least six variants of it may be recognized. Three of these have been described, namely the subsp. *leonhardi* Forel (1901) from Bolivia, the var. *hondurianus*

Mann (1922) from Honduras and the var. *coronatus* Santschi (1922) from the Alcatraz Islands, São Paulo, Brazil. *Leonhardi* and *coronatus* are based on minima workers, and though Mann had maximæ of *hondurianus* he described only the coloration of their legs. Emery (1894) had previously given a brief description of the female and the maxima of what he took to be the typical *quadrilaterus* (*sanctæ-fidei*) from Matto Grosso, Brazil, but his maxima specimen was immature. Since none of the castes has been described in much detail, it is difficult to determine the typical form of the species. I believe, however, that I can recognize it among my material from Central America and British Guiana. My specimens from these and other localities show that the worker is not strongly dimorphic, as Emery seems to have supposed, but trimorphic. There are large and small "soldiers" in the same colony. The smaller ones may be called "mediæ," but unlike the members of this subcaste in many other species of Camponotus, they differ much less from the true maximæ than from the minimæ. The three kinds of workers and the winged female of what I regard as the typical form of *sanctæ-fidei* are here described.

Worker maxima. Length 4.5–5 mm.

Head suboblong, convex above, one and one-fourth times as long as broad, with somewhat convex posterior border, rectangular anterior and posterior corners and straight, parallel sides, slightly sinuate at the cheeks. Eyes moderately large, flat, distant about their greatest diameter from the posterior corners of the head. Mandibles somewhat flattened above, with very convex external borders, 6-toothed, the three basal teeth short. Clypeus subrectangular, somewhat longer than broad, concave anteriorly, with broadly excised and bluntly bidentate median border; on the posterior half with two large, anteriorly diverging protuberances, which in profile give the clypeus a truncated appearance since each protuberance forms a projecting angle, with its upper or posterior border horizontal and feebly convex, its anterior border concave and perpendicular. Frontal area distinct, trapezoidal; frontal carinæ anteriorly approximated, sinuous, diverging behind; frontal groove very distinct. Antennæ rather slender; scapes curved, their tips extending only a distance equal to their greatest diameter beyond the posterior border of the head. Thorax stout, much narrower than the head, but nearly of the same length, including the mandibles, somewhat flattened above and laterally, with sharp promesonotal and mesoëpinotal sutures, and a distinct but not very deep impression at the latter. Pronotum less than twice as broad as long, semicircularly rounded in front, laterally

marginate, but without humeral angles; mesonotum transversely elliptical, nearly half again as broad as long; metathoracic spiracles large and prominent; epinotum with feebly convex base, slightly longer than broad, rounded anteriorly, with marginate, parallel sides and the posterior border transverse and distinctly excised in the middle, the posterior corners projecting as short, blunt teeth, the declivity perpendicular, concave, as long as the base. Petiolar scale broader than the epinotum, thick, with rounded superior border and ventrally converging sides, the posterior surface flat, the anterior really consisting of two surfaces meeting at an obtuse angle, the more ventral surface perpendicular, the dorsal sloping upward and backward to the superior border. Gaster elongate-elliptical, parallel-sided in the middle, the first segment anteriorly truncated, with an impression for the accommodation of the petiolar scale. Legs stout, fore femora somewhat incrassated, tibiæ clavate, not compressed.

Head, thorax and appendages subopaque, petiole and gaster shining; mandibles rather smooth, sparsely punctate; head and petiole very finely and indistinctly punctulate; thorax, especially on the sides, more coarsely reticulate, or evenly and densely punctate; clypeus and cheeks with shallow punctures; front, especially along the carinæ, vertex and thoracic dorsum with large, scattered piligerous punctures, or foveolæ. Gaster very finely shagreened, almost transversely striolate, with sparse, oblique, piligerous punctures.

Hairs sordid white or brownish on the thorax, white on the head and gaster, only moderately long, erect, sparse and rather blunt; short and subappressed on the appendages; pubescence whitish, appressed, short and dilute; almost lacking on the head and thorax, distinct on the gaster.

Black; gaster often very dark brown, with narrow, yellowish margins to the segments; clypeus and cheeks dull red; coxæ, femora and often also the apices of the tibiæ, brown; mandibles, except the teeth, antennæ, neck, tips of coxæ, trochanters, tarsi and bases of tibiæ brownish yellow; terminal funicular joints infuscated.

Worker media. Length 4–4.5 mm.

Differing from the maxima in its distinctly smaller stature and smaller and somewhat shorter head, which has slightly more rounded anterior and posterior corners, slightly less developed protuberances on the posterior half of the clypeus, somewhat more convex eyes, slightly longer antennal scapes, more pronounced and more flattened, lobe-like and longer teeth on the base of the epinotum. The angle between the anterior and dorsal surfaces of the petiole is sharper, so

that the scale has the three surfaces even more distinct than the maxima. Seen from above the petiole is trapezoidal, with straight, anteriorly converging sides and the oblique or dorsal surface transversely convex.

Sculpture, pilosity and color as in the maxima.

Worker minima. Length 3–3.5 mm.

Head trapezoidal, as broad or very nearly as broad as long, with distinctly convex posterior border and straight, anteriorly converging sides and carinæ extending from the posterior orbits of the convex, posteriorly situated eyes to the occipital border. Mandibles thinner and with much less convex external borders than in the maxima and media, teeth 6 to 7, small, rather crowded. Clypeus of the usual structure, without protuberances, broader than long, convex and carinate in the middle, the anterior border broadly rounded and somewhat projecting. Antennal scapes extending nearly half their length beyond the posterior border of the head. Thorax more flattened above than in the maxima and media; pronotum twice as broad as long with distinct indications of humeral angles; posterior corners of the base of the epinotum developed as flattened, slightly upturned lobe-like teeth, separated by an arcuate, marginate excision; declivity strongly concave. Petiole in profile with the short anterior surface concave and forming a sharp angle with the dorsal surface which is straight or even slightly concave; its sides from above distinctly concave; superior border broad, rather acute, crenulate, produced on each side below as a distinct tooth. Gaster oval, proportionally shorter than in the maxima and media.

Head, and especially the thorax, more sharply and coarsely punctate, the petiole transversely striolate. Pilosity longer and more abundant, pubescence very distinct on the anterior portion of the head and dorsal surface of the thorax and gaster. Black; gaster often paler brown than in the media and maxima; mandibles, anterior border of clypeus and cheeks, antennæ and legs, brownish yellow; tips of funiculi and femora darker brown; flexor surfaces of tibiæ sometimes brownish.

Female. Length 6 mm.

Head shaped as in the worker maxima but with less pronounced anterior and posterior corners and larger and more convex eyes. The mandibles and clypeus are also very similar, but the paired protuberances on the latter are less developed and more like those of the media. Antennal scapes extending twice their greatest diameter beyond the posterior border of the head. Thorax short, about twice as long as

wide; mesonotum slightly flattened, as broad as long; epinotum short, its base convex, sloping backward and forming a distinct angle with the longer, perpendicular and only slightly concave declivity. Petiole shaped as in the maxima but somewhat thicker. Gaster large, elongate-elliptical, as long as the remainder of the body. Wings measuring 6 mm.

Shining; head subopaque, very finely and indistinctly punctulate as in the maxima, with somewhat more shining, punctate mandibles; clypeus and cheeks with small, front with large punctures as in that phase.

Pilosity as in the maxima; pubescence very short, dilute, visible only on the gaster.

Black; mandibles, clypeus and cheeks deep red; palpi and antennæ yellow, the funiculi infuscated distally. Femora dark brown; tibiæ and tarsi paler, more reddish brown. Wings clear, iridescent, with pale brown veins and pterostigma.

Described from two females and numerous workers from Barro Colorado Island and Corozal, Panama. To the same form belong series of maximæ, mediæ and minimæ which I collected from dead twigs at San Jose, Costa Rica and Kartabo, British Guiana, a minima worker from Bartica, British Guiana (W. Beebe) and one from Port of Spain, Trinidad (R. Thaxter).

The peculiar conformation and coloration of the clypeus and anterior portion of the head in the maxima, media and female of this species indicate, I believe, a distinct and independent development of phragmotic habits analogous to those of the soldiers and females in the subgenera Colobopsis, Pseudocolobopsis, Manniella, Myrmobrachys, etc.

Camponotus (Myrmocladœcus) sanctæ-fidei var. hondurianus Mann

Comparison of two cotype maximæ and a minima from Carmelina, Honduras, received from Dr. Mann, and two maximæ and eight minimæ which I collected at Escuintla, Guatemala, with the typical *sanctæ-fidei* reveal few differences. The head of the maxima of *hondurianus* is somewhat larger and distinctly broader in proportion to its length, with distinctly less straight and parallel sides, and the yellow portions of the appendages are clearer yellow and less brownish. This difference in coloration is the only one I can detect between the minimæ of the two forms.

Camponotus (Myrmocladœcus) sanctæ-fidei var. coronatus Santschi

This form, described as a subspecies, is cited by Emery in the "Genera Insectorum" as a variety, and I am inclined to accept his interpretation. A single minima worker taken by Dr. J. C. Bradley at Esperanza, Amazonas, Brazil, agrees closely with Santschi's description. It is very much like the typical *sanctæ-fidei*, but the gaster and femora are jet black, the distal portions of the tibiæ dark brown, the thorax rather narrow, the pronotum being only one and three-fourths times as broad as long, the epinotum, without its flattened teeth, distinctly longer than broad. The crenulation of the posterior superior border of the petiole is rather coarse, the pilosity on the thorax and gaster rather long and the pubescence on the anterior portion of the head distinct. Santschi devotes most of his description to a comparison of his specimen with *C.* (*M.*) *bidens;* which seems to indicate that he had no other specimens of *sanctæ-fidei* with which to compare it. Most of the characters he mentions, including the crenulation of the petiolar border, to which the varietal name seems to allude, are found also in the minimæ of other forms of the species.

Camponotus (Myrmocladœcus) sanctæ-fidei leonhardi Forel

I have not seen this subspecies, which was described from a worker minima from Tipuani, Bolivia (A. von Leonhard). It has the pronotum only a third broader than long and but slightly broader than the mesonotum. The head is less trapezoidal and less narrowed anteriorly than in the typical *sanctæ-fidei*. The appressed pubescence is finer and sparser, the abdomen and legs rather pale brown.

Camponotus (Myrmocladœcus) sanctæ-fidei darlingtoni subsp. nov.

Worker minima. Length about 3.5 mm.

Head trapezoidal, as long as broad, larger and broader anteriorly than in the typical form of the species, eyes not so near the posterior corners, antennal scapes extending only about one-third their length beyond the posterior border. Thorax broader, the teeth of the epinotum much broader and more lobular, as in *C. latangulus*. Petiole decidedly stouter, its dorsal surface distinctly concave above and

laterally, its superior border crenulate, broadly triangular, with a distinct median denticle, as large as that of *C. bidens*, the lateral teeth well-developed, acute.

Dense punctuation of the head, thorax and petiole coarser than in the typical *sanctæ-fidei*, gaster more sharply reticulate. Pilosity on the thorax, and especially on the gaster, more abundant and decidedly longer; appressed pubescence long and sparse, developed on the sides of the head and gaster. Jet black; tibiæ and tarsi red; apical halves of middle and hind tibiæ dark brown; mandibles and antennæ paler, reddish yellow; apical half of funiculi dark brown.

A single specimen taken by Dr. P. J. Darlington in sweepings on Mt. Tucuche, Trinidad, at an altitude of 3070 feet.

Camponotus (Myrmocladœcus) sanctæ-fidei convexinodis subsp. nov.

Worker minima. Length 2.7–3.5 mm.

Head without the mandibles, distinctly broader than long, broad anteriorly, as in *darlingtoni*, but the eyes further back, as in the typical form of the species. Teeth on the epinotum not flattened, longer, stouter and more elevated at their tips, with a much broader excision between their bases. Petiole unlike that of any of the preceding forms of the species and like that of *C. bidens*, the anterior and dorsal surfaces not separated by a ridge but forming in profile a single convex surface, the superior border with a short, acuminate, median tooth like that of *bidens*.

Head, thorax and petiole more opaque than in the typical form and *darlingtoni*, but the sculpture as in the former. Pilosity and pubescence white, the hairs longer and more abundant on the head, thorax and gaster than in any of the preceding forms; pubescence long and sparse, conspicuous over the whole dorsal surface of the head, not appressed but merging into the pilosity. Black; scapes and trochanters yellow; mandibles, borders of cheeks, funiculi, neck and legs reddish yellow; coxæ dark brown; last funicular joint and a streak along the flexor surface of the middle and hind femora brownish.

Described from six specimens taken by Dr. J. C. Bradley at Porto America, Brazil.

This form might, perhaps, be regarded as a distinct species. In the structure of the petiole it closely resembles *C. bidens*, but in most other respects it agrees with *sanctæ-fidei*, and the following variety seems clearly to represent a transition between the two forms.

Camponotus (Myrmocladœcus) sanctæ-fidei convexinodis var. transilis var. nov.

Worker minima. Length 3.5–4.2 mm.

Sculpture and color as in *convexinodis*, but slightly larger, with the sides of the head more convex; superior border of petiole more rounded and less distinctly dentate in the middle; pilosity shorter and like that of the typical *sanctæ-fidei*, but distinctly more abundant; the pubescence on the head short and appressed.

Two workers taken by Dr. P. J. Darlington at St. Augustine, Trinidad.

Camponotus (Myrmocladœcus) callistus bradleyi subsp. nov.

Worker minor. Length about 3.5 mm.

Head subtrapezoidal, without the mandibles broader than long, with broad, nearly straight posterior border, rather sharp posterior corners and anteriorly converging sides, which are sinuate at the level of the eyes and distinctly convex in front. In profile the head is most convex in the middle of the front, with the vertex distinctly, transversely flattened and bordered on each side with a sharp carina from the eye to the occipital border. Eyes rather large, convex, placed distinctly behind the middle of the head. Mandibles with convex external borders, 6-toothed, the three basal teeth short. Clypeus large, convex in the middle, narrow and depressed laterally, its median anterior border broadly rounded and entire. Frontal area large, trapezoidal, twice as broad as long; frontal carinæ not closely approximated, straight and subparallel anteriorly, arcuate and diverging behind; frontal groove short and tenuous. Antennæ long and stout; scapes reaching about two-fifths of their length beyond the posterior border of the head. Thorax narrower than the head, very broad through the pronotum; promesonotal suture impressed; mesoëpinotal impression very deep, wide at the sides, where the large, projecting metanotal spiracles are situated. Pronotum somewhat less than twice as broad as long, flattened above, semicircularly rounded in front, sides straight and subparallel in the middle, converging behind, the anterior and lateral borders marginate; mesonotum sloping, about one and one-half times as broad as long, broader in front, semicircularly rounded behind, the sides marginate, as are also those of the epinotum, the base of which is somewhat longer than broad, anteriorly sub-

triangular, sloping upward and backward, posteriorly more parallel-sided, except for a short, blunt projection on each side; posterior border arcuately excised and bearing at each corner a horn-like spine, which is stout and flattened at the base and turned somewhat outward and upward, produced apically as a somewhat shorter, more slender, blunt and terete extension, which is turned inward and upward. Declivity of epinotum concave, perpendicular, scarcely more than half as long as the base; sides of pronotum concave, meso- and metapleuræ flattened. Petiole large and thick, shaped like that of *C. sanctæ-fidei*, in profile with the anterior and posterior surfaces straight and perpendicular, the dorsal surface very feebly concave, sloping upward to the superior border, which, seen from behind is acute, arcuately rounded, indistinctly crenulate, bilobulate in the middle above and on each side below produced as a straight, blunt, spine, which is nearly twice as long as broad at its base. From above the petiole is broader than the epinotum, subtrapezoidal, with straight anterior and posterior borders and concave, anteriorly converging sides. Gaster small, rounded-subquadrate, nearly as broad as long. Legs very long and stout.

Mandibles, head, sides of pronotum, apical portion of epinotal spines, ventral portion of epinotal declivity, gaster and legs very smooth and shining, with fine, sparse, piligerous punctures. Dorsal surface of thorax, meso- and metapleuræ and petiole opaque, coarsely, evenly and closely punctate, the punctures becoming finer at the anterior end of the pronotum.

Hairs moderately abundant, pale yellow, erect, very fine and long, even on the tips of the epinotal spines, shorter on the scapes and legs; pubescence undeveloped, except on the funiculi.

Mandibular teeth, thorax and petiole black; head, sides and anterior border of pronotum, apical portion of epinotal spines, superior border of petiole, gaster, antennæ and legs, including the coxæ, bright yellowish red; knees somewhat brownish.

A single specimen taken by Dr. J. C. Bradley at El Campamiento, Perene, Peru.

This beautiful specimen agrees very closely with Emery's description of the typical *callistus*, of which he had major, minor and female specimens from Mapiri, Bolivia, but the Peruvian specimen is decidedly smaller (the minor of *callistus* measures 4.5 mm.) and seems to have a differently shaped petiole. This segment Emery described as "très epaisse, avec une face dorsale bombée, declive en avant, plus étroite devant que derrière et dont le bord antérieur (qui constitue

proprement la tranche de l'écaille) est arqué et se prolonge de chaque coté par une épine courte, presque horizontale." Certainly the words "bombée" and "declive en avant" do not apply to the dorsal and anterior petiolar surfaces of the Peruvian specimen, and the border which Emery describes as "antérieur" (apparently my "superior border," homologous with the simple superior petiolar border in most species of Camponotus) is actually posterior. Perhaps, however, "antérieur" is a *lapsus calami* for "postérieur."

Camponotus (Myrmocladœcus) corniculatus sp. nov.

Worker maxima. Length 3.3 mm. (Fig. 6 a–c.)

Head subrectangular, distinctly longer than broad, somewhat narrower in front than behind, with very feebly convex posterior border, straight sides and slightly rounded cheeks; posterior and anterior corners not sharp; in profile the anterior surface of the head is subtruncate, the dorsal surface convex. There are no ridges from the eyes to the posterior corners. Eyes large, moderately convex, as long as their distance from the posterior border of the head. Mandibles stout, somewhat geniculate at the base, with very convex external borders and five acute teeth, the basal four well-developed. Clypeus large, subquadrate, flat, nearly as long as broad, surrounded by a deep suture; behind and parallel with its raised lateral borders there is on each side a blunt longitudinal, ridge-like projection, corresponding to the more pronounced protuberance in *C. sanctæ-fidei*. Anterior border of clypeus straight in the middle, forming a short transverse lobe, because it is rather deeply excised on each side. Frontal area distinct, trapezoidal, fully twice as broad as long; anterior halves of frontal carinæ straight and strongly diverging, posterior halves straight and slightly converging behind; frontal groove distinct. Antennæ rather stout; scapes extending twice their greatest diameter beyond the posterior border of the head. Thorax stout; pronotum large, excluding the neck twice as broad as long, flattened in the middle, semicircularly rounded anteriorly, the sides only bluntly marginate; mesonotum very regularly elliptical, nearly one and one-half times as broad as long, raised above the posterior end of the pronotum anteriorly and especially at the sides which are bluntly marginate, its surface flattened. sloping backward and downward to the long and deep mesoëpinotal impression, bearing the large, prominent metathoracic spiracles, which are separated by a distance equal to twice the length of the impression. Base of epinotum rising very

abruptly above the impression to the height of the promesonotum and forming a trapezoidal plate, broader behind than in front, with straight, submarginate anterior and lateral borders and broadly excised posterior border, the corner of which are produced backwards as short, flattened, distinctly in-turned lobes; declivity steeply sloping

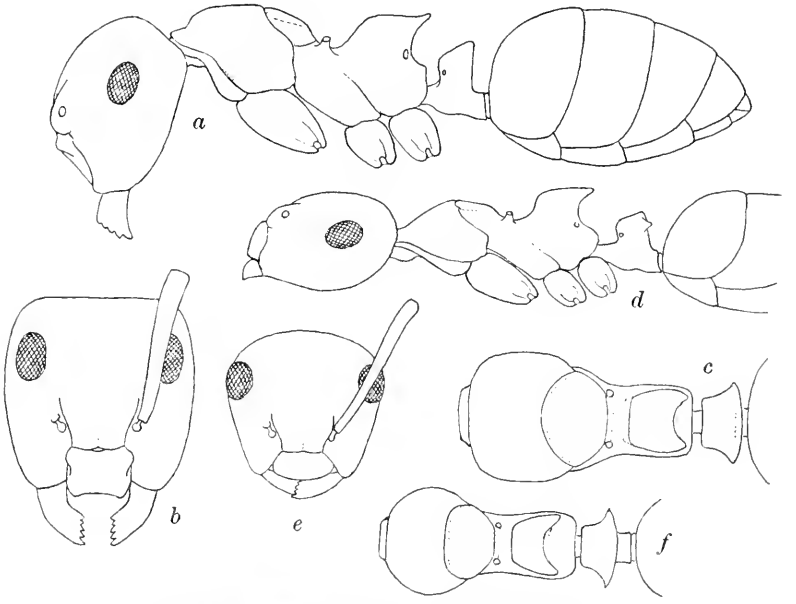

Fig. 6. *Camponotus* (*Myrmocladœcus*) *corniculatus* sp. nov. of British Guiana. *a*, worker maxima in profile; *b*, head of same, dorsal aspect; *c*, thorax and petiole of same, dorsal aspect; *d*, worker minima in profile; *e*, head of same, dorsal aspect; *f*, thorax and petiole of same, dorsal aspect.

and deeply concave, as long as the base. Petiole shaped much as in *sanctæ-fidei;* from above trapezoidal, twice as broad as long, with straight anterior, posterior and anteriorly converging lateral borders, the posterior corners acute; in profile the anterior surface is slightly concave, forming a distinct angle with the dorsal surface which is transversely convex and slopes upward and backward to the rather blunt, narrow and transversely rounded superior border, which terminates on each side in a sharp, tooth-like angle, the sides of the border concave, converging inferiorly. The petiole has a short but distinct

posterior extension or peduncle. Gaster rather large, oval, broader in front than behind, the anterior surface of the first segment rounded, with a very distinct articular condyle but without a median impression for the accommodation of the petiolar scale. Legs rather long, fore femora somewhat enlarged.

Shining; finely coriaceous; mesonotum, mesopleuræ, metapleuræ and petiole more coarsely, almost reticulate rugulose, the base of the epinotum somewhat longitudinally, the dorsal surface of the petiole transversely, striate. Mandibles indistinctly shagreened, with fine piligerous punctures; clypeus, cheeks and front with coarse, shallow, sparse punctures; gaster very finely and transversely coriaceous, and like the posterior portion of the head, the promesonotum, legs and scapes with sparse piligerous punctures.

Hairs yellowish, abundant, rather coarse, of uneven length, long and erect on the head, thorax and gaster, shorter and more oblique on the scapes and legs, where they are most numerous on the extensor surfaces; on the cheeks and clypeus short and blunt; pubescence undeveloped.

Brownish yellow; mandibular teeth, posterior two-thirds of head, the mesonotum, mesopleuræ, base of epinotum and anterior half of metapleuræ and the petiole, except its ventral surface, deep piceous brown; gaster, extensor surfaces of femora and some irregular spots on the pronotum, paler brown.

Worker media. Length 3 mm.

Very similar to the maxima, but the head is smaller and very nearly as broad as long. Clypeus similar but subcarinate at the base and with the posterolateral ridges slightly less developed. Antennal scapes longer, extending about one-fourth their length beyond the posterior border of the head. Pronotum smaller and narrower, the base of the epinotum distinctly concave above, with its lateral borders more elevated, the posterior excision deeper and the lobes more acute and dentiform, with more pronounced inward curvature. Petiole very similar to that of the maxima but the sides are more concave and the teeth at the lateral corners of the superior border are more distinct.

Sculpture, pilosity and color much as in the maxima, but less distinctly coriaceous, the erect hairs on the thorax longer and more abundant, those on the cheeks and clypeus shorter and more appressed; yellow portions of head confined to the mandibles, clypeus and anterior borders of cheeks.

Worker minima. Length 2.2–2.5 mm. (Fig. 6 d–f.)

Resembling the media, but the head is much smaller and, without the mandibles, not longer than broad, with the sides more converging anteriorly and smaller, more convex and more posteriorly situated eyes. Clypeus trapezoidal, broader in front than behind, very convex and distinctly carinate in the middle, without posterolateral ridges, its anterior border broad, entire, feebly sinuate on each side. Scapes extending about two-fifths their length beyond the posterior border of the head. Thorax, with laterally sharply marginate pro-, meso- and epinotum; pronotum not more than one and one-half times as broad as long, flattened above; mesonotum also very flat, sloping backward and downward and forming an obtuse angle with the pronotum in profile; epinotum horizontal, more concave above than in the media with more elevated, convex and anteriorly converging sides, so that it appears crescentic and with more acute inwardly curved posterior teeth; in profile the base rises above the highest level of the promesonotum so that the declivity is longer, steeper and more concave. Petiole much as in the media but the sides even more concave, the dentate corners of the superior border more pronounced and the posterior peduncle-like extension somewhat longer. Legs and antennæ longer; gaster shorter.

Sculpture finer; surface of body smooth and shining with fine, sparse, piligerous punctures; only the gaster distinctly coriaceous. Pilosity proportionally longer, especially on the thorax; cheeks with ordinary, sparse, pointed hairs, some of which are appressed as in the media. Color much as in the maxima and media but the pronotum darker brown above and the yellow portions of the head and thorax more brownish.

Female. Length 5.5–6 mm.

Head very similar to that of the maxima, but the eyes are larger and more convex, the clypeus broader and more hexagonal, with the posterolateral ridges well-developed. Antennal scapes extending three times their greatest diameter beyond the posterior corners of the head. Thorax of the usual shape in Camponotus females, subelliptical from above, more than twice as long as broad; mesonotum as broad as long, epinotum short, convex, slightly sloping, the declivity of about the same length, abrupt, very concave, the incurved teeth of the worker forms represented by a pair of blunt, feeble protuberances. Petiole resembling that of the maxima but higher and broader, the boundary between its anterior and dorsal surfaces more rounded, the latter transversely convex, the superior border bluntly angular and produced upward in the middle, without lateral teeth; the sides

straight. Gaster large, elongate-elliptical, parallel-sided in the middle. Wings very short, measuring only 4 mm.

Smooth and shining; finely but distinctly coriaceous like the maxima, with scattered piligerous punctures; meso- and metapleuræ and petiole more opaque and more coarsely coriaceous, the petiole regularly transversely striate. Coarse punctures on the cheeks, clypeus and front and the pilosity as in the maxima. Dark piceous brown; mandibles, clypeus, anterior borders of cheeks, antennæ, middle and hind coxæ and trochanters and ventral portion of petiole brownish yellow; pronotum and legs pale brown; the middle and hind femora and tibiæ darker; wing-insertions and posterior borders of gastric segments sordid yellow. Wings rather opaque, whitish, with brownish yellow veins and pterostigma.

Described from 23 specimens (a maxima, a media, 16 minimæ and five females) taken by Mr. H. O. Lang at Kurupung, British Guiana, Nov. 1922, from a single colony nesting in a hollow twig.

This ant is, perhaps, only a subspecies of *C. hippocrepis*, described by Emery (1920) from a single defective minima taken by Balzan at Salinas sul Beni, Bolivia. Emery's figure and brief description agree with my specimens, except in indicating that *hippocrepis* has a much shorter and shallower mesoëpinotal impression and differently shaped petiolar scale. The latter is described as depressed, with the dorsal surface broad and flat. Furthermore, the frontal carinæ of *corniculatus* are neither widely separated nor parallel, as in Emery's species. Both species are closely related to *C. raphaelis* Forel of Costa Rica, which I know only from the original description. Like *sanctæ-fidei*, the maxima of *corniculatus* shows in the shape of its head a significant approximation to certain species of the subgenus Colobopsis.

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AUSTRALIAN REPTILES IN THE MUSEUM OF COMPARATIVE ZOÖLOGY CAMBRIDGE, MASSACHUSETTS

BY ARTHUR LOVERIDGE

WITH ONE PLATE

CAMBRIDGE, MASS., U. S. A.
PRINTED FOR THE MUSEUM
DECEMBER, 1934

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE

There have been published of the BULLETIN Vols. I to LXV, LXVII–LXXV, of the MEMOIRS Vols. 1 to LII, LIV.

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No. 6.— *Australian Reptiles in the Museum of Comparative Zoölogy, Cambridge, Massachusetts*

By Arthur Loveridge

CONTENTS

INTRODUCTION

The collection of Australian reptiles in the Museum of Comparative Zoölogy consists of 2,091 specimens, representing 267 species or races, comprising 1 of crocodilians, 8 of chelonians, 73 of snakes and 185 of lizards.

In the following report on this collection, I give the results of an examination of every individual, except where definitely stated to the contrary. The statistical results of this study are stated under each species so that they may be available to Australian herpetologists, who will have some check upon the identifications and be able to utilize the data in defining geographical races.

The name by which each species is now known is followed by the original citation and type locality. With the latter I have taken the liberty of substituting Australia for New Holland, Tasmania for Van Diemen's Land, and Northern Territory for the old political area of Central Australia. (Native names are given for a few of the central forms; it should be understood, however, that these names are generally quite local, and may not be used among neighboring tribes.)

In listing the material, the registration number in the departmental catalogues is given, followed by the locality. Certain abbreviations for political areas have been deemed advisable; these are:

N.S.W. for New South Wales
N.T. for Northern Territory
Q. for Queensland
S.A. for South Australia
T. for Tasmania
T.S. for Torres Straits
V. for Victoria
W.A. for Western Australia

If little known, the locality is generally amplified below, but it might be as well to state here that the Margaret River so frequently mentioned is the one situated in the South-West Division of Western Australia, and that Lake Violet is at the north end of Lake Way and only three miles from Wiluna, Western Australia.

Where known, the collector's name is given; if unknown, then the source from which the specimen reached the Museum of Comparative Zoölogy. The same procedure has been followed with respect to dates. Either the date of collecting is given or, if this is not known, the date of receipt at the Museum is substituted.

THE HARVARD AUSTRALIAN EXPEDITION OF 1931–1932

More than half of our Australian reptiles, *i.e.*, 1,196, representing 157 species of which no fewer than 61 were new to the collection, were actually taken in the field by members of the recent Harvard Expedition. The last figure might be augmented by a dozen more species presented to the party by Australian friends.

The members of the Expedition from August to December, 1931, were Professors W. M. Wheeler and G. M. Allen and Messrs. R. Ellis, I. M. Dixson, P. J. Darlington and W. E. Schevill. During these early months the bulk of the material (388 specimens) was simply credited to the Harvard Expedition. Later, when the seniors returned home, Dr. P. J. Darlington and W. E. Schevill remained in the field and took independent itineraries, so that the material gathered by each (331 and 453 reptiles respectively) is credited to the actual collector in the following pages.

It is entirely unnecessary for me to invite attention to the energetic and thorough way in which these two naturalists prosecuted their work—such will be obvious if one turns the pages of this report—but I cannot refrain from voicing my appreciation after handling so many hundreds of their perfectly preserved and labeled specimens. The remarkably complete collection of Hermannsburg reptiles, embracing as it does 29 species of lizards and topotypes of almost every race described by Sternfeld, made by Mr. Schevill merits special mention. Nor should it be forgotten that the gathering of herpetological material by these gentlemen was but incidental to the prosecution of researches in their own particular fields of geology and entomology.

The receipt last year of the final consignment resulting from the Harvard Expedition, together with the necessity for identifying its component species, resulted in the production of this report.

EARLIER HARVARD AUSTRALIAN EXPEDITION

Alexander Agassiz's Great Barrier Reef Expedition of 1896 provided the first direct contact between the Museum of Comparative Zoölogy and Australia. Some 47 reptiles were collected at Cooktown and in its vicinity by Messrs E. A. Olive, A. G. Mayer, and W. M. Woodworth. Of the 18 Australian species represented, two (*Typhlops affinis* and *Ablepharus buruetti*) still remain the only examples of their kind in the Museum. The collection was reported upon by Garman (1901) and references to this paper are cited throughout the present one.

In 1913, Dr. H. L. Clark, aided by a Fellowship of the Carnegie Foundation, visited Australia to study echinoderms. He secured some reptiles which were reported upon by Barbour (1914). On two subsequent visits (1929–1930 and 1932) Dr. Clark obtained further herpetological material making a total of 116 specimens representing 35 species of which 18 were new to the collection, at least so far as Australia was concerned.

Finally, through the generosity of Dr. Barbour, in 1927 Mr. W. S. Brooks was able to visit south Western Australia. He collected 344 reptiles of 34 species, 11 of which were new to the Museum, and four, including such a rarity as *Furina bimaculata*, still remain the only representatives of their kind in the collection.

OTHER SOURCES OF MATERIAL

The first Australian specimens to reach the Museum consisted of some 15 reptiles without history or precise locality data. In 1861, however, these were augmented by a dozen things from Hobart, Tasmania, presented by J. W. Robertson, Esq. During the years 1864 to 1873, C. L. Salmin contributed 16 more and between 1877 and 1879 Professor Alexander Agassiz obtained 13 from Edward Gerrard. The latter were especially valuable additions as they came from the Torres Straits from which region the Museum had nothing. In 1881 and succeeding years some 16 examples of almost as many species were received from H. A. Ward of Rochester: with but few exceptions they represented species new to the collections. In 1883 a moloch lizard from Sir H. St. George Ord, one time Governor of Western Australia, is of no small historical interest as were also 5 reptiles from the Horn Expedition which were obtained from the American Museum of Natural History by Dr. Thomas Barbour.

Among his own herpetological collection which Dr. Barbour presented in 1903, were 25 Australian specimens representing 18 species, 5 of these still remain the only examples of their kind in the Museum. These were followed by 8 reptiles purchased from W. F. H. Rosenberg to fill other gaps, then, from the same donor, a portion of the historically valuable Malcolm A. Smith collection of sea snakes of which 31 specimens of more than a dozen species came from Australian seas. Other individuals contributed 135 reptiles in small numbers. To enumerate them all would be tedious though these gifts are none the less appreciated, especially those that represented species new to the Museum.

Exchanges with other museums have always been a fruitful method of rounding off the collections. The first of these involving Australian reptiles, took place with the Göttingen Museum in 1865 and is of interest because of W. Keferstein's papers dealing with this material. About the same time half-a-dozen Australian lizards were received from the Paris Museum through A. A. Duméril. Several of these have been generally considered cotypes but in view of the fact that the exchange took place about a quarter of a century after the publication of the famous Erpétologie Général such a view should be accepted with reserve.

In the years 1870, 1876 and 1890, exchanges were carried out with Gerald Krefft of the Australian Museum. They culminated in the magnificent exchange arranged by Dr. Barbour in 1914. The latter

brought up the total number of reptiles received from Sydney to 170 representing 80 distinct species. The inestimable value of such exchanges for purposes of comparative study need not be emphasized. We feel grateful to the Australian Museum authorities for their coöperation in the undertaking. In the same year 19 reptiles were received from the Queensland Museum and were followed by exchanges of lesser importance with the Western Australian Museum (1 specimen), United States National Museum (1), Peabody Academy of Salem (3), British Museum (5), Amsterdam (1), Basel (1) and Vienna (1). Of greater importance was the recent receipt of 14 specimens from the Senckenberg Museum; many of these were cotypes of species described by Sternfeld from the collections made at Hermannsburg by M. von Leonhardi.

ACKNOWLEDGEMENTS

I take this opportunity of expressing my indebtedness to Messrs. Darlington and Schevill for permission to incorporate their interesting field notes in the present report, as well as for their kindness in frequently supplying me with information regarding localities. To Mr. W. E. Schevill in particular I am deeply grateful for reading over this manuscript and for his promise to see it through the press during my absence in Africa. I am also greatly indebted to him for much help received, particularly during the last week when my departure necessitated speeding up the revision of Leiolopisma, the last genus to be attempted.

This final rush has made it impossible for me to consult the literature on the Scincidae to the same extent as was done with other families; this is the explanation of possible omissions in according due prominence to the findings of other workers in this group.

To Messrs. J. R. Kinghorn, L. Glauert, and H. A. Longman, I desire to express my thanks for so kindly answering questions, supplying me with data pertaining to specimens in their care, and for offering criticisms of portions of this manuscript.

SUMMARY OF TAXONOMIC ALTERATIONS

Since the publication of Boulenger's catalogues of the Reptiles in the British Museum (1885–1896), with the notable exception of Kinghorn's fine contributions to our knowledge of the snakes, Australian herpetology scarcely seems to have received that attention which so interesting a fauna demands.

Of outstanding importance are Sternfeld's papers (1919 and 1925) on von Leonhardi's collections from the Hermannsburg Mission in that portion of central Australia now included in the Northern Territory for administrative purposes. I believe that every, certainly almost every, species or race described with such acumen by Sternfeld, will be found worthy of recognition. In a few instances, however, his names must give way to those proposed by Rosèn for reptiles collected by Dr. N. Holst in "West Australia." It would be of no small interest to know exactly where Holst collected. One thing is abundantly clear and that is that many of the races inhabiting central Australia range in a northwesterly direction to Broome on the west coast.

The check list of Australian lizards compiled by Zietz in 1920 has been very helpful though it was obviously largely a non-critical compilation. In synonymizing a great many of the species recognized by Zietz, I have endeavoured to perform for this group what Kinghorn has already done for the snakes. Much apparent synonymizing results from my treatment of the scincids formerly included in the genus Lygosoma. I take the view that taxonomy is largely a matter of convenience and Lygosoma, already of unwieldy proportions and, by the discovery and description of new forms, increasing more rapidly than almost any other group, had better be split up into a number of genera. Boulenger (1887), followed by Zietz (1920), called these genera 'sections' of Lygosoma. Other herpetologists have treated them as subgenera though this course results in unwieldy quadrinomials. While perfectly willing to concede that the relationships between certain of these groups such as Hemiergis and Siaphos are much more slender than those separating the average genus, I prefer to regard them as full genera. In doing so I have to restore to use a number of names preoccupied in Lygosoma when used in the larger sense adopted by Boulenger.

No stability of nomenclature in Australian herpetology can be hoped for until some authority examines the types (where still extant) and definitely settles the status of the many names so lavishly proposed by those earlier Australian workers Macleay and De Vis. Longman has done much work in this direction, but I would plead for one comprehensive study of every species described. I have attempted to synonymize some sixteen of them in this present paper and have revived several of their species which had been relegated to the synonymy by other workers. Doubtless much remains to be done in both directions. The descriptions, more particularly the earlier ones, of both these authors—Macleay and De Vis—were so scanty

and meagre that it is often difficult to decide with any confidence what action to take regarding their disposition.

As a result of this study, the following species or races have been described for the first time[1]:

Nephrurus wheeleri
Amphibolurus darlingtoni
Amphibolurus barbatus minimus
Physignathus gilberti centralis
Sphenomorphus leae brooksi
Sphenomorphus scherilli
Rhodona nichollsi
Lygosoma darlingtoni

while the undermentioned are revived:

Typhlops nigrescens (Gray) from synonymy of *polygrammicus* (Schlegel)
Diplodactylus ciliaris Boulenger " *spinigerus* Gray
Egernia nitida (Gray) " *kingii* (Gray)
Egernia napoleonis (Gray) " *kingii* (Gray)
Omolepida melanops (Stirling & Zietz) " *branchiale* (Günther)
Lygosoma lentiginosus (De Vis) " *verreauxii* (A. Duméril)
Lygosoma frontalis (De Vis) " *ophioscincus* Boulenger
Ablepharus anomalus (Gray) " *lineoocellatus* (Gray)

and the following regarded as subspecies:

Lycodon reticulatus Gray as a race of *Demansia psammophis* (Schlegel)
Lycodon olivaceus Gray " *Demansia psammophis* (Schlegel)
Pseudonaja nuchalis Günther " *Demansia textilis* (Dum. & Bib.)
Pseudonaja affinis Günther " *Demansia textilis* (Dum. & Bib.)
Gehyra australis Gray " *Peropus variegatus* (Dum. & Bib.)
Grammatophora inermis De Vis " *Amphibolurus reticulatus* (Gray)
Lygosoma tympanum Lönnberg & Andersson as a race of *Sphenomorphus quoyii* (Dum. & Bib.)
Lygosoma brachysoma Lönnberg & Andersson as a race of *Sphenomorphus tenuis* (Gray)
Lygosoma (*Homolepida*) *petersi* Sternfeld as a race of *Omolepida casuarinae* (Dum. & Bib.)

The following, then, are believed to be synonyms:

Emydura signata Ahl = *Emydura latisternum* (Gray)
Typhlops waitii Boulenger = *Typhlops australis* (Gray)
Liasis childreni perthensis Stull = *Liasis childreni* Gray
Pseudelaps muelleri insulae Barbour = *Pseudelaps muelleri* (Schlegel)
Pseudoferania macleayi Ogilby = *Enhydris polylepis* (Fischer)

[1]See bibliography.

Diemenia maculiceps Boettger	= *Demansia p. psammophis* (Schlegel)
Diemenia atra Macleay	= *Demansia p. olivacea* (Gray)
Diemenia ingrami Boulenger	= *Demansia t. nuchalis* (Günther)
Denisonia signata var. *vagrans* Garman	= *Denisonia signata* (Jan)
Denisonia maculata var. *devisi* Waite & Longman	= *Denisonia maculata* (Steindachner)
Hoplocephalus nigrescens Günther	= *Denisonia pallidiceps* (Günther)
Heteronota fasciata Macleay	= *Gymnodactylus pelagicus* (Girard)
Heteronota marmorata Macleay	= *Gymnodactylus pelagicus* (Girard)
Gymnodactylus heteronotus Boulenger	= *Gymnodactylus pelagicus* (Girard)
Gymnodactylus cheverti Boulenger	= *Gymnodactylus pelagicus* (Girard)
Heteronota eboracensis Macleay	= *Heteronota binoei* Macleay
Phyllodactylus macrodactylus Boulenger	= *P. marmoratus* (Gray)
Phyllodactylus affinis Boulenger	= *P. marmoratus* (Gray)
Phyllodactylus guentheri Boulenger	= *P. marmoratus* (Gray)
Oedurella taeniata Lönnberg & Andersson	= *Diplodactylus michaelseni* Werner
Gymnodactylus lacris Sternfeld	= *Diplodactylus conspicillatus* Lucas & Frost
Diplodactylus platyurus Parker	= *Diplodactylus hilli* Longman
?*Diplodactylus bilineatus* Lucas & Frost	= *D. pulcher* (Steindachner)
Diplodactylus pulcher var. *dorsalis* Werner	= *D. pulcher* (Steindachner)
?*Diplodactylus lucasi* Fry	= *D. pulcher* (Steindachner)
Oedura tryoni De Vis	= *Oedura marmorata* Gray
Oedura fracticolor De Vis	= *Oedura marmorata* Gray
Oedura ocellata Boulenger	= *Oedura marmorata* Gray
Oedura cincta De Vis	= *Oedura marmorata* Gray
Oedura monilis De Vis	= *Oedura marmorata* Gray
Oedura mayeri Garman	= *Oedura marmorata* Gray
Phyllodactylus (Oedura) castelnaui Thominot	= *Oedura marmorata* Gray
Amphibolurus websteri Boulenger	= *Amphibolurus scutulatus* Stirling & Zietz
Amphibolurus holsti Rosén	= *Amphibolurus scutulatus* Stirling & Zietz
Amphibolurus modestus Ahl	= *Amphibolurus pictus* Peters
A. reticulatus major Sternfeld	= *A. reticulatus inermis* De Vis
Amphibolurus pallidus Boulenger	= *A. adelaidensis* (Gray)
Amphibolurus vitticeps Ahl	= *A. b. barbatus* (Cuvier)
Physignathus nigricollis Lönnberg & Andersson	= *Diporiphora bilineata* Gray
Diporophora nuchalis De Vis	= *Diporiphera australis* (Steindachner)
Diporophora ornata De Vis	= *Diporiphera australis* (Steindachner)

Physignathus incognitus Ahl	= *P. gilberti gilberti* (Gray)
Amphibolurus branchialis De Vis	= *Physignathus lesueurii* (Gray)
Varanus ingrami Boulenger	= *V. spenceri* Lucas & Frost
Egernia striata Sternfeld	= *Egernia inornata* Rosén
Egernia pulchra Werner	= *Egernia napoleonis* (Gray)
Tiliqua o. auriculare Kinghorn	= *T. o. multifasciata* Sternfeld
[1]*Macrogongylus brauni* Werner	= *Celestus occiduus* (Shaw)
Lygosoma ocelliferum Boulenger	= *Sphenomorphus ocellatus* (Boulenger)
Lygosoma (Hinulia) breviunguis Kinghorn	= *S. ocellatus* (Boulenger)
Lygosoma lesueurii Duméril & Bibron	= *S. a. australis* (Gray)
Lygosoma dorsale Boulenger	= *S. spaldingi* (Macleay)
Lygosoma (Hinulia) quoyi kosciuskoi Kinghorn	= *S. quoyii tympanum* (Lönnberg & Andersson)
Lygosoma (Hinulia) tenuis intermedia Kinghorn	= *S. t. tenuis* (Gray)
Lygosoma tamburinense (Lönnberg & Andersson)	= *S. tenuis brachysoma* (Lönnberg & Andersson)
Mocoa nigricaudis Macleay	= *Sphenomorphus pardalis* (Macleay)
Lygosoma (Hinulia) elegantulum Peters & Doria	= *S. pardalis* (Macleay)
Hinulia ambigua De Vis	= *S. f. fasciolatus* (Günther)
Hinulia domina De Vis	= *Sphenomorphus tigrina* (De Vis)
Mocoa spectabilis De Vis	= *Leiolopisma challengeri* (Boulenger)
Mocoa lichenigera O'Shaughnessy	= *Leiolopisma cuprea* (Gray)
?*Mocoa delicata* De Vis	= *L. guichenoti* (Duméril & Bibron)
Lygosoma devisii Boulenger	= *L. peronii* (Duméril & Bibron)
Heteropus mundus De Vis	= *Leiolopisma pectoralis* (De Vis)
Lygosoma laeve Oudemans	= *Leiolopisma novaeguinea* (Meyer)
Lygosoma aeratum Garman	= *Leiolopisma novaeguinea* (Meyer)
Lygosoma gastrostigma Boulenger	= *Omolepida melanops* (Stirling & Zietz)
?*Hemiergis initiale* Werner	= *Siaphos maccoyi* Lucas & Frost
Siaphos scharffi (Boulenger)	= *Lygosoma graciloides* Lönnberg & Andersson
Lygosoma praepeditum Boulenger	= *Rhodona lineata* (Gray)
S(iaphus) simplex Cope	= *Lygosoma verreauxii* (A. Duméril)
Lygosoma verreauxii var. *biunguiculata* Oudemans	= *Lygosoma lentiginosus* (De Vis)
Lygosoma bancrofti Longman	= *Lygosoma lentiginosus* (De Vis)
Ablepharus lineo-ocellatus var. *ruficaudus* Lucas & Frost	= *Ablepharus taeniopleurus* Peters
Ablepharus heteropus Garman	= *Ablepharus burnetti* Oudemans
Ablepharus rhodonoides Lucas & Frost	= *Ablepharus timidus* De Vis

[1]Extralimital, being West Indian.

Australian Reptiles in the Museum of Comparative Zoölogy

Note: Species discussed though unrepresented in the collection are placed in parentheses.

VARANIDAE

SCINCIDAE

CROCODYLIDAE

Crocodylus johnstoni Krefft

Crocodilus johnsoni Krefft, 1873, Proc. Zoöl. Soc. London, p. 335: Cardwell, Rockingham Bay, Queensland. Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 13.

Crocodilus (*Philas*) *johnstoni* Gray, 1874, Proc. Zoöl. Soc. London, p. 177, pl. xxvii.

1 (M. C. Z. 6464) Cooktown, Q. (E. A. Olive) 1896.
2 (M. C. Z. 35001–2) Flinders River, Q. (G. W. de Teliga) 1932.
1 (M. C. Z. 35003) Norman River, Q. (G. W. de Teliga) 1932.
4 (M. C. Z. 35004–7) Saxby River, Q. (G. W. de Teliga) 1932.

The pair from Flinders River were shot by Major G. W. de Teliga on July 29, below the Manfred Arms Hotel, south of Mount Brown.

Those from Saxby River in the Four-mile Hole, "Myola", on August 1, 2, and 3, 1932.

The narrow-snouted crocodile of Australia had for so long been represented in our collections by a single alcohol-preserved embryo that Mr. W. E. Schevill's success in obtaining a representative series of adults, half-grown, and young proved one of the outstanding achievements of the Harvard Expedition. The smallest specimen (No. 35003) is 658 mm. long.

Mr. Schevill's field measurements follow:

No. 35001.	♂	Girth at axillae	640 mm.
		Girth at groin	591 mm.
		Maximum girth of belly	712 mm.
		Girth behind genal bulge	545 mm.
		Total length	2454 mm.
No. 35002.	♀	Total length	2046 mm.
No. 35004.	♀	Total length	1510 mm.
No. 35005.	♂	Total length	1613 mm.
No. 35006.	♂	Total length	1119 mm.
No. 35007.	♂	Total length	1674 mm.
Field Mus.	♀	Total length	1463 mm.

Mr. Heber Longman (1925, p. 95) has given an important and well-illustrated account of the osteology, external characters and relations of this interesting reptile. Gray (loc. cit.), on the authority of Krefft, changed the spelling of the specific name from *johnsoni* to *johnstoni*, as the name of the collector of the first specimen was Johnstone. It would seem that the emended spelling may be allowed to stand in this case on the grounds of a *lapsus calami* in the original rendering.

CHELONIIDAE

Eretmochelys imbricata (Linnaeus)

Testudo imbricata Linnaeus, 1766, Syst. Nat., ed. 12, **1**, p. 350: American Seas.
Eretmochelys squamata Agassiz, 1857, Contr. Nat. Hist. U. S., **1**, Indian and Pacific Oceans.

1 (M. C. Z. 4176) Torres Straits (E. Gerrard) 1877.

I have not reinvestigated the status of the alleged Pacific race of the Hawksbill Turtle but follow Malcolm Smith (1931, p. 67) in referring *squamata* to the synonymy of the Atlantic *imbricata*. Our Torres Straits specimen measures only 46 mm. in total length of carapace.

Chelonia mydas (Linnaeus)

Testudo mydas Linnaeus, 1758, Syst. Nat., ed. 10, p. 197: Ascension Island.
Testudo japonica Thunberg, 1787, Sven. Akad.-Handl. Stockholm, **8**, p. 178, pl. vii: Japan.
Chelonia japonica Barbour, 1914, Proc. Biol. Soc. Washington, p. 205.
1 (M. C. Z. 9471) Mer Island, Torres Straits (H. L. Clark) 1914.

Here again the much discussed question as to whether *japonica* is really distinct from the Atlantic *mydas* has been disregarded and the latest investigator (Malcolm Smith, 1931, p. 70) followed. The Mer Island turtle has been discussed at length by Barbour (*loc. cit.* p. 205), it agrees with *mydas* and not with *depressa* as outlined by Fry in his key (1913, p. 168). The total length of carapace is only 50 mm.

Chelonia depressa Garman

Chelonia depressa Garman (part), 1880, Bull. Mus. Comp. Zoöl., **6**, p. 124: North Australia.
Natator tessellatus McCulloch, 1908, Rec. Austral. Mus. Sydney, **7**, p. 126, pls. xxvi-xxvii: Port Darwin, Northern Territory.
Type (M. C. Z. 4473) North Australia (H. A. Ward) N. D.

The young cotype from Penang, East Indies (M.C.Z. 1413) is definitely known to be a young *Chelonia mydas*.

Fry (1913, pp. 159–185) went very thoroughly into the status of *depressa*, which he considered a valid species of which *Natator tesselatus* is a synonym. The juvenile material at my disposal does not wholly support Fry's views. I think it more probable that the type of *depressa* is an aberrant individual which should be referred to the synonymy of *mydas* as was done by Boulenger (1889, p. 182), Siebenrock (1909, p. 546) and Malcolm Smith (1931, p. 70).

CHELYDIDAE

Chelodina longicollis (Shaw)

Testudo longicollis Shaw, 1802, Gen. Zoöl., **3**, p. 62, pl. xvi: Australasia or New Holland.
10 (M. C. Z. 2871, 8368–9, 8371–2, 8374–7, 8383) Australia (D. Franklin) 1913.
1 (M. C. Z. 5053) Gippsland Lakes, V. (H. A. Ward) 1881.

This series conforms well to Fry's (1915, p. 90) key to the genus except that No. 8369 has the intergular noticeably less (by 4 mm.) than twice as long as the suture between the pectorals. This results

in its running down to *C. siebenrocki* Werner, a species originally described as from New Guinea but whose type locality was later stated to be incorrect. Our specimen (No. 8369) is so obviously conspecific with the remainder of the series which show such astonishing variations in the size and shape of the intergular shield that I regard this specimen as an aberrant individual. Number 8368 has the right gular subdivided to form two shields. Number 8383 has only 10 marginals on the left side though all other specimens have the normal 11 on both sides. Number 8383 has a supernumary vertebral shield resulting from the transverse division of the third vertebral. The length of carapace of the largest terrapin (No. 5053) is 64 mm.

Chelodina steindachneri Siebenrock

Chelodina steindachneri Siebenrock, 1914, Anz. Ak. Wiss. Wien, **27**, p. 386: Marloo Station, De Grey River, Western Australia.

Chelodina millymillyensis Glauert, 1923, Journ. Roy. Soc. West. Austral., **9**, p. 53, pl. iv: Milly Milly, Murchison River, Western Australia.

1 (M. C. Z. 33501) Marloo Station, W. A. (Senckenberg Mus.) 1931.

This topotype answers correctly to Fry's (1915, p. 90) key excepting that the suture between the humerals and that between the pectorals are almost equal. The length of its carapace is 44 mm.

Chelodina oblonga Gray

Chelodina oblonga Gray, 1841, in Grey's Journ. Exped. West. Austral., **2**, p. 446, pl. vii: Western Australia.

Chelodina rugosa Ogilby, 1890, Rec. Austral. Mus. Sydney, **1**, p. 56, pl. vii: Cape York, Queensland.

1 (M. C. Z. 28758) Port Essington, N. T. (Lieut. Ince) 1929.

This stuffed specimen, received as identified from the British Museum in 1929, agrees with Fry's (1915, p. 90) key excepting that the third vertebral shield is 10 mm. broader than long, not "longer than broad." It reasonably resembles the figures of the aberrant carapace and plastron which served as the type of Ogilby's *rugosa*. The latter was referred to the synonymy of *oblonga* by Siebenrock (1909, p. 573).

Emydura krefftii (Gray)

Chelymys krefftii Gray, 1871, Ann. Mag. Nat. Hist. (5), **8**, p. 366: Burnett River, Queensland.

1 (M. C. Z. 4067) Rockhampton, Q. (C. L. Salmin) 1873.
1 (M. C. Z. 5197) Australia (Exhibition Gallery) N. D.
2 (M. C. Z. 10293–4) Burnett River, Q. (Australian Mus.) 1914.
1 (M. C. Z. 10295) Burdekin River, Q. (Australian Mus.) 1914.
3 (M. C. Z. 35008–10) Boyne River, Q. (W. E. Schevill) 1932.

Number 10293 is from Eidsvold and was received as *krefftii* from the Australian Museum while nos. 10294–5 were received as *macquarii* from the same institution, though they lack the barbels of that species. The Boyne River terrapin were taken near Mundubbera in March.

The material listed above agrees in possessing a nuchal shield; length of the plastron 3 to 3¼ times the width of the bridge; small rounded tubercles on upper surface of the neck; no barbels. A yellow streak (sometimes only a blob) from the eye to the ear; a yellow band from the end of the snout to the ear.

One Boyne River terrapin differs from its companions in having its plastron obtusely acuminate anteriorly as in *albertisii* Boulenger of New Guinea, not broadly rounded. Perhaps *albertisii* will prove to be at most a race of *krefftii*. The length of carapace of the largest terrapin (No. 5197) measures 255 mm.

Emydura latisternum (Gray)

Elseya latisternum Gray, 1867, Ann. Mag. Nat. Hist. (4), **20**, p. 44: Australia.
Emydura signata Ahl, 1932, Sitz. Ges. Naturf. Freunde, Berlin, p. 127, figs: (Brisbane), Queensland.

3 (M. C. Z. 35011–3) Lake Barrine, Q. (W. E. Schevill) 1932.
5 (M. C. Z. 35014–8) Lankelly Creek, Q. (P. J. Darlington) 1932.
Lankelly Creek is N.E. of Coen, Cape York.

These specimens are characterized by the absence and presence of a nuchal shield; by the width of the intergular at its broadest being contained 1½ to 2½ times in its length; length of the plastron 3 to 4 times in the width of the bridge; anterior surface of limbs with a series of very broad, transverse lamellae, the forelimbs particularly strongly fringed on the outer side.

The variation displayed by this material is of considerable interest, the nuchal is absent from the Lake Barrine terrapin (97 to 150 mm. in length) as also in the two younger examples (48 and 84 mm. in length) from Lankelly Creek, is minute in a medium-sized specimen (140 mm.) and best developed in the biggest (200 and 205 mm.) from the same locality, which is in the McIlwraith Range.

The coloration of the plastron varies greatly with age in series from a given locality.

TYPHLOPIIDAE

Typhlops grypus Waite

Typhlops grypus Waite, 1918, Rec. S. Austral. Mus., **1**, p. 17, figs: Marble Bar, north Western Australia, and Gregory Downs, Queensland.

1 (M. C. Z. 35019) Hughenden, Q. (W. E. Schevill) 1932.

Midbody scale-rows 18; nasal cleft in contact with first labial. Diameter 5.5 mm. Total length 355 (348+7) mm.

Kinghorn (1929, p. 53) states that only four examples of this species were then known, two being without locality. It is interesting to note that *T. kenti* also occurs at Hughenden.

Typhlops proximus Waite

Typhlops proximus Waite, 1893, Rec. Austral. Mus., **2**, p. 60, pl. xv, figs. 1–4: Cairns, Queensland.

1 (M. C. Z. 2875) Australia (No further history) N. D.
1 (M. C. Z. 10277) Temora, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10278) Murrumbal, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10279) Parkes, N. S. W. (Australian Mus.) 1914.

Midbody scale-rows 20; nasal cleft in contact with first labial. Diameters 5–14 mm., included in total lengths 32–34 times. Largest snake (No. 10279) measures 515 (507+8) mm.

Typhlops nigrescens (Gray)

Anilios nigrescens Gray, 1845, Cat. Liz. Brit. Mus., p. 135: Paramatta, New South Wales.

Typhlops reginae Boulenger, 1889, Ann. Mag. Nat. Hist., (6), **4**, p. 362: Queensland.

2 (M. C. Z. 10221, 34321) Australia (Australian Mus. & H. A. W.) 1914.
2 (M. C. Z. 10222, 10271) New South Wales (Australian Mus.) 1914.
1 (M. C. Z. 10270) Randwick, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10272) Armidale, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 35029) Hartley Vale, N. S. W. (P. J. Darlington) 1932.

Midbody scale-rows 22; nasal cleft in contact with first labial. Diameters 6–10 mm., included in total lengths 37–49 times. Largest snake (No. 10271) measures 495 (484+11) mm.

Numbers 10221–2 were received as *reginae* Boulenger, numbers 10270–2 as *nigrescens* Jan.

Waite (1918, p. 18), followed by Kinghorn (1929, p. 56) considered *nigrescens* Gray (1845), *ruppelli* Jan (1864) and *reginae* Boulenger

(1889) synonymous with *polygrammicus* Schlegel (1884) from Timor. However Malcolm Smith (1927, p. 219) has shown that Australian snakes may be separated on account of the nasal cleft being in contact with the first labial while in *polygrammicus* it proceeds from the suture between the first and second labials or frequently from the second labial only. The above specimens have been compared with a topotypic series of *polygrammicus*.

Mr. Kinghorn, to whom these notes have been shown, writes me that he has examined over a hundred of these snakes and finds that in all "the cleft proceeds from the first labial, so apparently all our specimens are *T. nigrescens*."

Typhlops kenti Boulenger

Typhlops kenti Boulenger, 1914, Ann. Mag. Nat. Hist., (8), **11**, p. 482: Northern Queensland.

1 (M. C. Z. 35020) Hughenden, Q. (W. Charles) 1932.

Midbody scale-rows 18; nasal cleft in contact with second labial. Diameter 3 mm., included in total length 72 times. Total length 218.5 (216+2.5) mm.

Parker (1931, p. 605) has recently figured the type of *kenti* to show that the Western Australian species figured by Waite (1918, p. 22) was really an undescribed form which he then names *nigroterminatus*. Though *kenti* was described from Queensland, Kinghorn (1929, p. 59) omits all mention of Queensland in the distribution of the species.

Typhlops nigroterminatus Parker

Typhlops nigroterminatus Parker, 1931, Ann. Mag. Nat. Hist., (10), **8**, p. 604: Roebuck Bay, north Western Australia.

1 (M. C. Z. 32809) Mullewa, W. A. (W. E. Schevill) 1931.

Midbody scale-rows 18; nasal cleft in contact with second labial. Diameter 3 mm., included in total length 92 times. Total length 276 (265+11) mm.

Typhlops affinis Boulenger

Typhlops affinis Boulenger, 1889, Ann. Mag. Nat. Hist., (6), **4**, p. 363: Queensland.

Typhlops wiedii Garman (not of Peters), 1901, Bull. Mus. Comp. Zoöl., **39**, p. 11.

1 (M. C. Z. 6487) Cooktown, Q. (E. A. Olive) 1896.

Midbody scale-rows 18; nasal cleft apparently joining second labial. Diameter 2.5 mm., included in total length 57 times. Total length 144 (141+3) mm.

This is the specimen referred to *wiedii* by Garman. Its state of preservation leaves much to be desired but I am reasonably confident that the reidentification is correct.

Typhlops bituberculatus (Peters)

Onychocephalus bituberculatus Peters, 1864, Monatsb. Akad. Wiss. Berlin, 1863 (1864), p. 233: near Adelaide, South Australia.

1 (M. C. Z. 10284) Bourke, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10285) Gandenbah, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10286) Hillston, N. S. W. (Australian Mus.) 1914.
3 (M. C. Z. 24425, 24494–5) Mundaring, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 32810) Lake Violet, W. A. (W. E. Schevill) 1931.

Midbody scale-rows 20; nasal cleft joining second labial; head trilobed. Diameters 2.5–9 mm., included in total length 49–61 times. Largest snake (No. 10284) measures 442 (436+6) mm.

The specimen from Lake Violet, near Wiluna, was "dug out of the nest of a small species of ant [Melophorus sp., *fide* Dr. W. M. Wheeler]. There were very few ants in the nest." (W. E. S.)

Typhlops wiedii Peters

Typhlops wiedii Peters, 1867, Monatsb. Akad. Wiss. Berlin, p. 24: Brisbane, Queensland.

1 (M. C. Z. 10223) Warren, Macquarie R., N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10224) Eidsvold, Burnett R., Q. (Australian Mus.) 1914.

Midbody scale-rows 20; nasal cleft joining second labial; head rounded. Diameter 3 mm., included in total lengths 57–65 times. Larger snake (No. 10223) measures 202 (195+7) mm.

Typhlops pinguis Waite

Typhlops pinguis Waite, 1897, Trans. Roy. Soc. S. Austral., **21**, p. 25, pl. iii: South Australia.

Typhlops opisthopachys Werner, 1917, Mitt. Zoöl. Mus. Hamburg, **34**, p. 35: Tanga, Tanganyika Territory.

1 (M. C. Z. 32813) Lake Preston, W. A. (J. McCallum Smith) 1931.

Midbody scale-rows 20; nasal cleft joining second labial; snout pointed in lateral view. Diameter 21 mm., included in total length 16 times. Total length 345 (333+12) mm.

Lake Preston is near Cookernup. Elsewhere I (1933, p. 222) have given my reasons for doubting the accuracy of the type locality of *opisthopachys* which I feel convinced is a synonym of *pinguis* Waite.

Typhlops australis (Gray)

Anilios australis Gray, 1845, Cat. Liz. Brit. Mus., p. 135: Western Australia.
Typhlops waitii Boulenger, 1894, Proc. Linn. Soc. N. S. W., (2), **9**, p. 718: north Western Australia.

1 (M. C. Z. 10265) s. of Perth, W. A. (Australian Mus.) 1914.
1 (M. C. Z. 10266) Strelley River, W. A. (Australian Mus.) 1914.
3 (M. C. Z. 24424, 24492–3) Mundaring, W. A. (W. S. Brooks) 1927.
2 (M. C. Z. 32811–2) Rottnest Island, W. A. (P. J. Darlington) 1931.

Midbody scale-rows 22; nasal cleft joining second labial. Diameters 3.5–13 mm., included in total length 29–42 times, 31–42 times in Rottnest Island snakes alone. Largest snake (No. 10266) measures 378 (370+8) mm.

Waite (1918, p. 29) hesitated to synonymize Boulenger's species with *australis* but I think that there is little reason for considering it distinct.

Typhlops endoterus Waite

Typhlops endoterus Waite, 1918, Rec. S. Austral. Mus., **1**, p. 32, figs.: Hermannsburg, Northern Territory.
Typhlops leonhardii Sternfeld, 1919, Mitt. Senckenb. Naturf. Gesell, **1**, p. 77: Hermannsburg Mission, Upper Finke River, Northern Territory.

Cotype (M. C. Z. 22082) Hermannsburg, N. T. (M. v. Leonhardi) 1910.

This cotype of *leonhardii* was received from the Senckenberg Museum. The species has recently been referred to the synonymy of *endoterus* by Kinghorn (1932, p. 355) a conclusion already reached by Dr. Robert Mertens, who wrote that name upon the label when sending us the specimen in 1926.

Midbody scale-rows 22; nasal cleft joining preocular. Diameter 4 mm., included in total length 48 times. Total length 192 (186+6) mm.

BOIDAE

Liasis childreni Gray

Liasis childreni Gray, 1842, Zoöl. Miscell., p. 44: northwest Australia.
Liasis childreni perthensis Stull, 1932, Occ. Papers Boston Soc. Nat. Hist., **8**, p. 26: Perth, Western Australia.

2 (M. C. Z. 4215) Island in Torres Straits (A. Agassiz) 1877.
1 (M. C. Z. 24426) Perth, W. A. (W. S. Brooks) 1927.

The Perth snake is the holotype of the race *perthensis* which Dr. Stull differentiated from the typical form of northern and eastern Australia by its "smaller number of scale rows (35 instead of 39–45), in the smaller number of ventrals (250 instead of 257–287, average 270.8), and the three pairs of prefrontals, as opposed to two in *L. c. childreni*."

Regarding the status of this form, Mr. L. Glauert of the Western Australian Museum wrote to me under date of September 28, 1932. "On examining our series I have come to the conclusion that this subspecies cannot stand. The scalation of the body varies with the age and size of the individual, while the head shields are not by any means constant as was pointed out in the British Museum Catalogue." i.e. Boulenger (1893, p. 77).

Subsequently, in reply for a request for more definite information, Mr. Glauert wrote that "the smallest snake in our collection is No. 102" and furnished me with the undermentioned scale-counts. Unfortunately precise localities are not furnished but from the context I gather that most, or all, came from the vicinity of Perth.

Museum Number	Scale-rows	Ventrals	Museum Number	Scale-rows	Ventrals
192	31	212	R. 2651	42	273
R.1417	41	293	R. 4062	42	270
345	42	264	R. 1837	43	268

When passing through London recently, I took the opportunity of examining such specimens of *childreni* as had been received by the British Museum since the publication of the "Catalogue of Snakes." These supply the following data:

Locality	Scale-rows	Ventrals	Subcaudals
Cooktown, Queenslond	42	264	43
Groote Eyelandt, N. Terr.	48	291	50
Baudin Id., north W. A. (yng)	43	247	46
" (ad)	43	253	44

It will be observed that the Baudin Island snakes conform to typical *childreni* in possessing 43 midbody scale-rows, but to *perthensis* in the low number of ventrals. With more abundant material it may yet be demonstrated that *perthensis* is valid on a basis of *average* lower counts.

Liasis amethistinus amethistinus (Schneider)

Boa amethistina Schneider, 1801, Hist. Amph., **2**, p. 254.
Python amethystinus Boulenger (part), 1893, Cat. Snakes Brit. Mus., **1**, p. 83.

Liasis clarki Barbour, 1914, Proc. Biol. Soc. Washington, **27**, p. 202: Mer Island, Murray Islands, Torres Straits.

1 (M. C. Z. 9600) Mer Id., Torres Straits (H. L. Clark) 1914.

This specimen is the holotype of *clarki* which Barbour correctly referred to Liasis, his action being confirmed by Stull in mss. who finds that it conforms to typical New Guinea *amethistinus*. I might add that our two New Guinea and this Mer Island snake differ from the continental material in lacking an interparietal.

Liasis amethistinus kinghorni Stull

Liasis amethistinus kinghorni Stull, 1933, Occ. Pap. Mus. Zoöl., Univ. Michigan, No. 277, June 28, p. 3: Lake Barrine, Queensland.

1 (M. C. Z. 35021) Cucania, near Babinda, Q. (W. E. Schevill) 1932.

3 (M. C. Z. 35022–4) Lake Barrine, Q. (W. E. S. & P. J. D.) 1932.

The above are the original type series, one of which has since been presented to the Queensland Museum, Brisbane.

Midbody scale-rows 45–52; ventrals 332–344; subcaudals 108–116; supralabials 13–14, 4 pitted; infralabials 22–24, 7–9 pitted; preoculars 2–3; postoculars 3–5; loreals 4–5; *interparietal present*. Largest snake (No. 35023) measures 3650 (3180+470) mm. These are field measurements made before skinning by Mr. W. E. Schevill, who further writes regarding this snake: "Shortly after midnight, April 4, 1932, this python raided the fowl-yard, but on detection abandoned the hen, which was already dead, and took refuge in a papaya tree about 15 feet high. A dog that was chained nearby, and which ordinarily gave the alarm when dasyures or cats were raiding, made no sound, but lay low." (W. E. S.)

Of the others Mr. Schevill writes: "One, taken at night, was lying fully extended on a trail near Lake Barrine. It made no move; had recently shed. Measured 2437 mm. immediately after death. Stomach empty. Aboriginal name *Goondai*." "At Dinner Creek, Cucania, Queensland, a male measuring 2315 mm. was caught killing a hen. April 6, 1932." (W. E. S.)

Morelia argus (Linnaeus)

(*Coluber*) *Arges* Linnaeus, 1758, Syst. Nat., 10th ed., **1**, p. 227: "Africa."

(*Coluber*) *Argus* Linnaeus, 1766, Syst. Nat., 12th ed., **1**, p. 389: "Africa."

Coluber spilotus Lacépède, 1804, Ann. Mus. Paris, **4**, pp. 194, 209: Australia.

Morelia variegata Gray, 1842, Zoöl. Miscell., p. 43: Port Essington, Northern Territory.

Python spilotes macrospila Werner, 1909, Zoöl. Jahrb. Syst., **28**, p. 274: no locality.

3 (M. C. Z. 2200, 2513, 18379) Australia (Paris & Australian Mus.) V. D.
2 (M. C. Z. 2214, 6305) Sydney, N. S. W. (Göttingen & Austral. Mus.) V. D.
2 (M. C. Z. 10555 Exhibit) Queensland (Queensland Mus. & N. Y. Zoo) 1914.
5 (M. C. Z. 32801–5) West Wallaby Id., W. A. (W. E. Schevill) 1931.
1 (M. C. Z. 32806) Margaret River, W. A. (P. J. Darlington) 1931.
3 (M. C. Z. 35025–7) Lake Barrine, Q. (W. E. Schevill) 1932.
1 (M. C. Z. 35028) Hermannsburg Mission, N. T. (W. E. Schevill) 1932.

Midbody scale-rows 43–51; ventrals 259–290; anal single; supralabials 12–14; infralabials 16–20; preoculars 2–4; postoculars 3–6; loreals 5–8. The largest snake (No. 32804) measures 1691 (1430+261) mm.

Boulenger (1893, p. 82, footnote) rejected *argus* (*arges errore* in 10th ed.) as it was based on a figure in Seba (Thes., **2**, pl. ciii, fig. 1) which appeared to be a composite. The body pattern is undoubtedly that of the snake more recently called *spilotes* but large cephalic plates have been drawn in. Dr. O. G. Stull (in mss.) considers that *argus* must be recognized, and has revived the genus Morelia for its reception.

M. variegata Gray, though so strikingly different in color and pattern from typical *argus*, appears to me to be nothing but a dimorphic form, its distribution uncorrelated with any definite geographical region or topographical environment. Of the above series Nos. 2214, 6305 and 18379 might be referred to typical *argus* and the rest to *variegata* but numerous intermediates occur so that one form grades into the other. Of the distribution of *argus* (as *spilotes*) Kinghorn (1929, p. 80) states: "The coastal districts of Australia generally. It is also found inland in some eastern parts" while of *variegata* he (1929, p. 78) says: "Essentially an inland variety though it may be met with in some of the coastal areas." The West Wallaby Island series are quite definitely of the *variegata* type, however.

Of these West Wallaby snakes Mr. Schevill writes: "Very sluggish, at least at the time of our visit (October 10–23, 1931). Generally found coiled up into a truncated cone, asleep—sometimes under a bush or in the mouth of a shearwater burrow, but more often in a secluded niche among the rocks. Even when found crawling about were quite sluggish and easily captured. One was taken just after swallowing a small *Egernia stokesii*."

Aspidites melanocephalus ramsayi Macleay

Aspidiotes ramsayi Macleay, 1882, Proc. Linn. Soc. N. S. W., **6**, p. 813: Fort Bourke, New South Wales.

Aspidites collaris Longman, 1913, Mem. Queensl. Mus., **2**, p. 140: Avondale Station, via Cunnamulla, Queensland.

1 (M. C. Z. 32806) Near Burracoppin, W. A. (W. Australian Mus.) 1931.

1 (M. C. Z. 32807) ? Merredin, W. A. (E. A. LeSouef) 1931.

Midbody scale-rows 53; ventrals 283–296; anal entire; subcaudals 44–48; labials 11–13, 6th or 7th or 6th and 7th entering the orbit; the eye is not separated from the labials; prefrontals form a median suture. Both are within a millimetre of the same measurements, the larger 1717 (1585+132) mm.

When Boulenger (1893, p. 91) dealt with this genus he had only Krefft's type of *melanocephalus*. *A. ramsayi* was only known to him from Macleay's description.

Waite (1917, pp. 436–440) has given a good summary of our knowledge of this genus and states that Longman suggests the possibility of *collaris* being based on a semi-albino juvenile.

Glauert (1928, p. 28) gives the range of *melanocephalus* in Western Australia as "Kimberly Tableland, North Wheat Belt and Burracoppin." (the last record doubtless based on the specimen listed above); for *ramsayi* he gives "Geraldton to Meckering."

Kinghorn (1929, p. 82) is probably more correct in restricting the range of *melanocephalus* to northern Australia. The type locality is Port Denison, Queensland and the only other records known to Waite were all northern Queensland. He follows Waite in referring *collaris* to the synonymy of *ramsayi*.

On comparing the material listed above with the descriptions of *melanocephalus* and *ramsayi*, they are found to be in agreement with the latter both in coloration and in the number of ventrals; the number of midbody scale-rows and subcaudal shields are so close in both forms as to be of doubtful diagnostic value; the same might be said regarding the number of supralabials—10 to 12 in *melanocephalus*, 11 to 14 in *ramsayi*. They are in agreement with *melanocephalus* in having the eye in contact with the labials. Waite has shown that this is constant in *melanocephalus* but inconstant in *ramsayi*. It seems to me therefore that we are dealing with geographical forms of one species which may be separated as follows:

Ventrals more than 310 (known range 320–350); head usually black in adults. Eastern and northern Queensland	*A. m. melanocephalus*
Ventrals less than 310 (known range 283–308); head usually brown in adults. Western and central Australia; New South Wales; southern Queensland	*A. m. ramsayi*

COLUBRIDAE (COLUBRINAE)

Natrix mairii (Gray)

Tropidonotus mairii Gray, 1841, in Grey's Journ. Exped. West. Austral., **2**, p. 442: Australia.

1 (M. C. Z. 2524) Queensland (Australian Mus.) 1870.
1 (M. C. Z. 10269) Clarence R., N. S. W. (Australian Mus.) 1914.
3 (M. C. Z. 35070–2) Nr. Mundubbera, Q. (J. Parker et al.) 1932.

Midbody scale-rows 15; ventrals 149–153; anals 2; subcaudals 67–70; supralabials 8–9, 3rd, 4th and 5th or 4th, 5th and 6th entering the orbit; preoculars 1 (being abnormal in No. 2524) or 2. Largest snake (No. 10269) measures 640 (530+110+) mm.; tip of tail missing.

Number 2524 was received from Dr. Krefft as *picturatus* (Schlegel), a species with which *mairii* was for some time confused. According to Rooij (1917, p. 77) *picturatus* does occur in Northern Australia but is omitted by Kinghorn (1929). In view of such records as the Clarence River snake it is surprising that the latter author (1929, p. 87) gives the distribution of *mairii* as "From the Moluccas, through New Guinea to the northern parts of Australia." though Lucas and Le Souef (1909, p. 170) under the name *picturatus* had given it as "East Australia, north of the Clarence River."

Dendrophis calligaster Günther[1]

Dendrophis calligaster Günther, 1867, Ann. Mag. Nat. Hist., (3), **20**, p. 53: Cape York, northeastern Australia.

Dendrelaphis schlenkeri Ogilby, 1898, Proc. Linn. Soc. N. S. W., **23**, p. 361, fig: Fife Bay, British New Guinea.

Dendrophis calligaster Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 12; Barbour, 1914, Proc. Biol. Soc. Washington, 27, p. 203.

1 (M. C. Z. 6488) Cooktown, Q. (A. E. Olive) 1896.
1 (M. C. Z. 9472) Mer Id., T. S. (H. L. Clark) 1914.
2 (M. C. Z. 35062–3) Lankelly Creek, Q. (P. J. Darlington) 1932.
3 (M. C. Z. 35064–6) Rocky Scrub, Q. (P. J. Darlington) 1932.

Both the last mentioned localities are in the McIlwraith Range, near Coen.

Midbody scale-rows 13; ventrals 179–183; anals 2; subcaudals 119–144; labials 8–9, 4th and 5th or 5th and 6th entering the orbit, the latter condition occurring in three snakes and then on one side of the

[1] For use of Dendrophis and not Ahaetulla, see Stejneger, Copeia, 1933, p. 199.

head only; temporals 2+3 except for two snakes where it is 1+1 or aberrant; a dark streak on the side of the head. Largest snake (No. 35064) measures 1162 (772+390) mm.

Dendrophis punctulatus (Gray)

Leptophis punctulatus Gray, 1827, in King's Voy. Austral., **2**, p. 432: Careening Bay, Northern Territory.

Dendrophis (*Ahetula*) *olivacea* Gray, 1842, Zoöl. Miscell., p. 54: Port Essington, Northern Territory.

Dendrophis (*Ahetula*) *fusca* Gray, 1842, Zoöl. Miscell., p. 54: Port Essington, Northern Territory.

Dendrophis prasinus Girard, 1857, Proc. Acad. Nat. Sci. Philad., p. 181: Australia.

Dendrophis gracilis Macleay, 1877, Proc. Linn. Soc. N. S. W., **2**, p. 220: Townsville, Cleveland Bay, Queensland.

Head (M. C. Z. 2521) New South Wales (G. Krefft) 1870.
1 (M. C. Z. 3099) Australia (C. L. Salmin) N. D.
1 (M. C. Z. 7797) Mossman, Q. (J. C. Kershaw) 1910.

Midbody scale-rows 13; ventrals 204–208; anals 2; sub-caudals 126–128; labials 8, 4th and 5th entering the orbit; temporals 1+2; no dark streak on side of head. Larger snake (No. 3099) measures 1508 (1082+426+) mm., tip of tail missing.

These snakes are strongly reminiscent of the neotropical Leptophis, species of which are now known to be very variable. Longman regards *gracilis* as worthy of recognition as a color form but being doubtful of its status I follow Boulenger (1896, p. 82) in referring it to the synonymy.

COLUBRIDAE (HOMALOPSINAE)

Enhydris polylepis (Fischer)

Hypsirhina polylepis Fischer, 1886, Abh. Nat. Geb. Hamburg, **9**, p. 14: Fly River, New Guinea.

Pseudoferania macleayi Ogilby, 1890, Proc. Linn. Soc. N. S. W., (2), **5**, p. 51: Herbert River at Ripple Creek, Queensland.

♀ (M. C. Z. 35067) Coen, Q. (P. J. Darlington) 1932.

Midbody scale-rows 21; ventrals 152; anals 2; subcaudals 41; labials 8, 5th and 6th entering the orbit as in *polylepis;* 3 infralabials in contact with anterior chin shields; preocular 1; postoculars 2, temporals 1+2. Total length 673 (575+98) mm. Gravid with a dozen eggs measuring about 15 x 10 mm.; considerable deposits of fat; stomach empty.

De Rooij (1917, p. 183) gives the range for New Guinea *polylepis* as: Midbody scale-rows 21 or 23 (25); ventrals 137–156; subcaudals 37–48. Kinghorn (1929, p. 90) just repeats Boulenger's (1896, p. 9) old figures for *macleayi* (viz. Midbody scale-rows 21–23; ventrals 147–152; subcaudals 38–47), though Lönnberg and Andersson (1913, p. 8) had recorded a specimen from Cairns, under the name of *polylepis*, as having 155 ventrals and 38 subcaudals. As the other supposedly differential characters are now known to be variable I propose to unite *macleayi* with *polylepis* for they do not appear to be even geographical races.

COLUBRIDAE (BOIGINAE)

Boiga fusca (Gray)

Dendrophis fusca Gray, 1842, Zoöl. Miscell., p. 54: Port Essington, Northern Territory.

Dipsas boydii Macleay, 1884, Proc. Linn. Soc. N. S. W., **9**, p. 548: Ripple Creek, Ingham, northern Queensland.

Dipsas ornata Macleay, 1888, Proc. Linn. Soc. N. S. W. (2), **3**, p. 416: King George's Sound, north Western Australia.

1 (M. C. Z. 7800) Queensland (H. A. Ward) 1910.

1 (M. C. Z. 35068) Lake Barrine, Q. (P. J. Darlington) 1932.

Midbody scale-rows 19–21; ventrals 238–255; anal 1; subcaudals 97–100; labials 8–9, 3rd, 4th and 5th or 4th, 5th and 6th entering the orbit. Larger snake (No. 7800) measures 1485 (1190+295) mm.

Kinghorn (1929, p. 84) has synonymised *ornata* with *fusca* and states that the type has 19 midbody scale-rows, not 15 as appeared in the original description.

COLUBRIDAE (ELAPINAE)

Glyphodon tristis Günther

Glyphodon tristis Günther, 1858, Cat. Snakes Brit. Mus., p. 211: northeast Australia.

Denisonia fenestrata De Vis, 1905, Ann. Queensl. Mus., No. 6, p. 50: Queensland.

Glyphodon tristis Barbour, 1914, Proc. Biol. Soc. Washington, **27**, p. 203.

3 (M. C. Z. 9499–9501) Mer Id., T. S. (H. L. Clark) 1914.

1 (M. C. Z. 10155) Murray Is., T. S. (Australian Mus.) 1914.

Midbody scale-rows 17; ventrals 168–173; anals 2; subcaudals 46–47, paired except anterior three of No. 10155. Largest snake (No. 10155) measures 921 (790+131) mm.

Longman (1912, p. 23) has shown that *fenestrata* should be referred to the synonymy of this species.

Pseudelaps squamulosus Duméril & Bibron

Pseudelaps squamulosus Duméril & Bibron, 1854, Erpét. Gén., **7**, p. 1235: Type locality uncertain.

Pseudelaps fordei Krefft, 1869, Proc. Zoöl. Soc. London, p. 318, fig: Ipswich, Queensland.

1 (M. C. Z. 10280) Clarence R., N. S. W. (Australian Mus.) 1914.

1 (M. C. Z. 35073) Cascade, Dorrigo, N. S. W. (P. J. Darlington) 1932.

Midbody scale-rows 15; ventrals 172–177; anals 2; subcaudals 36–43, paired; temporals 1+2; nasal divided. Larger snake (No. 10280) measures 575 (500+75) mm.

Pseudelaps harriettae (Krefft)

Cacophis harriettae Krefft, 1869, Proc. Zoöl. Soc. London, p. 319, fig: Warro, Port Curtis, Queensland.

1 (M. C. Z. 5227) Australia (H. A. Ward) 1884.

1 (M. C. Z. 10243) Blackall Range, Q. (Australian Mus.) 1914.

1 (M. C. Z. 10541) Brisbane, Q. (Queensland Mus.) 1914.

Midbody scale-rows 15; ventrals 171–183; anals 2; subcaudals 26–34, paired. Despite its low ventral count, the Brisbane snake is undoubtedly *harriettae*. Largest snake (No. 10541) measures 398 (350+48) mm.

Longman (1918, p. 40) has published some interesting notes on the habits and variation of this species.

Pseudelaps diadema (Schlegel)

Calamaria diadema Schlegel, 1837, Phys, Serp., **2**, p. 32: Australia.

Pseudelaps diadema Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 12.

1 (M. C. Z. 6309) Sydney, N. S. W. (Australian Mus.) 1890.

1 (M. C. Z. 6489) Cooktown, Q. (E. A. Olive) 1896.

1 (M. C. Z. 35074) Coen, Q. (P. J. Darlington) 1932.

1 (M. C. Z. 35075) Nr. Mundubbera, Q. (J. Parker) 1932.

Midbody scale-rows 15; ventrals 170–176; anals 2; subcaudals 43–58, paired. Largest snake (No. 35074) measures 452 (360+92) mm.

Fry (1915, p. 92) has suggested that the records of this species from northern and western Australia may include examples of *christieanus* which closely resembles *diadema*.

Pseudelaps christieanus Fry

Pseudelaps christieanus Fry, 1915, Proc. Roy. Soc. Queensl., **27**, p. 91, fig. 6: Port Darwin, Northern Territory.

1 (M. C. Z. 29790) Near Darwin, N. T. (H. L. Clark) 1929.

Midbody scale-rows 17; ventrals 170; anals 2; subcaudals 56. Total length 326 (260+66) mm.

Kinghorn (1926, p. 65) has drawn attention to Tate Regan having entered this species in the Zoölogical Record for 1915 as *P.* (*i.e. Pseudechis*) *christieanus*, unfortunately, however, both then and later (1929, p. 127) Kinghorn omits the second "i" in the specific name; the author's original spelling is given above.

Though in a footnote Fry suggested that the tail of the type might be incomplete with 38 subcaudals, the suggestion is omitted by Kinghorn. In this connection I might remark that I have examined the type of *Pseudelaps muelleri insulae* Barbour from Djamna islet which was said to differ from the typical New Guinea snake in its shorter tail, fewer subcaudals and different coloring. The tail of the type has been truncated in life and healed over; the snake is a rather melanistic example but some of the underlying markings can be detected. As similar dark specimens are known to occur on the mainland I consider *insulae* to be a synonym of *muelleri* (Schlegel).

Kinghorn (1929, p. 127) states that only two examples of *christieanus* are known, our topotype is therefore the third and it should be observed that it has 56 subcaudals, paired.

Demansia psammophis psammophis (Schlegel)

Elaps psammophis Schlegel, 1837, Phys. Serp., **2**, p. 455: Australia.

Diemenia maculiceps Boettger, 1898, Katal. Rept. Mus. Senckenb., **2**, p. 116: Burnett River, Queensland.

2 (M. C. Z. 2516–7) New South Wales (Australian Mus.)1870.

2 (M. C. Z. 3100, 20172) Australia (C. L. Salmin) 1864

1 (M. C. Z. 10260) Clarence River, N. S. W. (Australian Mus.) 1914.

Midbody scale-rows 15; ventrals 174–183; anals 2; subcaudals 75–79, paired; No. 2516 is aberrant with 7 supralabials, 3rd and 4th entering the orbit. Largest snake (No. 2516) measures 762 (582+180) mm.

Of our material all those with vague data are pale olive above and undoubtedly represent the typical form. The Clarence River snake agrees with them in possessing the circumorbital markings characterizing *psammophis* and *reticulata* according to Kinghorn's figures

(1929, pp. 136–7) but it is black above. Boettger's *maculiceps* appears to me to be an intermediate between typical *psammophis* and *olivacea*.

To judge by Boulenger's (1896, p. 322) data, there would appear to be at least three good geographical color races: In the southeast (*psammophis*), in the west and northwest (*reticulata*), in the north and northeast and New Guinea (*papuensis*). To these I propose to add a fourth by reducing *olivacea* to subspecific rank. In African snakes of the genera Psammophis and Trimerorhinus I have found that the relative width and breadth of the rostral is not always of specific importance. In practice, also, the fine distinctions used in Boulenger's key to Demansia (1896, p. 321) where he utilises the length of the prefrontals in relation to that of the internasals, break down and do not separate *psammophis*, *olivacea* and *torquata*. In our material listed above, the rostral is broader than deep (*olivacea*) and the internasals more than half the length of the prefrontals (*psammophis* or *torquata*). Kinghorn's (1932, p. 356) recent records of *torquata* from southwestern Queensland makes one wonder if *torquata* is anything more than a color mutant of *psammophis*.

Kinghorn (1929, pp. 136–7) gives the ranges of *psammophis* and of *reticulata* as "Known from almost all over Australia, and parts of New Guinea" and "Probably all over Australia" but these are generalizations in a popular handbook. A reëxamination of all the material in Australian museums would help to clear up the status of the proposed races.

Demansia psammophis reticulata (Gray)

Lycodon reticulatus Gray, 1842, Zoöl. Miscell., p. 54: Australia.

1 (M. C. Z. 24438) Geraldton, W. A. (W. S. Brooks) 1927.

Midbody scale-rows 15; ventrals 188, the last one being divided; anals 2; subcaudals 71, paired; rostral broader than deep; internasals rather more than half the length of the prefrontals. Total length 749 (582+167) mm.

"Taken beneath a stone on February 17, 1927." (W. S. B.) A western and northwestern race extending eastwards to Alice Springs in central Australia.

Demansia psammophis olivacea (Gray)

Lycodon olivaceus Gray, 1842, Zoöl. Miscell., p. 54: northeast Australia.

Diemenia atra Macleay, 1884, Proc. Linn. Soc. N. S. W., **9**, p. 549: Ripple Creek, Ingham, northern Queensland.

1 (M. C. Z. 35076) Lankelly Creek, Q. (P. J. Darlington) 1932.

Midbody scale-rows 15; ventrals 172; anals 2; subcaudals 78; rostral as broad as deep; internasals more than half as long as the prefrontals. Total length 748 (565+183) mm.

This snake from the McIlwraith Range, Cape York, differs from typical *psammophis* and the race *reticulata* in lacking the circumorbital and transrostral markings and by possessing, though but faintly discernible, the temporal spotting as figured for *olivacea* by Kinghorn (1929, p. 131). Otherwise it is melanistic, except for the slightly paler head, light throat and posterior subcaudal region. It undoubtedly represents *atra* of Macleay (not Krefft as in Kinghorn) of which Kinghorn states that only the type is known.

Demansia modesta (Günther)

Cacophis modesta Günther, 1872, Ann. Mag. Nat. Hist., (4), **9**, p. 35, pl. iii, fig. C: Perth and northwest Australia.

Furina ramsayi Macleay, 1885, Proc. Linn. Soc. N. S. W., **10**, p. 61: Milparinka, western New South Wales.

1 (M. C. Z. 22379) Geraldton, W. A. (British Mus.) 1926.

Midbody scale-rows 17; ventrals 155; anals 2; subcaudals 51, paired. Total length 437 (360+77+) mm., tip of tail missing.

Fry (1914, p. 192) has reëxamined the types of *ramsayi* and points out numerous discrepancies in Macleay's description. He confirms Boulenger's action in synonymising *ramsayi* with *modesta*.

Demansia textilis textilis (Duméril & Bibron)

Furina textilis Duméril & Bibron, 1854, Erpét. Gén., **7**, p. 1242: Australia.

Pseudechis cupreus Boulenger (part), 1896, Cat. Snakes Brit. Mus., **3**, p. 329: Murray River, Australia.

1 (M. C. Z. 6306) Sydney, N. S. W. (Australian Mus.) 1914.

1 (M. C. Z. 6307) Richmond, N. S. W. (Australian Mus.) 1914.

1 (M. C. Z. 6308) Germanton, N. S. W. (Australian Mus.) 1914.

1 (M. C. Z. 35089) The Coorong, S. A. (W. E. Schevill) 1932.

Midbody scale-rows 17; ventrals 198–212; anals 2; subcaudals 63–66, paired, except in the Coorong snake which has the anterior six single; middle portion of frontal narrower than a supraocular; portion of rostral visible from above less than two-thirds its distance from the frontal. The three New South Wales specimens are very young, the first two listed exhibit transverse barring. The largest (No. 35089) which is uniformly dark brown above, below each scale edged with brown and usually mottled with grey, measures 1547 (1326+221) mm.

Considerable confusion has resulted from the earlier determinations of this snake and its immediate allies. The relationships of the confused forms are outlined in the following key, which should be tested by larger series than are at my disposal. In view of Thomson's (1930, p. 128) findings as to the wide range of variation in frontal width in *Pseudechis australis*, including *Pseudechis cupreus* Boulenger (part), it seems probable that this character will prove of little value in Demansia also. It is doubtful if *D. t. inframacula* Waite is worthy of recognition; as might be expected, our Coorong snake is intermediate between *textilis* and *inframacula* in belly coloring. Undoubtedly the key will require amending when tested by more material; care should be taken, however, to avoid inclusion of related species such as *carinata* (Longman) and *guttata* Parker, both of Queensland.

I regard *D. t. affinis* as the parent form which has given off *nuchalis* in the northwest and Northern Territory, *inframacula* on Coffin's Bay Peninsula, and *textilis* in the southeast.

Scales in 19 rows (Western Australia from Perth southwards) ..... *D. t. affinis*
Scales in 17 rows ..... 1.

1. Frontal narrower than a supraocular (New South Wales and South Australia; adjacent regions) ..... *D. t. textilis*
   Frontal broader than a supraocular ..... 2.
2. Frontal almost straight-sided; belly grey, each ventral scute with a pair of black blotches (Coffin's Bay Peninsula, South Australia) ... *D. t. inframacula*
   Frontal distinctly bell-shaped; belly yellow, immaculate, or with reddish-brown spots fading out in the adult. (North Western Australia and Northern Territory) ..... *D. t. nuchalis*

The foregoing conclusions were reached before reading Fry's (1914, pp. 190–6) views on this group. Though he treats the forms as full species we have arrived at much the same conclusions as to distribution. Regarding *nuchalis*, however, he has been led astray by accepting records such as that of Werner (1909, p. 257) for Rottnest Island, whereas I hazard a guess that Werner used *nuchalis* in the earlier sense and what he had was really *affinis*. Fry treats *Pseudelaps bancrofti* De Vis as a synonym of *nuchalis* which, if corrrect, would extend the range as defined above. I think, however, that the status of *bancrofti* and a number of other names should all be reconsidered carefully in the light of modern views of geographical races.

Demansia textilis nuchalis (Günther)

Pseudonaja nuchalis Günther, 1858, Cat. Snakes Brit. Mus., p. 227: Port Essington, Northern Territory.

Diemenia ingrami Boulenger, 1908, Ann. Mag. Nat. Hist., (8), **1**, p. 334: Alexandra, Northern Territory.

1 (M. C. Z. 29789) Broome, W. A. (H. L. Clark) 1929.
1 (M. C. Z. 35077) Port Darwin, N. T. (H. L. Clark) 1932.
1 (M. C. Z. 35078) Hermannsburg, N. T. (W. E. Schevill) 1932.

Midbody scale-rows 17; ventrals 189–213; anals 2; subcaudals 55–60; the labials on the right side of No. 35077 are aberrant, being 7, the 3rd, 4th and 5th entering the orbit. Largest snake (No. 35078) measures 1198 (1017+181) mm.

As indicated above, Boulenger (1896, p. 326) confounded *nuchalis* and *affinis*. Later (1908, *loc. cit.*) he described *ingrami*, stating that the diameter of the eye was equal to one-third the length of the snout. This is an age character, being a third in our large Hermannsburg snake, half in the half-grown Port Darwin reptile, and once and a half in the juvenile specimen from Broome. The portion of the rostral visible from above is equal, or slightly longer (No. 35077) than, its distance from the frontal (not "about one half"). Frontals are broader than the supraoculars (not "equal to") and their sides almost straight, being but slightly bell-shaped; nasal barely, or broadly, in contact with the preocular (not "separated from"); fifth supralabial broadly (in young) or narrowly (in largest) separated from the parietal. Despite these differences I feel reasonably sure that our three snakes represent the same race as Boulenger's holotype of *ingrami* which was a very old snake measuring 1510 (1270+240) mm.

Kinghorn (1929, p. 129) in writing of the distribution of *nuchalis*, states that he has "a somewhat doubtful record from Port Essington (Q.)" Apart from Port Essington not being in Queensland, this is strange, for Port Essington is the type locality of *nuchalis*.

Demansia textilis affinis (Günther)

Pseudonaja affinis Günther, 1872, Ann. Mag. Nat. Hist., (4), **9**, p. 35, pl. iv, fig. C: Australia.

1 (M. C. Z. 10281) Perth, A. W. (Australian Mus.) 1914.
2 (M. C. Z. 24444–5) Perth, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 32814) Rottnest Id., W. A. (P. J. Darlington) 1931.

Midbody scale-rows 19; ventrals 214–215; anals 2; subcaudals 56–62; portion of rostral visible from above is equal to (Nos. 10281,

24445) or only two-thirds (Nos. 24444, 32814) its distance from the frontal. Largest snake (No. 32814) measures 1160 (1000+160) mm.

Boulenger (1896, p. 326) confused *affinis* with *nuchalis*. Fry (1914, p. 193) followed by Kinghorn (1929, p. 133) revived *affinis* as a full species, a course which is probably the correct one for it differs from *textilis* and the other races in its more numerous midbody scale-rows and more numerous ventrals. It has, however, been confused with *nuchalis* so often that for the present I prefer to treat it as a race. Both Fry and Kinghorn give its number of midbody scale-rows as from 17 to 21, obtaining the former number from Boulenger and the latter from Lucas and Frost's (1896, p. 148) record of a snake from Reedy Creek, George Gill Range, Northern Territory. I suggest that a reëxamination of this snake will reveal it to be another species, possibly *guttata* Parker which has 21 midbody scale-rows.

Pseudechis australis (Gray)

Naja australis Gray, 1842, Zoöl. Miscell., p. 55: northeast Australia.

Pseudechis cupreus Boulenger (part), 1896, Cat. Snakes Brit. Mus., **3**, p. 329: Murray River, Australia. (Krefft's specimen).

Pseudechis australis Loveridge, 1927, Bull. Antivenin Inst. Amer., **1**, p. 58.

1 (M. C. Z. 7099) Australia (T. Barbour don.) 1903.

1 (M. C. Z. 35086) Jones Valley, Q. (W. E. Schevill) 1932.

1 (M. C. Z. 35087) Templeton River, Q. (W. E. Schevill) 1932.

1 (M. C. Z. 35088) Coen, Q. (P. J. Darlington) 1932.

Jones Valley is N.W. of Hughenden; Templeton R. between Mt. Isa and Camooweal.

Midbody scale-rows 17; ventrals 198–208; anals 2; subcaudals 57–67, partly single, partly paired. In this connection I might remark that I have very carefully reëxamined the snake from Merauke, New Guinea (MC.Z. 22811) which has all except the last subcaudal single (*loc. cit. supra*) and am satisfied with its identification. All five snakes are uniformly yellowish beneath. Largest snake (No. 35086) measures 1716 (1470+246) mm. Waite (1915, p. 737) mentions an example of 1640 mm., which he thinks may be the largest recorded; it is surpassed by one from Stewart River, Queensland, recorded by Thomson (1930, p. 128), which measured 2039 mm.

I am deeply indebted to Mr. J. R. Kinghorn for drawing my attention to Thomson's important paper in which that author synonymises *P. darwiniensis* with *australis*. Thomson (1930, p. 153) also shows that *cupreus* was based on McCoy's colored plate of a Demansia, plus Krefft's description of two snakes from the Murray River and Port

Denison which were undoubtedly *P. australis*. Thus *cupreus* Boulenger is a composite and may be dropped from the Australian list. The snake from the Coorong, now referred to *Demansia t. textilis*, agreed so well with McCoy's figure and description that I confess to having referred it to *cupreus* before reading Thomson's paper and examining its teeth.

In the above series the rostral is slightly (No. 35086) or considerably broader than long; the internasals measured along the median suture, are less than half, or exactly half (Nos. 35086, 35088) the length of the prefrontals; the frontal is from once and a half (Nos. 35086, 35088) to twice (Nos. 7099, 35087) as broad as long, and either barely broader than (No. 35087), broader than (Nos. 7099, 22811[1]) or much broader than (Nos. 35086, 35088) the supraocular. It will be seen that the Jones Valley and Coen snakes vary in the direction of *darwiniensis*, but Thomson has showed wide variation in frontal width not only in his series from Coen but in three specimens supposedly from the type locality—Port Darwin. The temporals may be 1+1 or 1+2 on different sides of the head in the same snake.

Eradu, type locality of *Pseudechis denisonioides* Werner, is near Geraldton, so that it is hardly correct to say "Restricted to Southwestern Australia" (Kinghorn, 1929, p. 161). Glauert (1928, p. 74) has recorded it from Dorre Island, about 300 miles north of Eradu. Whether this second specimen had an entire anal like the type is not stated, nor am I certain whether an entire anal in such a genus as Pseudechis is of diagnostic value as a specific character. A critical study of all Western Australian "*australis*" might show that the name *denisonioides* could be applied in a wider sense. Unfortunately Fry (1914, p. 197) did not give the locality of the western snake with a divided anal whose scale counts agreed with those of *denisonioides*.

Mr. Glauert, to whom the preceding paragraph was submitted, writes me (May 19, 1933) as follows: "When I checked recently a specimen from Dorre Island which was regarded as *denisonioides* in my list of Western Australian reptiles on a determination made when the Reptilia were not under my control, I found that the snake had a divided anal and that in other respects it was within the variation of the series of *australis* in the collection. I agree with Donald F. Thomson who, (1930, p. 133) maintains that *P. darwiniensis* and *P. cupreus* are synonyms of *P. australis*. To these I would add *P. denisonioides* which I think was described from an abnormal specimen of *P. australis*.

"Concerning *Pseudechis australis*, of which we possess fifteen specimens ranging from the Kimberley district in the north to the country

[1]From Merauke, New Guinea.

around Perth, I find that the individuals collected in that part of the state known as the South-west Division resemble one another fairly closely. The tail is rather long and their ventrals less numerous, ranging between 189 and 198; the anals are all divided; the subcaudals, which range from 51 to 58, have from 32 to 41 undivided scales followed by from 15 to 25 divided ones, the tail ending as usual in a small undivided scale. In spite of all that may have been written concerning the rarity of this snake it is one of the commonest in the vicinity of Perth. On the sandhill country towards the coast according to my experience it outnumbers the so-called Brown Snake (*Demansia nuchalis*) of which we consider *D. affinis* to be a variety."

Of the Templeton River snake, taken in August, fifteen miles west of Mount Isa, Mr. W. E. Schevill has made the following note: "This snake came out of a hole among the roots of a large gum on the bank where de Teliga was skinning birds. It was evidently lying by his foot when he moved it and the snake struck. The fangs penetrated his trousers, but did not reach the skin, although venom was spilled upon it."

Pseudechis porphyriacus (Shaw)

Coluber porphyriacus Shaw, 1794, Zoöl. New Holland, p. 27, pl. x: Australia.

1 (M. C. Z. 2215) Sydney, N. S. W. (W. Keferstein) 1865.
1 (M. C. Z. 3106) Melbourne, V. (C. L. Salmin) 1864.
1 (M. C. Z. 10715) New South Wales (T. Barbour don.) 1903.
1 (M. C. Z. 35079) Blackheath, N. S. W. (P. J. Darlington) 1932.
1 (M. C. Z. 35080) Dorrigo, N. S. W. (W. Heron) 1932.
1 (M. C. Z. 35081) Bunya Mountains, Q. (W. E. Schevill) 1932.
1 (M. C. Z. 35082) Lake Barrine, Q. (P. J. Darlington) 1932.
1 (M. C. Z. 35083) Millaa Millaa, Q. (P. J. Darlington) 1932.
2 (M. C. Z. 35084–5) Mt. Spurgeon, Q. (P. J. Darlington) 1932.

Midbody scale-rows 17; ventrals 176–193; anals 2; subcaudals 51–56, partly single, partly paired; length of the frontal is *equal to* (Nos. 35080–1), longer than, or much longer than (Nos. 35082, 35085) its distance from the rostral. Though the last to be collected, the most northerly Red-bellied Black Snakes (Nos. 35082–5) comprising both very young and adults, are without, or with but a faint tinge of, the red which is so characteristic of the southern examples. Largest snake (No. 35084) measures 1589 (1395+194) mm.

"The largest black snake that I got at Millaa Millaa showed a remarkable defensive habit. I caught it in the evening twilight under a log, recently felled, in 'scrub' country. I dragged it out and put my foot upon its neck. The next moment it was striking viciously at my

foot with what certainly looked like its head, each stroke landing with a thump. I nearly let the reptile go to avoid being bitten, but on looking more closely I saw that it was striking with its tail which it had looped tightly near the end to simulate a head. There was a single loop, not a knot. A minute later, after I had got my light on it, the snake struck repeatedly in the same way so that I am sure that the action was deliberate." (P. J. D.)

Denisonia superba (Günther)

Hoplocephalus superbus Günther (part), 1858, Cat. Snakes Brit. Mus., p. 217: Australia and Tasmania.

1 (M. C. Z. 919) Hobart, T. (J. W. Robertson) 1861.
1 (M. C. Z. 5238) Victoria (H. A. Ward) 1884.
1 (M. C. Z. 10283) Moss Vale, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 13291) Boggabri, N. S. W. (W. F. H. Rosenberg) 1918.
1 (M. C. Z. 32823) Mill Grove, V. (Harvard Exped.) 1931.
2 (M. C. Z. 32824–5) Mt. Kosciusko, N. S. W. (W. E. Schevill) 1931.

Midbody scale-rows 15; ventrals 148–158; anal 1; subcaudals 40–48, single; frontal once and three-quarters to twice and an eighth as broad as long. Largest snake (No. 32824) measures 793 (670+123) mm.

Number 919 has long been in the collection as *coronoides* while No. 13291 was received from Rosenberg as *gouldii*.

Denisonia coronata (Schlegel)

Elaps coronatus Schlegel, 1837, Phys. Serp., **2**, p. 454: Australia.

1 (M. C. Z. 22385) Western Australia (British Mus.) 1926.
4 (M. C. Z. 24428–31) Nr. Denmark, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 24432) Mt. Melville, W. A. (W. S. Brooks) 1927.
3 (M. C. Z. 24433–5) Augusta, W. A. (W. S. Brooks) 1927.
2 (M. C. Z. 24436–7) Pemberton, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 32820) Pemberton, W. A. (P. J. Darlington) 1931.

Midbody scale-rows 15; ventrals 133–146; anal 1; subcaudals 40–49, single; frontal once and two-thirds to two and a quarter times as broad as long so this character cannot be utilized to differentiate this species from *superba* as employed by Boulenger (1896, p. 333). Largest snake (No. 22385) measures 507 (426+81) mm.

Numbers 24428–9 are gravid females with embryos present in the ova. They were "taken together beneath a log near Denmark River, south of Denmark on 21.i.1927." (W. S. B.)

Denisonia coronoides (Günther)

Hoplocephalus coronoides Günther, 1858, Cat. Snakes Brit. Mus., p. 215: Tasmania, and Swan River, Western Australia.

Pseudelaps minutus Fry, 1915, Proc. Roy. Soc. Queensl., **27**, p. 93, fig. 7: Wilde's Meadow, near Moss Vale; Colo Vale; Tamworth or Guntawang; all in New South Wales.

1 (M. C. Z. 5239) Victoria (H. A. Ward) 1884.

4 (M. C. Z. 32815–8) Below Dead Horse Pass, N. S. W. (P. J. Darlington) 1931.

Dead Horse Pass is near the summit of Mt. Kosciusko.

Midbody scale-rows 15; ventrals 132–142; anal 1; subcaudals 48–55, single; No. 32815 is abnormal in that the lower temporal borders the lip on the right side making 7 supralabials on the right, the left side remaining normal; frontal two and a third to two and a quarter times as broad as long. Longest snake (No. 5239) measures 416 (335+81) mm.

Denisonia signata (Jan)

Alecto signata Jan, 1859, Rev. & Mag. Zoöl., p. 128: Australia.

Denisonia signata var. *vagrans* Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 13: Dunk Island, Queensland.

11 (M. C. Z. 2242) Melbourne, V. (C. L. Salmin) 1869.

1 (M. C. Z. 2528) New South Wales (G. Krefft) 1870.

Type (M. C. Z. 6490) Dunk Island, Q. (W. M. Woodworth) 1896.

1 (M. C. Z. 10258) Warrell Creek, N. S. W. (Australian Mus.) 1914.

Midbody scale-rows 17; ventrals 151–167; anals 2; subcaudals 47–55, single; frontal from one and two-thirds to two and an eighth times as broad as long. Largest snake (No. 10258) measures 469 (385+84) mm.

Number 6490 is the holotype of *vagrans* which Garman proposed to separate from *signata* because its frontal is one and a half times the width of a supraocular, the fifth supralabial being longer than the sixth, and because "*D. signata* has a darker color in the middle of the ventral surface which is not seen in the present type." With regard to this alleged color difference, Garman's snake was apparently about to slough, hence the opaque olivaceous coloring of the ventrals; if a few scutes be removed, the underlying ones in no way differ from many of those in the Melbourne series. It is true that Boulenger states (1896, p. 338) of the frontal "but slightly broader than the supraocular" while Garman's type has a frontal one and a half times as broad.

However, in the Melbourne series alone are snakes representing both these extremes. There remains then the character of the fifth supralabial which in *signata* is usually slightly shorter than the sixth but varies from much shorter than, to others in which it equals, the sixth; the fact of its being slightly longer in *ragrans* does not seem to me to be sufficient grounds on which to recognize a local race.

Denisonia suta (Peters)

Hoplocephalus sutus Peters, 1863, Monatsb. Akad. Wiss. Berlin, p. 234: Adelaide, South Australia.

Hoplocephalus frenatus Peters, 1870, Monatsb. Akad. Wiss. Berlin, p. 646: Lake Elphinstone, Queensland.

Hoplocephalus frontalis Ogilby, 1889, Proc. Linn. Soc. N. S. W., (2), **4**, p. 1027: Narrabri, New South Wales.

Hoplocephalus stirlingi Lucas & Frost, 1896, Report Horn Sci. Exped., **2**, p. 149, pl. xii, fig. 5: Oodnadatta, S. A.; Charlotte Waters, Alice Springs, Hermannsburg, Northern Territory.

Denisonia frontalis var. *proprinqua* De Vis, 1905, Ann. Queensl. Mus., No. 6, p. 51: Queensland.

Denisonia forresti Boulenger, 1906, Ann. Mag. Nat. Hist., (7), **18**, p. 440: Alexandria, Northern Territory.

1 (M. C. Z. 10268) Gidley, N. S. W. (Australian Mus.) 1914.

Midbody scale-rows 19; ventrals 154; anal 1; subcaudals 33, single; frontal one and a quarter times as long as broad. Total length 410 (365+55) mm.

Longman (1912, p. 23) has recorded *forresti* from Careena Station, Queensland. Kinghorn (1920, p. 110 and 1929, p. 84) in two most interesting papers adds *forresti*, as well as the four other names enumerated above, to the synonymy of *suta*. It seems just possible that *forresti* might be retained as a northern race characterized by a higher number of ventrals; *stirlingi* consisted of intermediates. Southern with 154–164, northern 168–178. Seeing that *gouldii* has a greater range it seems likely that this apparent difference is attributable to the inadequacy of material in the case of *suta*.

Denisonia flagellum (McCoy)

Hoplocephalus flagellum McCoy, 1878 (Decem. 2), Prodr. Zoöl. Viet., p. 7, pl. xi, fig. 1: Victoria.

1 (M. C. Z. 32822) Mt. Lofty, S. A. (W. M. Wheeler) 1931.

Midbody scale-rows 17; ventrals 132; anal 1; subcaudals 35, single. So recently as 1929, Kinghorn (1929, p. 188) gives the subcaudal

count as 25–27 as quoted by Boulenger (1896, p. 340) who had no specimen. Further, Kinghorn states that this species is apparently restricted to southern Victoria, so that the example taken at 1,000 feet by Dr. Wheeler provides an interesting extension of range. Total length 333 (280+53) mm.

Denisonia maculata (Steindachner)

Hoplocephalus maculatus Steindachner, 1867, Reise Oesterr. Freg. Novara. Reptiles, p. 81: New South Wales.

Denisonia ornata Krefft, 1869, Proc. Zoöl. Soc. London, p. 321, fig.: Rockhampton, Queensland.

Hoplocephalus ornatus De Vis, 1884, Proc. Roy. Soc. Queensl., **1**, p. 100, pl. xv: Near Surat, Queensland.

Denisonia maculata var. *devisi* Waite & Longman, 1920, Rec. S. Austral. Mus., **1**, p. 177, fig. (New name for *ornatus* De Vis).

1 (M. C. Z. 10255) Tamworth, N. S. W. (Australian Mus.) 1914.

Midbody scale-rows 17; ventrals 136; anal 1; subcaudals 25, single. Total length 297 (263+34) mm.

In coloration this snake agrees with the color variant *devisi* rather than with *maculata* as figured by Kinghorn (1929, p. 171). When renaming it Waite and Longman (1920, p. 178) believed it to be confined to Western Queensland. Kinghorn (1921, p. 147) upholds the race because his only specimen of *maculata* had four teeth following the fang while his big series of *devisi* had five. His extension of the range of *maculata* and *devisi* (1929, pp. 171–2) does not lend support to the view that *devisi* can be recognized as a geographical race.

Denisonia fasciata Rosén

Denisonia fasciata Rosén, 1905, Ann. Mag. Nat. Hist., (7), **15**, p. 179: West Australia.

1 (M. C. Z. 32819) Perth, W. A. (P. J. Darlington) 1931.

Midbody scale-rows 17; ventrals 159; anal 1; subcaudals 30, single. Total length 782 (695+87) mm.

Kinghorn (1929, p. 173) apparently without material, has treated this big snake as a variety of *maculata*. Though falling next to that species in Boulenger's (1896, p. 333) key, as indicated by its author, it is a perfectly distinct species, differing in many ways of which I need only mention:

Ventrals 121–140; subcaudals 20–37 ..... *D. maculata*
Ventrals 153–165; subcaudals 28–31 ..... *D. fasciata*

Though the type locality is given as "West Australia," Kinghorn says: "Found only in south-western Australia."

Denisonia gouldii (Gray)

Elaps gouldii Gray, 1841, in Grey's Journ. Exped. West. Australia, **2**, p. 444, pl. v, fig. 1: Western Australia.

Hoplocephalus nigriceps Günther, 1863, Ann. Mag. Nat. Hist., (3), **12**, p. 362: No locality.

Hoplocephalus spectabilis Krefft, 1869, Snakes Australia, p. 68, pl. xii, fig. 7: Port Lincoln, South Australia.

1 (M. C. Z. 3666) Melbourne, V. (F. Müller) 1865.
1 (M. C. Z. 10233) Manila, Namoi R., N. S. W. (Australian Mus.) 1914.
3 (M. C. Z. 24439–41) Perth, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 24442) Mundaring, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 24443) Yalgoo, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 32821) Mullewa, W. A. (W. E. Schevill) 1931.
1 (M. C. Z. 35090) Dalby, Q. (Mrs. H. McKee) 1932.

This last record from Dalby, southeastern Queensland, being the first record of the occurrence of *gouldii* in that state, should be received with caution. The snake was given by Mrs. H. McKee of Dalby to a member of the Harvard Expedition and was believed to have been taken locally by the donor.

Midbody scale-rows 15; ventrals 143–177; anal 1; subcaudals 22–35, single; frontal one and a quarter to one and a half times as long as broad. Largest snake (No. 24443) measures 472 (413+59) mm.

Denisonia pallidiceps (Günther)

Hoplocephalus pallidiceps Günther, 1858, Cat. Snakes Brit. Mus., p. 214: Port Essington, Northern Territory and Northeast Australia.

Hoplocephalus nigrescens Günther, 1862, Ann. Mag. Nat. Hist., (3), **9**, p. 131, pl. ix, fig. 12: Sydney, New South Wales.

Alecto permixta Jan, 1873, Icon. Gén., **44**, pl. i, fig. 2: Australia.

Hoplocephalus assimilis Macleay, 1885, Proc. Linn. Soc. N. S. W., p. 68: Herbert River, Queensland.

1 (M. C. Z. 6310) Sydney, N. S. W. (Australian Mus.) 1896.
2 (M. C. Z. 35091–2) Cascade, N. S. W. (P. J. Darlington) 1932.
1 (M. C. Z. 35093) Lake Barrine, Q. (P. J. Darlington) 1932.
3 (M. C. Z. 35094–6) Millaa Millaa, Q. (P. J. Darlington) 1932.

Midbody scale-rows 15; ventrals 169–193; anal 1; subcaudals 32–46, single; frontal one and an eighth to one and a quarter times as long as broad; No. 35096 is abnormal in that the lower temporal borders the lip on the right side, making 7 supralabials on the right, the left

side remaining normal. Largest snake (No. 35094) measures 755 (652+103) mm.

As a result of a careful study of the above series, I am of the opinion that *nigrescens* is a synonym of *pallidiceps*. No. 35091 has the eye noticeably shorter than its distance from the mouth and though an old male about to slough, has the olive coloring of *pallidiceps*, a species long known only from the types. Number 35092 is a juvenile and though taken at the same time as the other snake it is typically *nigrescens;* the scale counts of these two specimens are almost identical. The variability of this species is further demonstrated by No. 35096 which differs from all the rest in having the nasal separated from the preocular. The young Millaa Millaa snake is white below except for the black throat and a dusky spot in the middle of each ventral and subcaudal shield; in the half-grown reptile from the same locality the central spots are enlarged and by coalescing tend to form a median stripe; in the adult, also from Millaa Millaa, the whole lower surface is uniformly black.

Denisonia carpentariae (Macleay)

Hoplocephalus carpentariae Macleay, 1888 (1887), Proc. Linn. Soc. N. S. W., (2), **2**, p. 403: Normanton, Queensland.

1 (M. C. Z. 35097) Mundubbera, Q. (J. Kahler) 1932.

This locality may be accepted with reserve as the snake was given to Mr. J. Kahler and though he believes that it was taken locally, there remains an element of uncertainty. The species has been recorded from Peak Downs, and our example agrees in every detail with Boulenger's (1896, p. 344) redescription embracing specimens from both localities.

Midbody scale-rows 15; ventrals 168; anal 1; subcaudals 33, single; second labial in contact with the prefrontal, it is well to remember that such a condition occurs in *pallidiceps* as an aberration. Total length 417 (360+57) mm.

Hoplocephalus bitorquatus (Jan)

Alecto bitorquata Jan, 1859, Rev. et Mag. Zoöl., p. 128: Australia.

1 (M. C. Z. 2518) New South Wales (Australian Mus.) 1870.

1 (M. C. Z. 6311) Tamworth, N. S. W. (Australian Mus.) 1890.

1 (M. C. Z. 10230) Manila, N. S. W. (Australian Mus.) 1914.

2 (M. C. Z. 35098–9) Mundubbera, Q. (J. Kahler) 1932.

Midbody scale-rows 21; ventrals 202–216; anal 1; subcaudals 46–

52; single, occasionally a few divided. Largest snake (No. 2518) measures 593 (520+73) mm.

Numbers 2518 and 6311 were received from Dr. G. Krefft as *Denisonia pallidiceps* (Günther), then included in the genus Hoplocephalus.

Hoplocephalus bungaroides (Boie)

Naja bungaroides Boie, 1828, Oken's Isis, p. 1034: no locality.

1 (M. C. Z. 2525) New South Wales (Australian Mus.) 1876.
1 (M. C. Z. 3642) Australia (W. Keferstein) 1865.
1 (M. C. Z. 10282) Mt. Wilson, N. S. W. (Australian Mus.) 1914.

Midbody scale-rows 21; ventrals 213–217; anal single; subcaudals 45–53, last two divided in No. 2525. Largest snake (No. 3642) measures 667 (580+87) mm.

Notechis scutatus (Peters)

Naja (Hamadryas) scutata Peters, 1861, Monatsb. Akad. Wiss. Berlin, p. 690: "Java."

1 (M. C. Z. 920) Hobart Town, T. (J. W. Robertson) 1862.
1 (M. C. Z. 7867) Australia (New York Zoöl. Soc.) 1911.
1 (M. C. Z. 10275) Randwick, N. S. W. (Australian Mus.) 1914.

Midbody scale-rows 17–19; ventrals 170–172; anal 1; subcaudals 49–56, single. Largest snake (No. 10275) measures 993 (830+163) mm.

Though Kinghorn's (1921, p. 145) subspecies *niger* from Kangaroo Island, South Australia, may stand as an insular melanistic race, it is extremely doubtful whether the relative length of the anterior and posterior chin shields can be used for diagnostic purposes, for in one of our specimens the anterior chin shield is shorter than the posterior on the left side, while the right anterior is longer than the right posterior on the same reptile. In most groups of snakes the length of the chin shields is a variable character.

Rhinhoplocephalus bicolor Müller

Rhinhoplocephalus bicolor Müller, 1885, Verh. Nat. Ges. Basel, **7**, p. 690, pl. ix, figs. f-i: Australia.

1 (M. C. Z. 24449) Augusta, W. A. (W. S. Brooks) 1927.

Midbody scale-rows 15; ventrals 159; anal 1; subcaudals 28, single, this is a new low number. Total length 404 (355+49) mm. Kinghorn (1931, p. 87) has recently figured this rare snake and contributes interesting information on range of variation and diet.

Acanthophis antarcticus (Shaw)

Boa antarctica Shaw, 1794, Nat. Miscell., pl. mxxxv: no locality.
1 (M. C. Z. 10549) s. Queensland (Queensland Mus.) 1914.
1 (M. C. Z. 35100) Coen, Q. (P. J. Darlington) 1932.
1 (M. C. Z. 35101) Dalby, Q. (Mrs. H. McKee) 1932.

Midbody scale-rows 21–22; ventrals 122–127; anal 1; subcaudals 39–47; anterior single, posterior paired. Largest snake (No. 10549) measures 588 (500+88) mm.

Acanthophis pyrrhus Boulenger

Acanthophis pyrrhus Boulenger, 1898, Ann. Mag. Nat. Hist., (7), **2**, p. 75: Station Point, Northern Territory.
1 (M. C. Z. 35102) Hermannsburg, N. T. (W. E. Schevill) 1932.

Midbody scale-rows 19; ventrals 145; anal 1; subcaudals 49, anterior single, posterior paired; labials 6, separated from orbit by suboculars. Total length 199 (167+32) mm.

Waite (1915, pp. 737–9) has given a most interesting account of this pink adder.

Rhynchoelaps bertholdi (Jan)

Elaps bertholdi Jan, 1859, Rev. et Mag. Zoöl., p. 123: Australia.
1 (M. C. Z. 10220) Strelley River, W. A. (Australian Mus.) 1914.
2 (M. C. Z. 24450–1) Perth, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 24452) Yalgoo, W. A. (R. C. Richardson) 1927.
1 (M. C. Z. 32826) West Wallaby Id., W. A. (G. M. Allen) 1931.
1 (M. C. Z. 32827) 50 mi. N. W. Menzies, W. A. (W. E. Schevill) 1931.

Midbody scale-rows 15; ventrals 116–124; anals 2; subcaudals 16–24, paired; labials usually 6, though sometimes 5 (No. 24452) or 7 (No. 32826) on one side of the head, always 3rd and 4th entering the orbit. Largest snake (No. 32827) measures 232 (205+27) mm.

Of No. 32826, Mr. W. E. Schevill writes: "Found coiled beneath a stone by Dr. G. M. Allen. Though quite active it made no attempt to bite, either at time of capture or later when I handled it preparatory to preservation." (W. E. S.)

Rhynchoelaps australis (Krefft)

Simotes australis Krefft, 1864, Proc. Zoöl. Soc. London, p. 180: Port Curtis, Queensland.
1 (M. C. Z. 10226) Clarence River, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10241) Copmanhurst, N. S. W. (Australian Mus.) 1914.

Midbody scale-rows 17; ventrals 149–151; anals 2; subcaudals 16–

20, paired except for last two of No. 10241; labials 5, 3rd and 4th entering orbit. Larger snake (No. 10241) measures 272 (250+22) mm.

The striking resemblance of these little burrowing snakes to their aglyphous allies of the genus Prosymna of Africa, makes me suspect that with longer series it will be found that head shield characters are unstable in the genus Rhynchoelaps. This view is borne out by our two specimens, the frontal shield of the smaller agreeing in part with *australis* and in part with *semifasciatus* of Boulenger's (1896, p. 362) key. That of the larger being less than twice the width of the supraocular. It will be noted that both agree with *campbelli* Kinghorn (1929, p. 191) of Almaden, Queensland, in the number of labials. Kinghorn compares *campbelli* with the western *fasciolatus*, to me it appears much more closely related to *australis*. I might mention that *R. anomalus* Sternfeld (1919, p. 77) from Hermannsburg, Northern Territory is omitted from Kinghorn's (1929, p. 192) key.

Furina bimaculata Duméril & Bibron

Furina bi-maculata Duméril & Bibron, 1854, Erpét. Gén., **7**, p. 1240: "Tasmania" (*crrore*).

2 (M. C. Z. 24446–7) Perth, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 24448) Yalgoo, W. A. (W. S. Brooks) 1927.

Midbody scale-rows 15; ventrals 184–198; anals 2; subcaudals 25–26, paired; labials 5, 3rd and 4th entering the orbit; preocular in contact with the nasal. Largest snake (No. 24446) measures 366 (346+20) mm.

Though the type was supposed to have come from Tasmania, subsequent material is only known from Western Australia. Fry (1914, p. 197) refers to it as a very rare species, mentions that there are two examples in the Western Australian Museum, and figures the head of one.

Furina annulata (Gray)

Calamaria annulata Gray, 1841, in Grey's Journ. Exped. West. Australia, **2**, p. 443: Australia.

Elaps occipitalis Duméril & Bibron, 1854, Erpét. Gén., **7**, p. 1220: Australia.

1 (M. C. Z. 6312) Sydney, N. S. W. (Australian Mus.) 1890.
1 (M. C. Z. 6313) Paramatta, N. S. W. (Australian Mus.) 1890.
1 (M. C. Z. 8065) Bundara, N. S. W. (W. F. H. Rosenberg) 1911.
1 (M. C. Z. 10547) Brisbane, Q. (Queensland Mus.) 1914.
1 (M. C. Z. 35103) Brisbane, Q. (Queensland Mus.) 1932.
1 (M. C. Z. 35104) Mundubbera, Q. (J. Parker) 1932.
1 (M. C. Z. 35105) Ayr, Q. (W. Charles) 1932.

Midbody scale-rows 15; ventrals 201–238; anals 2; subcaudals 17–25, paired; labials 6, 3rd and 4th entering the orbit; black annuli on body and tail 27–58. Largest snake (No. 8065) measures 462 (439+23) mm.

Longman (1918, p. 42) has pointed out the priority of Gray's name which had escaped Boulenger's (1896, p. 407) notice. Kinghorn (1929, p. 196) is in error in attributing *annulata* to Duméril & Bibron.

HYDROPHIIDAE

The Museum of Comparative Zoölogy possesses examples of all the sea snakes of the world excepting seven species. Five of these occur in Australian Seas and are earnestly desired; they are:

Aipysurus tenuis Lönnberg & Andersson, 1913, Broom, W. A.
Ephalophis greyi Malcolm Smith, 1931, Cape Boileau, W. A.
Hydrelaps darwiniensis Boulenger, 1896, Port Darwin, N. T.
Hydrophis mertoni (Roux), 1910, Sungei Waskai, Aru Islands.
Hydrophis belcheri (Gray), 1849, New Guinea.

Three other species from Oceania are unrepresented by Australian examples, though the Museum possesses series of them from other regions.

As Dr. Malcolm A. Smith utilized our material in connection with his recent (1926) Monograph of the Sea-Snakes, no useful purpose would be served in reprinting the data concerning them. A simple list of the material in this group from the Australian region is therefore given. The major portion of the collection of sea snakes was presented to the Museum by Dr. Thomas Barbour.

Laticauda laticaudata (Linnaeus)

Coluber laticaudatus Linnaeus (part), 1778, Syst. Nat., ed. 10, **1**, p. 222: Indies.
1 (M. C. Z. 921) Melbourne Harbour, V. (F. Müller) 1862.
1 (M. C. Z. 23793) Geelvink Bay, N. G. (M. A. Smith) 1927.

Laticauda colubrina (Schneider)

Hydrus colubrinus Schneider, 1799, Hist. Amphib., **1**, p. 238: Type locality unknown.
1 (M. C. Z. 10546) British New Guinea (Queensland Mus.) 1914.
1 (M. C. Z. 23788) Queensland (M. A. Smith) 1927.

Laticauda schistorhynchus (Günther)

Platurus schistorhynchus Günther, 1874, Proc. Zoöl. Soc. London, p. 297, pl. xlv: Savage Island, South Pacific.
1 (M. C. Z. 25137) Savage Island (H. C. Kellers) 1927.

Aipysurus eydouxii (Gray)

Tomogaster eydouxii Gray, 1849, Cat. Snakes Brit. Mus., p. 59: Indian Ocean.
1 (M. C. Z. 29786) Roebuck Bay, W. A. (H. L. Clark) 1930.

Aipysurus fuscus (Tschudi)

Stephanohydra fusca Tschudi, 1837, Arch. für Naturg. Berlin, p. 335, pl. viii: Ashmore Reefs, Timor Sea.
9 (M. C. Z. 23481–9) Ashmore Reefs, Timor Sea (M. A. Smith) 1927.

Aipysurus laevis Lacépède

Aipysurus laevis Lacépède, 1804, Ann. Mus. Hist. Nat. Paris, **4**, pp. 197, 210, pl. lvi, fig. 3: Australia.
1 (M. C. Z. 23498) Queensland (M. A. Smith) 1927.
1 (M. C. Z. 35069) Broome, W. A. (H. L. Clark) 1932.

The Broome specimen has: Midbody scale-rows 23; ventrals 148; anals 2; subcaudals 30; labials 9, the 4th only on the right, the 4th, 5th and 6th on the left entering the orbit. Total length 1205 (1047+158) mm. The creature is encrusted with small barnacles.

Aipysurus duboisii Bavay

Aipysurus duboisii Bavay, 1869, Mem. Soc. Linn. Normandie, No. 5, p. 33: New Caledonia.
2 (M. C. Z. 23475–6) Ashmore Reefs, Timor Sea (M. A. Smith) 1927.

Aipysurus foliosquama Malcolm Smith

Aipysurus foliosquama Malcolm Smith, 1926, Monog. Sea-Snakes, p. 22, figs. 11 and 12: Ashmore Reefs, Timor Sea.
6 (M. C. Z. 23492–7) Ashmore Reefs, Timor Sea (M. A. Smith) 1927.

The above form part of the paratype series.

Aipysurus apraefrontalis Malcolm Smith

Aipysurus apraefrontalis Malcolm Smith, 1926, Monog. Sea-Snakes, fig. 13, p. 24: Ashmore Reefs, Timor Sea.
2 (M. C. Z. 23477, 24900) Ashmore Reefs, Timor Sea (M. A. Smith) 1927.

The above form part of the paratype series.

Emydocephalus annulatus Krefft

Emydocephalus annulatus Krefft, 1869, Proc. Zoöl. Soc. London, p. 322: ? Australian Seas.

4 (M. C. Z. 23536–9) Ashmore Reefs, Timor Sea (M. A. Smith) 1927.

Enhydrina schistosa (Daudin)

Hydrophis schistosus Daudin, 1803, Hist. Nat. Rept., **7**, p. 386: Tranquebar, India.

1 (M. C. Z. 10276) Australian Seas (Australian Mus.) 1914.

Hydrophis kingi Boulenger

Hydrophis kingi Boulenger, 1896, Cat. Snakes Brit. Mus., **3**, p. 276: North Australia.

1 (M. C. Z. 23649) Broome, W. A. (M. A. Smith) 1927.

Hydrophis elegans (Gray)

Aturia elegans Gray, 1842, Zoöl. Misc., p. 61: Port Essington, Northern Territory.

1 (M. C. Z. 23625) Moreton Bay, Q. (M. A. Smith) 1927.

Hydrophis major (Shaw)

Hydrus major Shaw (part), 1802, Gen. Zoöl., **3**, p. 558, pl. 124: Indian Ocean.

1 (M. C. Z. 23664) Holothuria Bank, W. A. (M. A. Smith) 1927.

Hydrophis ornatus ocellatus Gray

Hydrophis ocellata Gray, 1849, Cat. Snakes Brit. Mus., p. 53: Australia.

Distira mjöbergi Lönnberg & Andersson, 1913, Svenska. Vetensk.-Akad Handl., Stockholm, **52**, No. 3, p. 13: Broome, Western Australia.

1 (M. C. Z. 23672) Locality uncertain (M. A. Smith) 1927.

Hydrophis fasciatus atriceps Günther

Hydrophis atriceps Günther, 1864, Rept. Brit. India, p. 371, fig: Siam.

1 (M. C. Z. 29787) Broome, W. A. (H. L. Clark) 1930.

Acalyptophis peronii (Duméril)

Acalyptus peronii Duméril, 1853, Mem. Acad. Sci. Paris, **23**, p. 522: ?New Holland.

Pseudodistira horrida Kinghorn, 1926, Proc. Zoöl. Soc. London, p. 71, pl. 1, text-fig. 1: McCulloch Reef, Great Barrier Reef.

1 (M. C. Z. 23474) Broome, W. A. (M. A. Smith) 1927.

Lapemis hardwickii Gray

Lapemis hardwickii Gray, 1834, Illus. Ind. Zoöl., **2**, pl. lxxxvii, col. fig: India.
1 (M. C. Z. 29788) Broome, W. A. (H. L. Clark) 1930.

GEKKONIDAE

Nephrurus laevis De Vis

Nephrurus levis De Vis, 1886, Proc. Linn. Soc. N. S. W., (2), **1**, p. 168: Queensland.
Nephrurus platyurus Boulenger, 1886, Ann. Mag. Nat. Hist., (5), **18**, p. 91: Adelaide, South Australia.
1 (M. C. Z. 28654) South Australia (British Mus.) 1929.
1 (M. C. Z. 35106) Hermannsburg, N. T. (W. E. Schevill) 1932.

Supralabials 20; 5-6 tubercles at narrowest point between interorbital semicircles; transverse grooves on dorsal surface of tail 18; tail longer than fore limb and longer than head. Larger gecko (No. 28654) measures 111 (73+38) mm.

I follow Lucas and Frost (1896, p. 116) in treating *platyurus* as a synonym for our specimens, agree with *laevis* in the number of their supralabials and possibly in the number of tubercles, but with *platyurus* in respect to caudal grooves and relative tail length.

The following key may be found of use in defining the three species of the genus.

Enlarged, smoothly conical, dorsal tubercles are surrounded by a ring of granules no larger than the adjacent granules (South and central Australia; New South Wales, Queensland) ..... *N. laevis*
Enlarged dorsal tubercles surrounded by a ring of enlarged tubercles larger than the adjacent granules... 1.
1. Enlarged dorsal tubercles smoothly conical; post mental granules much larger than the fine granules covering the greater part of the throat (Western Australia) ..... *N. wheeleri*
Enlarged dorsal tubercles sharply spinose; postmental granules merging imperceptibly with the fine granules covering the greater part of the throat (Queensland) ..... *N. asper*

It is possible that these ranges can be extended. Zietz (1920, p. 182) gives Western and central Australia in addition for *asper* and

Western in addition for *laevis*. As however, *wheeleri* was confused with *asper* and *laevis* at that time, I have omitted copying the ranges as defined by Zietz.

Nephrurus wheeleri Loveridge

Nephrurus wheeleri Loveridge, 1932, Proc. New England Zoöl. Club, **13**, p. 31: Yandil, thirty miles northwest of Wiluna, Western Australia.
5 (M. C. Z. 32950–4) Yandil, W. A. (A. G. Paterson) 1931.

The above are part of the original type series; others have been dispatched to the Western Australian and British Museums. Largest gecko measures 119 (87+32) mm.

Lucas and Le Souef (1909, p. 206) have figured *wheeleri* under the name of *laevis*. If this figure be compared with Lucas and Frost's colored plate in the Horn Report (1896, pl. ix, fig. 1) the difference in the color pattern will be apparent immediately. Werner (1910, p. 452) figures *platyurus* which is now regarded as a synonym of *laevis*.

Nephrurus asper Günther

Nephrurus asper Günther, 1876, Journ. Mus. Godeffroy, **5**, 12, p. 46: Peak Downs, Queensland.
3 (M. C. Z. 13351, 13961–2) Queensland (Queensland Mus.) 1919–20.

The largest gecko (No. 13961) measures 104 (92+22) mm. The specimen from Kimberley, northwestern Australia, referred to *asper* by Lönnberg & Andersson (1913, p. 1) should be reëxamined in view of the subsequent description of *wheeleri*. Longman (1918, p. 37) has photographed this curious reptile (pl. xi) and gives an interesting account of its strange movements.

Rhynchoedura ornata Günther

Rhynchoedura ornata Günther, 1867, Ann. Mag. Nat. Hist., (3), **20**, p. 50: Nicol Bay, Western Australia.
1 (M. C. Z. 35107) Hermannsburg, N. T. (W. E. Schevill) 1932.

Total length 77 (46+31) mm. Distinguished by its beak-like rostral, so well figured by Boulenger (1885, p. 12, pl. ii, fig. 1).

Lucasius damaeus (Lucas & Frost)

Ceramodactylus damaeus Lucas & Frost, 1896, Proc. Roy. Soc. Vict., (2), **8**, p. 1: Charlotte Waters, Northern Territory.
1 (M. C. Z. 29009) Northern Territory (G. Buchanan) 1926.
1 (M. C. Z. 35108) Hermannsburg, N. T. (W. E. Schevill) 1932.

Supralabials 10–11. Number 29009 measures 95 (52+43) mm., and was received as from Central Australia.

Kinghorn (1929, p. 77) proposed the generic name Lucasius for *damaeus*, which is not closely related to the Perso-Arabian genus Ceramodactylus. Kinghorn furnishes considerable data on the variation and distribution, giving its range as from New South Wales to South and Western Australia in the vicinity of Perth. Zietz (1920, p. 182) has Queensland.

Carphodactylus laevis Günther

Carphodactylus laevis Günther, 1897, Novit. Zoöl., **4**, p. 403, pl. xi: Bartle Frere Mountains, Queensland.

14 (M. C. Z. 35109–18) Lake Barrine, Q. (P. J. D. & W. E. S.) 1932.

This bizarre-looking gecko has been excellently figured and the description leaves little to add. Reproduced tails, however, lack the five, prominent, white bands of the original tail, and evidence of its fragility is shown by the fact that only four of our series carry their original tails. Thus the larger gecko measures 115 mm. from snout to vent, the largest tail is 102 mm., exceeding the type by 17 mm.

"At night these geckoes habitually stand rigidly with tail extended in line with the body. This rigid stance may be in any direction, even head downwards on a sapling." (W.E.S.) "I have seen the carrot-tailed species only at Lake Barrine, usually on the ground in 'scrub' (rain forest). Barred-tailed individuals occurred with the others." (P.J.D.)

Phyllurus platurus (Shaw)

Lacerta platura Shaw, 1790, in White's Journ. Voyage N. S. W., App., p. 246, pl. iii, fig. 2: New South Wales.

1 (M. C. Z. 6297) Wentworth Falls, N. S. W. (Australian Mus.) 1890.
1 (M. C. Z. 10185) Greenwich, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10259) Mt. Tambourine, Q. (Australian Mus.) 1914.
2 (M. C. Z. 18808–9) Hornsby, N. S. W. (W. F. H. Rosenberg) 1924.
2 (M. C. Z. 35119–20) Dorrigo, N. S. W. (W. Heron) 1932.

The largest gecko (No. 10259) measures 158 (95+63) mm., original tail.

This Tambourine specimen was received as *cornutus* (Ogilby) and is an intermediate, agreeing with *platurus* in the development of spinous tubercles upon its back, nearer to *cornutus* in tail characters though these are not nearly so pronounced as in more northerly examples. Lönnberg and Andersson (1915, p. 3) refer a specimen from the Tambourine Mountains to *platurus*.

Phyllurus cornutus (Ogilby)

Gymnodactylus cornutus Ogilby, 1892, Rec. Austral. Mus. Sydney, **2**, p. 8: Bellenden Ker Ranges, Queensland.

Phyllurus lichenosus Günther, 1897, Novit. Zoöl., **4**, p. 404, pl. xii: Bartle Frere Mountains, Queensland.

Phyllurus cornutus Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 2.

1 (M. C. Z. 6468) Cooktown, Q. (E. A. Olive) 1896.
2 (M. C. Z. 35121–2) Mt. Spurgeon, Q. (P. J. Darlington) 1932.
2 (M. C. Z. 35123–4) Lake Barrine, Q. (P. J. Darlington) 1932.
19 (M. C. Z. 35125–34) Millaa Millaa, Q. (P. J. Darlington) 1932.

The largest gecko (No. 35125) measures 206 (141+65) mm., but the tail is reproduced and relatively small.

"The remarkable flat-tailed lizard from Millaa Millaa, of which I got a few also at Lake Barrine and which I saw at Vine Creek, Ravenshoe, all in "scrub", is found chiefly on tree-trunks, rarely on the ground. I only found them by shining their eyes at night; even after shining the eyes I often could not see the body against the trunk, even at close range and with a strong light. They are very sluggish and I have shot them down from thirty feet or so up the tree." (P.J.D.)

Gymnodactylus louisiadensis De Vis

Gymnodactylus louisiadensis De Vis, 1892, Ann. Queensl. Mus., No. 2, p. 11: Sudest Island, New Guinea.

Gymnodactylus olivii Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 1, pl. i, figs. 1–1d: near Cooktown, Queensland.

Type (M. C. Z. 6470) Near Cooktown, Q. (E. A. Olive) 1896.
1 (M. C. Z. 7329) Rockhampton, Q. (T. Barbour don.) 1909.

No preanal pores on either specimen. The holotype of *olivii* measures 200 (101+99) mm., and so is slightly larger than the Rockhampton gecko which is 195 (115+80) mm.

Gymnodactylus milii (Bory)

Phyllurus milii Bory de St. Vincent, 1825, Dict. Hist. Nat., **7**, p. 183, pl. —, fig. 1: Shores of the Baie des Chiens-marins, Australia.

1 (M. C. Z. 2226) Sydney, N. S. W. (W. Keferstein) 1865.
2 (M. C. Z. 3223) Australia. (No History) N. D.
1 (M. C. Z. 10167) Peak Hill, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10168) Colah, Sydney, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 24487) Swan View, Perth, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 32857) Mr. Brown, W. A. (St. Joseph's School) 1931.
10 (M. C. Z. 32858–67) West Wallaby Id., W. A. (Harvard Exped.) 1931.

The largest gecko (No. 10168) measures 154 (88+66) mm. "Not rare on West Wallaby Island. Quite sluggish when first exposed under rocks." (W. E. S.)

Gymnodactylus pelagicus (Girard)

Heteronota pelagica Girard, 1857, Proc. Acad. Nat. Sci. Philad., 1857, p. 197: Fiji and Navigator Islands.

Heteronota fasciata Macleay, 1877, Proc. Linn. Soc. N. S. W., **2**, p. 100: Hall Sound, New Guinea.

Heteronota marmorata Macleay, 1877, Proc. Linn. Soc. N. S. W., **2**, p. 100: Fitzroy Island and Endeavour River, Queensland.

Gymnodactylus heteronotus Boulenger, 1885, Cat. Liz. Brit. Mus., **1**, p. 41: n.n. for *fasciata* Macleay.

Gymnodactylus cheverti Boulenger, 1885, Cat. Liz. Brit. Mus., **1**, p. 41: n.n. for *marmorata* Macleay.

Gymnodactylus pelagicus Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 1.
3 (M. C. Z. 6473) Cooktown & Barrier Reef (Olive & Mayer) 1896.
1 (M. C. Z. 35135) Coen, Q. (P. J. Darlington) 1932.

The characters on which Macleay based his two species appear to have but little significance. The Cooktown series show the internasals in contact (*marmorata*) but in the Coen gecko they are separated by two granules (*fasciata*). The Cooktown gecko has subtriangular chin-shields (*fasciata*) while the Coen specimen possesses rounded chin-shields (*marmorata*) and so forth. Boulenger (1885, p. 41), who had no specimens, renamed both when transferring them to the genus Gymnodactylus where they would be preoccupied. Garman has already discussed variation in the Cooktown series. There are about 14 rows of conical, striated tubercles, the lateral rows ill-defined. Largest perfect gecko measures 87 (41+46) mm.

Kopstein has named a race from the Kei Islands which, if valid, would necessitate the use of trinomials for the present form. The species is so widely distributed among the islands and so variable in any locality that it is doubtful if the Kei Island form is recognizable. These geckos, except for their keeled ventral scales etc., so closely resemble Heteronota that I have rearranged the order adopted by Boulenger by transferring Phyllurus in front of Gymnodactylus in its present restricted sense so that *pelagicus* comes next to Heteronota.

Heteronota binoei Gray

Heteronota binoei Gray, 1845, Cat. Liz. Brit. Mus., p. 174: Houtman's Abrolhos, Western Australia.

Eublepharis derbiana Gray, 1845, Cat. Liz. Brit. Mus., p. 274: Port Essington, Northern Territory.

Heteronota eboracensis Macleay, 1877, Proc. Linn. Soc. N. S. W., **2**, p. 101: Cape York, Queensland.

Gymnodactylus pelagicus Barbour (not of Girard), 1914, Proc. Biol. Soc. Washington, **27**, p. 203.

2 (M. C. Z. 9494–5) Prince of Wales Id., T. S. (H. L. Clark) 1913.
1 (M. C. Z. 10202) Eidsvold, Q. (Australian Mus.) 1914.
1 (M. C. Z. 10203) Narrabri N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 31876) Broome, W. A. (H. A. Clark) 1929.
2 (M. C. Z. 31896–7) Near Darwin, N. T. (H. L. Clark) 1929.
3 (M. C. Z. 32868–70) Mullewa, W. A. (P. J. Darlington) 1931.
8 (M. C. Z. 32871–7) Meekatharra, W. A. (P. J. D. & W. E. S.) 1931.
2 (M. C. Z. 32878–9) Yandil, W. A. (P. J. Darlington) 1931.
1 (M. C. Z. 32914) Dalgaranger, W. A. (G. E. Nicholls) 1931.
1 (M. C. Z. 32946) West Wallaby Id., W. A. (W. E. Schevill) 1931.
1 (M. C. Z. 35136) Rutherford, Q. (W. E. Schevill) 1932.
1 (M. C. Z. 35137) Dunraven, Q. (W. E. Schevill) 1932.
11 (M. C. Z. 35138–46) Coen, Q. (P. J. Darlington) 1932.
4 (M. C. Z. 35147–50) Hermannsburg, N. T. (W. E. Schevill) 1932.

Yandil is near Wiluna; Rutherford near Mount Coolon; Dunraven near Hughenden.

Dorsal tubercles in 12–16 rows, usually 14; preanal pores of thirteen males 4–6, average 5. Largest gecko (No. 32874) measures 113 (47+66) mm., original tail intact.

Lucas and Frost (1896, p. 120) have presented cogent reasons for considering *derbiana* a synonym of *binoei*. Independently Procter (1923, p. 1074) arrived at the same conclusion. A study of our material confirms these views and it will be noted that we possess a topotype of *binoei*, while the Darwin specimens are not far from the type locality of *derbiana*. The specimen with the most irregularly arranged rows of tubercles is from Eidsvold in southern Queensland and, together with the Narrabri gecko, was received from the Australian Museum as *derbiana*. Werner (1910, p. 453) furnishes good data on variation of a large series of *binoei* from Western Australia.

Our Coen series, which may be considered as topotypes of *eboracensis*, agree with the description of that species, except for "scales mostly tricarinate," which is somewhat ambiguous.

Phyllodactylus marmoratus (Gray)

Diplodactylus marmoratus Gray, 1844, Zoöl. Erebus and Terror, Rept., pl. xv, fig. 6: Australia.

Phyllodactylus macrodactylus Boulenger, 1885, Cat. Liz. Brit. Mus., **1**, p. 89, pl. vii, fig. 2: Australia.

Phyllodactylus affinis Boulenger, 1885, Cat. Liz. Brit. Mus., **1**, p. 89, pl. vii, fig. 4: Aneitum, New Hebrides.

Phyllodactylus guentheri Boulenger, 1885, Cat. Liz. Brit. Mus., **1**, p. 90, pl. vii, fig. 3: Lord Howe Island; Norfolk Island; Champion Bay, Western Australia.

2 (M. C. Z. 10195–6) Lord Howe Island (Australian Mus.) 1914.
1 (M. C. Z. 10204) Victoria (Australian Mus.) 1914.
13 (M. C. Z. 24472–84) Augusta, W. A. (W. S. Brooks) 1927.
2 (M. C. Z. 24485–6) Pemberton, W. A. (W. S. Brooks) 1927.
3 (M. C. Z. 32915–7) Rottnest Id., W. A. (Harvard Exped.) 1931.
2 (M. C. Z. 32918–9) Darling Range, W. A. (Harvard Exped.) 1931.
5 (M. C. Z. 32920–4) West Wallaby Id., W. A. (Harvard Exped.) 1931.
4 (M. C. Z. 32925–8) Walleliffe, W. A. (Harvard Exped.) 1931.
6 (M. C. Z. 32929–34) Margaret River, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 32935) Bridgetown, W. A. (Harvard Exped.) 1931.
2 (M. C. Z. 32936–7) Perth, W. A. (Harvard Exped.) 1931.
2 (M. C. Z. 32947–8) Pemberton, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 32949) Forrest, W. A. (C. Barrett) 1931.

Walleliffe is near Margaret River.

The variations such as nostril in contact with, or separated from, the rostral; 8 or 10 transversely enlarged lamellae under the fourth toe, which led Boulenger to describe *affinis* and other species, may be found in the Augusta series alone. See also Werner's (1910, pp. 454–5) comments. Lönnberg and Andersson (1913, p. 1) record *macrodactylus* from Adelaide. Glauert (1929, p. 43, footnote) states that *marmoratus* had only recently been found on Rottnest Island, his record finds confirmation in our series. Largest gecko (No. 32935) measures 114 (56+58) mm.

"Beneath bark of red gums and under logs." (W. S. B.) Of the Pemberton specimens Mr. Schevill writes: "Collected by Ira M. Dixson on November 12, 1931 from under loose bark of a karri gum tree (*Eucalyptus diversicolor*) felled in his presence, the geckoes being taken at a point about a hundred feet above the ground." (W. E. S.)

Phyllodactylus ocellatus (Gray)

Diplodactylus ocellatus Gray, 1844, Zoöl. Erebus and Terror, Rept., pl. xv, fig. 4: Australia.

Diplodactylus bilineatus Gray, 1844, Zoöl. Erebus and Terror, Rept., pl. xv, fig. 3: Houtman's Abrolhos, Western Australia.

8 (M. C. Z. 32938–45) West Wallaby Id., W. A. (Harvard Exped.) 1931.

West Wallaby Island being one of the Abrolhos group, these little geckoes are topotypes. From their larger relatives they are distinguished by their keeled dorsal scales. Largest gecko (No. 32941) measures 54 (30+24) mm.

Diplodactylus spinigerus spinigerus Gray

Diplodactylus spinigerus Gray, 1842, Zoöl. Miscell., p. 53: Houtman's Abrolhos, Western Australia.

1 (M. C. Z. 5725) Southwest Australia (Peabody Museum) 1886.
1 (M. C. Z. 32840) Wiluna, W. A. (Harvard Exped.) 1931.
10 (M. C. Z. 32841–50) West Wallaby Id., W. A. (Harvard Exped.) 1931.

Number 5725, which has for long been in the collection as the type of *Peropus pusillus* Cope, cannot be that type for it has little in common with the original description.

Number 32850 is of considerable interest as it lacks the spinose scales on back and tail of typical *spinigerus*, though one of a topotype series; they are, however, indicated. In this respect it approaches *strophurus* (Duméril & Bibron) but disagrees in length of head which is no different from that of its fellows. Kinghorn (1929, p. 81) has resurrected *strophurus* from the synonymy of *spinigerus* to which it was referred by Zietz (1920, p. 185).

"Color in life; Light gray with black or sepia dots; lining of mouth dark blackish blue, as is also the tough subcutaneous membrane on the belly. Eye: a ring of bright, slightly greenish yellow surrounding an area of rich dark metallic brown which bears a number of nacreous white irregular spots; the slit for the pupil is on this brown area, and along either edge the white markings are regular and opposite: at top and bottom a vertical white streak, between these are three (occasionally four) equally spaced spots—these streaks and spots join when the pupil is closed." (W. E. S.)

"A very sluggish species. After exposure beneath a long piece of timber, three lay still while I picked them up one by one. Another was captured by Dr. G. M. Allen as it was walking slowly past his bed one morning." (W. E. S.)

Diplodactylus spinigerus ciliaris Boulenger

Diplodactylus ciliaris Boulenger, 1885, Cat. Lizards Brit. Mus., **1**, p. 98, pl. viii, fig. 2: Port Darwin, Northern Territory.

1 (M. C. Z. 35151) Dunraven, Q. (W. E. Schevill) 1932.
1 (M. C. Z. 35152) Prairie, Q. (W. E. Schevill) 1932.
1 (M. C. Z. 35153) Army Downs, Q. (W. E. Schevill) 1932.

Dunraven is near Hughenden and Army Downs near Richmond.

Zietz (1920, p. 185) has referred *ciliaris* to the synonymy of *spinigerus*. Kinghorn (1929, p. 80) agrees with this though he suggests "the possibility of a geographical variety or race."

Its relationship is probably best expressed by trinomials, though with the material at my disposal I was at first inclined to treat it as a full species. These Queensland specimens differ from our southwestern *spinigerus* in possessing very long supraciliary spines; when such spines occur in southwestern geckoes they are relatively very small. The heads of Queensland specimens are proportionately bigger than those of the southwestern series. Largest ♀ gecko measures 113 (69+44) mm.

D. s. ciliaris ranges across tropical Australia. Glauert (1923, p. 58) has recorded it from Wallal in northwestern Australia, and Zietz (1914, p. 441; 1915, p. 767) from the MacDonnell Ranges and other localities. Longman (1912, p. 24) remarks on some variations in a specimen from Carpentaria. Zietz comments on a foul-smelling sticky substance "exuded from the spines on the upper surface of the tail" in both *ciliaris* and *spinigerus*. In a recent letter Mr. Glauert tells me that this liquid is rather viscid and almost transparent; in some clippings from a local newspaper which he enclosed he states that he has seen it squirted from the soft spines and believes it to be blood. It has a peculiar smell.

Mr. Schevill detected differences between *ciliaris* and the typical race while in the field, for his notes read: "Diplodactylus taken at Prairie, 26 miles east of Hughenden, May 19, 1932. Iris differently marked from those of West Wallaby specimens; no yellow ring, brown field covered closely with mosaic of pale (yellow) phylliform spots. Further, no black dots (some adherent black soil!) but entirely silvery grey except for tubercles and spines, which are light brown. Some dark shows through between scales, especially on the legs. Arrangement of the spines seems different from my memory of those on the West Wallaby specimens." (W. E. S.)

Respecting their habits he writes: "Dunraven specimen taken at night late in May while hunting like the Carphodactylus from Lake Barrine." and "Army Downs Diplodactylus hibernating (in July)—at least it was dug out, with a Peropus and a skink, from under the concretions containing plesiosaur R-6." (W. E. S.)

Diplodactylus elderi Stirling & Zietz

Diplodactylus elderi Stirling & Zietz, 1893, Trans. Roy. Soc. S. Austral., **16**, p. 161, pl. vi, fig. 1: Barrow Range, Northern Territory.

1 (M. C. Z. 35154) Hermannsburg, N. T. (W. E. Schevill) 1932.

Total length only 62 (43+19) mm., tail in process of reproduction. Zietz (1914, p. 441) has already recorded this rare gecko from Hermannsburg in the MacDonnell Ranges, and gives a description of the tail for the first time; the tail of the type having been regenerated.

Diplodactylus byrnei Lucas & Frost

Diplodactylus byrnei Lucas & Frost, 1896, Proc. Roy. Soc. Victoria, **8**, p. 2: Charlotte Waters, Northern Territory.

1 (M. C. Z. 35157) Savages Creek, Q. (G. W. de Teliga) 1932.

Savages Creek is on "Charlotte Plains", northwest of Hughenden, Queensland. This record involves a considerable extension of range so that it is well to point out that our gecko is not wholly typical.

The rostral is about twice, not four times, as long as high; on the right side of the head the nostril is between the rostral, first labial, an internasal and four other scales. It differs principally in its very short, thick, rather carrot-shaped tail; dorsally the latter displays more than "five white spots",—actually these are enlarged white tubercles similar to those scattered over the back. There is an additional transverse band between the fore and hind limbs to those possessed by the type as shown in the Horn Report (1896, pl. xii, fig. 2). While the type was said to have "undersurfaces whitish", our specimen has this white surface blotched or spotted with dusky pigment, chiefly along the margin of the jaws and along the flanks while a dusky streak occupies the median line of the belly. Total length of the type was 77 (44+33) mm., and of our gecko 39 (27+12) mm.

Diplodactylus taenicauda De Vis

Diplodactylus taenicauda De Vis, 1886, Proc. Linn. Soc. N. S. W. (2), **1**, p. 169: Chinchilla, Queensland.

1 (M. C. Z. 10225) Eidsvold, Q. (Australian Mus.) 1914.

1 (M. C. Z. 10539) Queensland (Australian Mus.) 1914.

The rostral enters the nostril, thus agreeing with *taenicauda* and not *stenurus* Werner, also of Queensland, which seems very closely related. Kinghorn (1929, p. 79) has recently discussed the series in the Australian Museum. Larger gecko (No. 10225) measures 122 (72+50) mm.

Diplodactylus michaelseni Werner

Diplodactylus michaelseni Werner, 1910, in Michaelsen & Hartmayer's Fauna Südwest-Austral., **2**, p. 460, fig. 3: Denham, Western Australia.

Oedurella taeniata Lönnberg & Andersson, 1913, Svenska Vetensk.-Akad. Handl. Stockholm, **52**, No. 3, p. 5, fig. 1: Broome, Western Australia.

I believe that *Oedurella taeniata* is a synonym of *michaelseni*. Whether the genus Diplodactylus should be divided to eliminate those species answering to the definition of Oedurella is doubtful as many intermediate conditions of digital dilation occur among the numerous species at present referred to Diplodactylus. The subject is worthy of further consideration.

Diplodactylus vittatus Gray

Diplodactylus vittatus Gray, 1832, Proc. Zoöl. Soc. London, p. 40: Australia.
Diplodactylus ornatus Gray, 1844, Zoöl. Erebus & Terror, Rept., pl. xvi, fig. 2: Houtman's Abrolhos, Western Australia.
Diplodactylus polyophthalmus Günther, 1867, Ann. Mag. Nat. Hist., (3), **20**, p. 49: Champion Bay and Nicol Bay, Western Australia.

1 (M. C. Z. 2870) Australia (No history) N. D.
1 (M. C. Z. 8060) Parramatta, N. S. W. (T. Barbour don.) 1912.
1 (M. C. Z. 9357) Sydney, N. S. W. (T. Steel) 1914.
1 (M. C. Z. 10227) Western Australia (Australian Mus.) 1914.
1 (M. C. Z. 21925) South Australia (F. R. Zietz) 1925.
6 (M. C. Z. 32851–6) Swan View, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 33045) Mullewa, W. A. (Harvard Exped.) 1931.

Supranasals in contact except in Nos. 2870 and 21925; snout as long as the distance between the eye and the ear opening in all the smaller specimens, slightly longer in all the larger. Boulenger (1885, p. 98) uses this character to distinguish between *vittatus* and *polyophthalmus* but apparently it does not do so, both types of snout length may be found in the Swan View, Perth series. It is significant that Boulenger records both *vittatus* and *polyophthalmus* from Champion Bay and Werner (1910, pp. 458–459) from Gooseberry Hill. This opinion was reached before I noted that Kinghorn (1929, p. 78) had already referred *polyophthalmus* to the synonymy of *vittatus*, an action which I confirm. Largest gecko (No. 10227) measures 91 (55+36) mm.

Diplodactylus conspicillatus Lucas & Frost

Diplodactylus conspicillatus Lucas & Frost, 1897, Proc. Roy. Soc. Victoria, **9**, p. 55: Charlotte Waters, Northern Territory.
Gymnodactylus laevis Sternfeld, 1925, Abh. Senckenb. Naturf. Gesell., **38**, p. 229: Hermannsburg Mission, Upper Finke River, Northern Territory.

♀ (M. C. Z. 35155) Hermansburg, N. T. (W. E. Schevill) 1932.

This geeko possesses an intact, paddle-shaped tail like that of a beaver. She is gravid and displays a group of five flat tubercles on either side of the tail, postero-laterally to the anus. Lönnberg and Andersson (1913, p. 5) have recorded this species from Broome. Total length 85 (62+23) mm. See also the discussion below.

Diplodactylus hilli Longman

Diplodactylus hilli Longman, 1915, Mem. Queensl. Mus., **3**, p. 32: Port Darwin, Northern Territory.

Diplodactylus platyurus Parker, 1926, Ann. Mag. Nat. Hist., (9), **17**, p. 665: Torrens Creek, northern Queensland.

♂ (M. C. Z. 35156) Coen, Q. (P. J. Darlington) 1932.

This specimen differs from *conspicillatus* in coloring which has been admirably described by Lucas and Frost. This individual also differs from our example of *conspicillatus* in not having the tip of its spatulate tail prolonged and tapering; apparently an individual or age character, however, for Waite has figured *conspicillatus* with a tail no different from that of *hilli*.

This specimen differs from the description of *hilli* in that the mental does not project beyond the rostral, nor has the mental a small median process posteriorly; there is a tendency towards enlargement of some of the median dorsal scales.

It differs from *platyurus* in that its snout is twice the length of the orbit instead of once and a half. It agrees so closely in other respects including the cluster of spinous scales postero-laterally to the anus, and particularly in every little detail of coloration so ably noted by Parker that there is not the slightest doubt but that it represents *platyurus*.

Recently Kinghorn (1929, p. 81) has discussed the relationships of these three species and makes a key in which *platyurus* is shown to differ by possessing two internasal shields. He evidently overlooked Parker's statement that one of the paratypes had but a single shield between the nasals; this is the condition in our specimen.

D. platyurus does not differ from *conspicillatus* in either the breadth of the rostral or in the character of the upper caudal scales as was thought to be the case by Parker. I do not consider that *platyurus* can be held as distinct from *hilli* and I imagine that the relation of the latter to *conspicillatus* will prove to be subspecific when more material is available. Total length 85 (62+23) mm.

Diplodactylus alboguttatus Werner

Diplodactylus alboguttatus, 1910, in Michaelsen & Hartmeyer's Fauna Südwest-Austral., **2**, p. 462, fig. 4: Denham, Western Australia.

1 (M. C. Z. 24538) Geraldton, W. A. (J. Clark) 1927.

This gecko is extremely young but in all its characters it agrees with *alboguttatus* Werner as set forth in Fry's (1914, p. 177) key when differentiating *woodwardi* Fry. Whether much importance can be attached to these differential characters is doubtful for in other species of the genus it may be noted that several of them are subject to variation within a species. Total length 41 (24+17) mm.

Diplodactylus pulcher (Steindachner)

Stenodactylopsis pulcher Steindachner, 1870, Sitz. Akad. Wiss. Wein, **62**, p. 343, pl. ii, figs. 3–5: Swan River, Western Australia.

?*Diplodactylus bilineatus* Lucas & Frost, 1903, Proc. Roy. Soc. Victoria, **15**, p. 146: Carnarvon, Western Australia.

Diplodactylus pulcher var. *dorsalis* Werner, 1910, in Michaelsen & Hartmeyer's Fauna Südwest-Austral., **2**, p. 462: Eradu, Western Australia.

?*Diplodactylus lucasi* Fry, 1914, Rec. West. Austral. Mus., **1**, p. 177: n.n. for *bilineatus* Lucas & Frost (not of Gray).

2 (M. C. Z. 32828–9) Pindawa, W. A. (Harvard Exped.) 1931.

22 (M. C. Z. 32830–9) Mullewa, W. A. (Harvard Exped.) 1931.

Pindawa is 35 miles southeasterly from Mullewa.

Back covered with small, uniform, granular scales; digits with small, round tubercles inferiorly. Largest gecko (No. 32835) measures 89 (55+34) mm.

I am by no means confident that I am correct in synonymising *bilineatus*, hence *lucasi*, with *pulcher*. The former is said to have the nostril "pierced between the rostral, first labial, and five or six nasals"; in *pulcher* and our series the nostril is excluded from the rostral and first labial by a narrow rim. The type should be reëxamined and if correctly described and the rim has not fused with the rostral and first labial, I am probably in error. Except for this I fail to detect any difference between *pulcher* and *bilineatus*.

Taken alone our Mullewa series present very beautifully the transitional stages between the *pulcher* type with black-edged, light dorsal patches of irregular shape, and the *bilineatus* (inc. *dorsalis*) type in which through coalescing of the dorsal blotches a regular, black-edged, light dorsal streak is formed from occiput to base of tail.

Diplodactylus stenodactylus Boulenger

Diplodactylus stenodactylus Boulenger, 1896, Ann. Mag. Nat. Hist. (6), **18**, p. 232: Roebuck Bay, north Western Australia.

8 (M. C. Z. 33037–44) Mullewa, W. A. (Harvard Exped.) 1931.

Snout *longer* than the distance between eye and ear-opening; ear-opening both round and oval; nostril in contact with the first labial, internasal, and three or four granules, in a few geckoes the nostril is also in contact with the rostral; internasals in contact, or separated by granules (No. 33037); supralabials 9–12. Largest gecko (No. 33039) measures 96 (51+45) mm.

The series presents a wide variation in color pattern due to the light dorsal line (frequently absent) breaking up into irregular-shaped blotches yet distinct enough from *pulcher*.

Oedura marmorata Gray

Oedura marmorata Gray, 1842, Zoöl. Miscell., p. 52: Port Essington, Northern Territory.

Oedura tryoni De Vis, 1884, Proc. Roy. Soc. Queensl., **1**, p. 54: Stanthorpe, Queensland.

Oedura fracticolor De Vis, 1884, Proc. Roy. Soc. Queensl., **1**, p. 160: Kimberley, Gulf of Carpentaria, Queensland.

Oedura ocellata Boulenger, 1885, Cat. Lizards Brit. Mus., **1**, p. 105, pl. ix, fig. 1: Australia.

Oedura cincta De Vis, 1888 (1887), Proc. Linn. Soc. N. S. W. (2), **2**, p. 811: Charleville, southwestern Queensland.

Oedura monilis De Vis, 1888 (1887), Proc. Linn. Soc. N. S. W. (2), **2**, p. 812: Queensland.

Phyllodactylus (*Oedura*) *castelnaui* Thominot, 1889, Bull. Soc. Philom. Paris, (8), **1**, p. 22: Australia.

Oedura mayeri Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 3, pl. ii, figs. 2-2e: (Cooktown) Queensland.

6 (M. C. Z. 6469, 6471) Cooktown, Q. (Mayer & Olive) 1896.

1 (M. C. Z. 6728) Australia (T. Barbour don.) 1903.

1 (M. C. Z. 10161) North Australia (Australian Mus.) 1914.

1 (M. C. Z. 10540) Southern Queensland (Queensland Mus.) 1914.

2 (M. C. Z. 35158–9) Coen, Q. (P. J. Darlington) 1932.

1 (M. C. Z. 35160) Mt. Carbine, Q. (P. J. Darlington) 1932.

Dorsal scales large, flat; preanal-femoral pores 18–22, average for seven males 20. Largest gecko (No. 10161) measures 151 (93+58) mm., tail regenerated.

Longman (1915, p. 33) has commented on a specimen of *marmorata* from Port Darwin in which the infralabials are separated by an azygous scale behind the mental. This character was believed to be distinctive of *tryoni* but is inconstant in a series from one locality so I refer *tryoni* to the synonymy of *marmorata*. Our North Australian gecko, received as *marmorata* from the Australian Museum, agrees with *tryoni* in this character.

O. fracticolor appears to have been described chiefly on the grounds of its unusual color pattern; indications as to how its lateral stripes may have formed from coalescing of the more usual markings are present in some of our specimens.

Boulenger (1887, p. 483) referred his distinctively marked *ocellata* to the synonymy of *tryoni*.

O. cincta was differentiated on the basis of having a completely cleft rostral. Our series shows much variation in this respect from those which possess but a slight indication of a cleft to No. 10161 in which the cleft (or groove) extends to the buccal border.

O. monilis has been redescribed and figured by Fry (1915, p. 87) who, because it was found occurring with *tryoni* at Tamworth, New South Wales, thought it should be treated as a full species. Notwithstanding this view I believe that they are synonymous, that the ocelli are produced by fusion of the bordering lines, and that a good series from Tamworth should produce the intermediate stages.

Though Garman differentiated *mayeri* from *marmorata* on the grounds that the infralabials were separated behind the mental, two of his type series have the infralabials in contact. He further cited the greater number of femoral pores (20) but one of his series has 18. His third point, the longer and more slender tail, was presumably on account of three specimens retaining their original tails. *O. mayeri* has long been considered a synonym of *tryoni*.

Oedura robusta Boulenger

Oedura robusta Boulenger, 1885, Cat. Lizards Brit. Mus., **1**, p. 106, pl. x, fig. 1: Australia.

1 (M. C. Z. 10198) Moree, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10544) Sladevale, Q. (Queensland Mus.) 1914.
1 (M. C. Z. 35161) Mundubbera, Q. (J. Kahler) 1932.

Dorsal scales small, granular; divided lamellae beneath the median toes 4; preanal pores 2 (No. 10198) to 13 (No. 10544). Largest gecko (No. 10544) measures 141 (80+61) mm. In recent times this species

has been recorded from Cairns and Chillagoe, northern Queensland, by Lönnberg and Andersson (1915, p. 1).

Oedura lesueurii (Duméril & Bibron)

Phyllodactylus lesueurii Duméril & Bibron, 1836, Erpét. Gén., **3**, p. 392: Australia.

1 (M. C. Z. 5252) Australia (H. A. Ward) 1884.
2 (M. C. Z. 10156–7) Kingstown, N. S. W. (Australian Mus.) 1915.
3 (M. C. Z. 18810–1, 22016) Hornsby, N. S. W. (W. F. H. Rosenberg) 1924–5.

Dorsal scales small, granular; divided lamellae beneath the median toes 3; preanal pores absent. Largest gecko (No. 18810) measures 106 (68+38) m., tail regenerated.

Oedura rhombifer Gray

Oedura rhombifer Gray, 1844, Zoöl. Erebus & Terror, Rept., pl. xvi, fig. 6: Australia.

1 (M. C. Z. 6742) Western Australia (T. Barbour don.) 1903.

Poor condition, very shrivelled. Total length 73 (37+36) mm.

Thecadactylus australis Günther

Thecadactylus australis Günther, 1877, Ann. Mag. Nat. Hist. (4), **19**, p. 414: Islands of Torres Straits.

1 (M. C. Z. 35162) Lankelly Creek, Q. (P. J. Darlington) 1932.

The finding of this rare gecko in the McIlwraith Ranges of the mainland is an interesting addition to the mainland fauna. Excepting that its rostral is completely divided and the absence of the prominent crossbands of the figured type, it agrees closely with the description. Total length 186 (112+74) mm.

Hemidactylus frenatus Duméril & Bibron

Hemidactylus frenatus Duméril & Bibron, 1836, Erpét. Gén., **3**, p. 366: "l' Afrique australe" etc. also, Barbour, 1914, Proc. Biol. Soc. Washington, **27**, p. 203.

2 (M. C. Z. 9473–4) Mer Island, T. S. (H. L. Clark) 1913.

These geckoes from the Murray Islands have been reported upon by Barbour already. The larger measures 95 (50+45) mm.

Peropus variegatus variegatus (Duméril & Bibron)

Hemidactylus variegatus Duméril & Bibron, 1836, Erpét. Gén., **3** p. 353: Tasmania and Bay of the Chiens Marins, Australia.

1 (M. C. Z. 24540) Swan View, W. A. (J. Clark) 1927.
1 (M. C. Z. 32880) Yalgoo, W. A. (Hills) 1931.
13 (M. C. Z. 32881–90) Mullewa, W. A. (Harvard Exped.) 1931.
2 (M. C. Z. 32891–2) Pindawa, W. A. (Harvard Exped.) 1931.
4 (M. C. Z. 32893–6) Meekatharra, W. A. (P. J. Darlington) 1931.
7 (M. C. Z. 32897–903) Wiluna, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 32904) Yandil, W. A. (P. J. Darlington) 1931.
2 (M. C. Z. 32905–6) Geraldton, W. A. (Harvard Exped.) 1931.
16 (M. C. Z. 35163–9) Hermannsburg, N. T. (W. E. Schevill) 1932.
1 (M. C. Z. 35170) Alroy Downs, N. T. (W. E. Schevill) 1932.
1 (M. C. Z. 35171) Mona Vale, Q. (W. E. Schevill) 1932.
2 (M. C. Z. 35172–3) Pelican Bore, Q. (W. E. Schevill) 1932.
1 (M. C. Z. 35174) Soda Creek, Q. (W. E. Schevill) 1932.
3 (M. C. Z. 35175–7) Artesian Downs, Q. (W. E. Schevill) 1932.
1 (M. C. Z. 35178) Mt. Fort Bowen, Q. (W. E. Schevill) 1932.

Mona Vale, Pelican Bore and Soda Creek are near Hughenden; Artesian Downs near Richmond; Pindawa is 35 miles southeasterly from Mullewa; Yandil is near Wiluna.

Digital lamellae divided by a median groove; preanal pores 9–15; average 12. Largest ♂ (No. 35163) measures 116 (61+55) mm., largest ♀ (No. 35164) measures 105 (56+49) mm.

Zietz (1920, p. 190) refers *punctatus* Fry and *australis* Gray to the synonymy of *variegatus*. Our material, however, does give grounds for considering that these names may be retained in a subspecific sense with a distribution having geographical significance. Thus, while the typical form is distributed right across the continent approximately south of a line connecting Geraldton, Alice Springs and Mackay, in the northwest is a slightly larger race (*punctatus*) and in the extreme north and northeast a still larger one (*australis*) whose distribution may possibly be found to correspond fairly well with that of the Savannah Woodland zone. The arrangement of the digital lamellae of *australis* show that it occupies an intermediate position between typical *variegatus* and *oceanicus* both taxonomically as well as geographically.

It will be noted, however, that one of Gray's types of *australis* came from the Swan River. If this means the Swan River near Perth, I suggest that it is an aberrant individual; alternately there may be some error in its provenance, the term "Swan River" being used somewhat vaguely by the early explorers. In recent times Lönnberg and Andersson (1913, p. 7) have recorded *australis* from the interior of the Kimberley district.

"At Mullewa found most frequently under stones, more rarely under bark. At this early season (11–22. ix. 31) the nights are probably too cold for foraging." (W.E.S.)

Peropus variegatus punctatus Fry

Peropus variegatus var. *punctatus* Fry. 1914, Rec. West. Austral. Mus., **1**, p. 178: Strelley River, Pilbara, Western Australia.

1 (M. C. Z. 24541) Yalgoo, W. A. (R. C. Richardson) 1927.
1 (M. C. Z. 31875) Broome, W. A. (H. L. Clark) 1929.
8 (M. C. Z. 32907–13) Dalgaranger St., W. A. (G. E. Nicholls) 1931.
Dalgaranger is 50 miles N.E. of Yalgoo.

Digital lamellae divided by a median groove; preanal pores of two males 11–13; Largest ♂ (No. 32909) measures 128 (60+68) mm., largest ♀ (No. 32907) measures 119 (58+61) mm.

This race appears to occur alongside the typical form at Yalgoo but it will be noted that our material was donated and may not actually have come from the same township. The range extends northwards from Yalgoo to the Strelley River and Broome. The race is characterized by its striking coloration in conjunction with its larger size and arrangement of the digital lamellae. It should be noted, however, that specimens of *australis* from Coen are almost identical in markings with our series of *punctatus*.

Peropus variegatus australis (Gray)

Gehyra australis Gray, 1845, Cat. Lizards Brit. Mus., p. 163: Port Essington and Swan River, Australia.

Gehyra variegata Garman (not of Duméril & Bibron), 1901, Bull. Mus. Comp. Zoöl., **39**, p. 4.

6 (M. C. Z. 6472, 6474) Cooktown, Q. (E. A. Olive) 1896.
1 (M. C. Z. 35179) Green Id., off Cairns, Q. (W. E. Schevill) 1932.
1 (M. C. Z. 35180) Army Downs, Q. (W. E. Schevill) 1932.
1 (M. C. Z. 35181) Mt. Carbine, Q. (P. J. Darlington) 1932.
8 (M. C. Z. 35182–9) Coen, Q. (P. J. Darlington) 1932.
Army Downs is near Richmond.

Digital lamellae distally with more or less of a median groove which, however, does not separate them as in the typical form, their condition being intermediate between typical *variegatus* and *occanicus;* with the exception of the individual with 6 azygous pores, referred to by Garman, the preanal pores of five males are 13–19, average nearly 15. Largest ♂ (No. 35182) measures 66 mm. plus a regenerated tail, largest ♀ (No. 35183) measures 124 (61+63) mm.

PYGOPODIDAE

Pygopus lepidopodus (Lacépède)

Bipes lepidopodus Lacépède, 1804, Ann. Mus. Paris, pp. 193 and 209, pl. lv, fig. 1: Australia.

1 (M. C. Z. 2522) New South Wales (G. Krefft) 1870.
1 (M. C. Z. 10197) Wentworthville, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10287) Lindfield, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10288) Parramatta, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 24470) Perth, W. A. (J. Clark) 1927.

Preanal pores 10–16, average 11. Largest scalefoot (No. 2522) measures 464 (227+237) mm., tail regenerated. The Perth specimen differs from all our eastern examples in possessing the longitudinal rows of rectangular, white-edged, sepia blotches mentioned by Kinghorn.

Zietz (1920, p. 191) drew attention to the correct spelling of this name which I have verified as *lepidopodus*, not *lepidopus*.

In view of Kinghorn's (1926, pp. 40–64) revision of this family, which has been of great help to me, I have tested all our pygopods by his keys and descriptions and avoided discussing the numerous minor variations to which these unstable creatures are liable.

Pygopus nigriceps (Fischer)

Cryptodelma nigriceps Fischer, 1882, Arch. für Natur., **48**, part **1**, p. 289, pl. xvi, figs. 5–9: Nicol Bay, Western Australia.

Pygopus schraderi Boulenger, 1913, Ann. Mag. Nat. Hist. (8), **12**, p. 564: Milparinka, New South Wales.

1 (M. C. Z. 33063) Hillston, N. S. W. (T. A. White) 1914.

Preanal pores 16. Total length 237 (114+123) mm.

The reference given by Zietz (1920, p. 191) for *schraderi* is wrong both for volume, page, year, and habitat. Kinghorn (1926, p. 45) has referred it to the synonymy of *nigriceps*.

Pygopus baileyi (Günther)

Delma (*Cryptodelma*) *baileyi* Günther, 1897, Ann. Mag. Nat. Hist. (6), **19**, p. 170, figs. 1–3: Cue, Western Australia.

1 (M. C. Z. 21884) Australia (Senckenberg Mus.) 1925.
1 (M. C. Z. 24469) Dudu, W. A. (R. C. Richardson) 1927.

Preanal pores 12. Larger scalefoot (No. 24469) measures 479 (154+325) mm., tip of tail missing.

It should be noted that the original spelling of the specific name was *baileyi*, not *bayleyi*. Number 21884 was received as *Cryptodelma nigriceps* Fischer; while *baileyi* closely resembles *nigriceps* in head markings it differs by possessing perfectly smooth scales.

Delma fraseri fraseri (Gray)

Delma fraseri Gray, 1831, Zoöl. Miscell., p. 14: Western Australia.
5 (M. C. Z. 24461–4) Perth, W. A. (J. Clark) 1926.

Two pairs of frontonasals; 3 anal scales, this character distinguishing typical *fraseri* from *plebeia* De Vis as well as from *impar* both of which have but 2. Largest scalefoot (No. 24461) measures 314 (76+238) mm.

In his key, Kinghorn (1926, p. 51) states that the snout is longer than the distance between the eye and the ear, but in the text (pp. 51, 52) that it is as long both for *D. fraseri* and what he calls *D. f.* var. *plebeia*. In our Perth series the length of the snout might be said to be equal to, or a trifle longer, while in *tincta* and *impar* it is a trifle shorter than the distance between the eye and the ear. The difference is so slight, however, as to be of doubtful value as a specific character.

Delma fraseri aberration

1 (M. C. Z. 8974) Broome Hill, W. A. (W. F. H. Rosenberg) 1913.

This individual only differs from typical *fraseri* in having a single pair of frontonasals and a minute interparietal. It is not *tincta*, however, for it has the 4th labial below the eye, nor *impar* as it possesses 3 anal shields. Total length 271 (71+200) mm.

In view of the fact that Werner (1909, p. 265) records a normal *fraseri* from Broome Hill and had others from Eradu and Northampton, Western Australia, which had a single pair of frontonasals *but* combined with having the 3rd labial below the eye, and also Longman's (1916, p. 50) remarks on the variation shown by twenty Queensland specimens, as well as Kinghorn's (1926, p. 51) reference to *tincta* of examples labelled "Mt. Barker" and "Western Australia," it seems to me that we are dealing with one very variable species which has a preponderating proportion of *fraseri* characters in Western Australia and the Northern Territory and a preponderance of *tincta* characters in Queensland and New South Wales. If this view is found to be acceptable, then *plebeia* De Vis, of which only two examples are known, would

probably be regarded as an aberration of *tincta* De Vis, which has page precedence. Alternatively it can be retained as a third race of restricted range.

Delma fraseri tincta De Vis

Delma tincta De Vis, 1888 (1887), Proc. Linn. Soc. N. S. W. (2), **2**, p. 824: Normanton, Gulf of Carpentaria; Springsure, central Queensland.

Delma reticulata Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 5, pl. ii, figs. 1–1f: Cooktown, Queensland.

Type (M. C. Z. 6486) Cooktown, Q. (R. A. Olive) 1896.

1 (M. C. Z. 35190) Mt. Carbine, Q. (P. J. Darlington) 1932.

One pair of frontonasals; nasal and first labial distinct; 3rd labial below the eye; midbody scale-rows in all 14; anal shields 3, the point of the median one not always reaching so far forward as the others. Larger scalefoot (No. 35190) measures 213 (75+138) mm.

An unfortunate slip has occurred in Kinghorn's key (1926, p. 51) where "nasal and rostral not fused, 4th labial under eye" should read "nasal and 1st labial not fused, 3rd labial under eye" as is obvious from the text and from his figure 11.

Delma impar (Fischer)

Pseudodelma impar Fischer, 1882, Arch. für Natur., **48**, part 1, p. 287, pl. xvi, figs. 1–4: Melbourne, Victoria.

Delma lineata Rosén, 1905, Ann. Mag. Nat. Hist., (7), **16**, p. 131, figs. 2a, 2c, pl. viii, fig. 1: Victoria.

1 (M. C. Z. 22159) Victoria (Hausschild) 1900.

One pair of frontonasals; nasal and 1st labial fused; 4th labial below the eye; anal shields 2. Total length 176 (97+79) mm., tail intact.

Unfortunately in defining this species in his key, Kinghorn (1926, p. 51) states "nasal and rostral fused," the 1st labial is intended, not the rostral, *cf.* his figure 12.

Aprasia pulchella Gray

Aprasia pulchella Gray, 1839, Ann. Nat. Hist., **2**, p. 332: Australia.

1 (M. C. Z. 24460) Mundaring Weir, W. A. (W. S. Brooks) 1927.

3 (M. C. Z. 24467–8) Geraldton, W. A. (J. Clark) 1927.

Postocular scale present; snout shorter. Longest scalefoot (No. 24467) measures 149 (87+62) mm., tail intact. "Taken under stone." (W. S. B.).

Aprasia repens (Fry)

Ophioseps repens Fry, 1914, Rec. W. Austral. Mus., **1**, p. 178, figs. 2 and 3: Western Australia.

1 (M. C. Z. 24427) Balcatta Beach, W. A. (W. S. Brooks) 1927.
2 (M. C. Z. 24458–9) Geraldton, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 33027) Swan View, W. A. (W. M. Wheeler) 1931.
8 (M. C. Z. 33028–35) Rottnest Id., W. A. (Harvard Exped.) 1931.

Postocular scale absent; snout longer. Longest scalefoot (No. 33033) measures 174 (117+57) mm.

Lialis burtonis Gray

Lialis burtonis Gray, 1834, Proc. Zoöl. Soc. London, p. 134: New South Wales.
Lialis bicatenata Gray, 1842, Zoöl. Miscell., p. 52: Port Essington, Northern Territory.
Lialis punctulata Gray, 1842, Zoöl. Miscell., p. 52: Port Essington, Northern Territory.
Lialis burtonii Barbour, 1914, Proc. Biol. Soc. Washington, **27**, p. 203.

3 (M. C. Z. 5225, 5242, 5251) Australia (H. A. Ward) 1884.
1 (M. C. Z. 6298) Dubbo, N. S. W. (Australian Mus.) 1890.
1 (M. C. Z. 7098) Australia (T. Barbour don.) 1903.
1 (M. C. Z. 9492) Prince of Wales Id., T. S. (H. L. Clark) 1913.
2 (M. C. Z. 10548) South Queensland (Queensland Mus.) 1914.
2 (M. C. Z. 24465) Perth, W. A. (W. S. Brooks & J. Clark) 1927.
1 (M. C. Z. 24466) Mundaring Weir, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 31902) Near Darwin, N. T. (H. L. Clark) 1929.
3 (M. C. Z. 33024–5) West Wallaby Id., W. A. (R. Ellis) 1931.
1 (M. C. Z. 33026) Rottnest Id., W. A. (Harvard Exped.) 1931.
2 (M. C. Z. 35191–2) Hermannsburg, N. T. (W. E. Schevill) 1932.
2 (M. C. Z. 35193–4) Port Stewart, Q. (P. J. Darlington) 1932.

Preanal pores 4 or not distinguishable. Longest scalefoot (No. 33024) measures 324 (173+151) mm., tail intact.

"On West Wallaby Island found coiled under stones by day." (W. E. S.)

AGAMIDAE

Gonyocephalus spinipes (A. Duméril)

Lophyrus spinipes A. Duméril, 1851, Cat. Méthod. Coll. Rept. Paris, p. 90: Australia.

1 (M. C. Z. 24322) Australia (H. A. Ward) 1932.

Nuchal and dorsal crests subcontinuous; no pronounced gular pouch. Total length 349 (115+234) mm. See also Fry (1915, p. 88).

Gonyocephalus boydii (Macleay)

Tiaris boydii Macleay, 1884, Proc. Linn. Soc. N. S. W., **8**, p. 432: HerbertRiver, Queensland.

1 (M. C. Z. 10533) Herbert Gorge, Q. (Queensland Mus.) 1914.

Nuchal and dorsal crests distinctly separated; a pronounced gular pouch with strongly toothed scales on its anterior edge. Total length 400+(140+260+) mm., tip of tail missing.

Amphibolurus maculatus maculatus (Gray)

Uromastyx maculatus Gray, 1831, in Griffith's Cuvier, Animal King., **9**, Syn., p. 62: no locality.

2 (M. C. Z. 32956–7) Lake Violet, W. A. (W. E. Schevill) 1931.

2 (M. C. Z. 32983–4) Mullewa, W. A. (I. M. Dixson) 1931.

Femoral and preanal pores total 40–53, none in female. Largest ♂ (No. 32983) measures 194 (57+137) mm., and ♀ (No. 32984) 195 (56+139) mm.

Amphibolurus maculatus gularis Sternfeld

Amphibolurus maculatus gularis Sternfeld, 1925, Abh. Senckenb. Naturf. Gesell., **38**, p. 231: Hermannsburg Mission, Upper Finke River, Northern Territory.

1 (M. C. Z. 10194) Derby, W. A. (Australian Mus.) 1914.

1 (M. C. Z. 31878) Broome, W. A. (H. L. Clark) 1929.

1 (M. C. Z. 35229) Mt. Peake, N. T. (W. E. Schevill) 1932.

6 (M. C. Z. 35230–5) Birchip Downs, N. T. (W. E. Schevill) 1932.

41 (M. C. Z. 35236–50) Hermannsburg, N. T. (W. E. Schevill) 1932.

Mt. Peake is 50 miles in a northwesterly direction from Teatree Well. Birchip Downs is 40 miles west of Barrow Creek Telegraph Station.

Distinguished from the typical form by the tympanum being nearly as large as the eye, larger size, different coloring. Femoral and preanal pores 48–61 (No. 35236), average for 22 males is 50; females without pores. The largest perfect ♂ (No. 35230) measures 227 (72+155) mm., and ♀ (No. 10194) 222 (72+150) mm.

It is interesting to note that the second largest female (No. 35236), measuring 213 mm., though pregnant, her eggs being 11 mm. in circumference, is the only female with a tendency to adopt the secondary sexual coloring of the ♂. She has black sides and white lateral lines; below, dusky on the throat and breast, i.e. just those areas which are jet black in the males.

Amphibolurus ornatus (Gray)

Grammatophora ornata Gray, 1844, Zoöl. Erebus & Terror, Rept., pl. xviii, fig. 4: Western Australia.

1 (M. C. Z. 10175) Darling Range, W. A. (Australian Mus.) 1914.
2 (M. C. Z. 24542–3) Parkerville, W. A. (J. Clark) 1927.
2 (M. C. Z. 24544–5) Swan View, W. A. (W. S. Brooks) 1927.
2 (M. C. Z. 32985–6) Darling Range, W. A. (Harvard Exped.) 1931.

Femoral and preanal pores of two males 54–57. In his key, Boulenger (1885, p. 380) states: "No nuchal crest" but at the time had only the type. An extremely low nuchal crest is present in our adults. The largest ♂ (No. 24544) measures 270 (88+182) mm., and ♀ (No. 10175) 208 (70+138) mm.

Amphibolurus scutulatus Stirling & Zietz

Amphibolurus scutulatus Stirling & Zietz, 1893, Trans. Roy. Soc. S. Austral., **16**, p. 165, pl. vii, figs. 1–2: between Queen Victoria Springs and Fraser Range, Western Australia.

Amphibolurus websteri Boulenger, 1904, Ann. Mag. Nat. Hist., (7), **14**, p. 414, pl. xi: Coolgardie district, Western Australia.

Amphibolurus holsti Rosén, 1905, Ann. Mag. Nat. Hist., (7), **16**, p. 134, p.141, pl. ix: West. Australia.

8 (M. C. Z. 32998–33005) Lake Violet, W. A. (W. E. Schevill) 1931.
6 (M. C. Z. 33006–9) Wiluna, W. A. (W. E. Schevill) 1931.
Lake Violet is only three miles from Wiluna.

Femoral and preanal pores of three males 44–47. The largest ♂ (No. 33006) measures 338 (108+230) mm., and ♀ (No. 32999) 325 (100+225) mm.

Amphibolurus caudicinctus (Günther)

Grammatophora caudicincta Günther, 1844, Zoöl. Erebus & Terror, Rept., p. 19: Nicol Bay, Western Australia.

3 (M. C. Z. 32980–2) Wiluna, W. A. (Harvard Exped.) 1931.
3 (M. C. Z. 32995–7) Meekatharra, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 35251) Hermannsburg, N. T. (W. E. Schevill) 1932.

It seems possible that *imbricatus* Peters and *rufescens* Stirling and Zietz may be regarded as races of *caudicinctus*. Our Hermannsburg specimen is undoubtedly the same species as those from Hermannsburg referred to *caudicinctus* by Sternfeld (1925, p. 232).

If the key devised by Boulenger (1885, p. 380) be applied, our specimens run down to *imbricatus* of South Australia. They differ from

Peters' original description, however, in their shorter limbs, the shortest finger of the fore limb only reaching the eye in the large Hermannsburg dragon, barely reaching the nostril in the six smaller specimens; the adpressed hind limbs do not reach *beyond* the end of the snout but to the nostril (Wiluna) or anterior corner of the eye (Meekatharra). While in general the coloration agrees with that of *imbricatus*, it differs in details, such as the absence of transverse white lines on the back.

From *rufescens* they differ in possessing a total of 29–39 (average of five males 33, instead of 58) femoral and preanal pores. The color description agrees perfectly.

From *caudicinctus* they differ in that their ventrals are very slightly and obtusely keeled, less noticeable in the females; in this respect they agree with *imbricatus* and *rufescens;* the keels are so faint as to be easily overlooked. Judging by the appearance of the type as figured by Boulenger (1885, pl. xxix, fig. 2) it seems obvious that the tail of the holotype was incomplete, Boulenger states that it is one and a half times the length of the head and body but as he gives 78 mm. as the head and body length and 25 mm. for the tail there would appear to be a misprint.

The largest ♂ (No. 35251) measures 265 (80+185) mm., and ♀ (No. 32996) 67 from snout to anus, the tail being injured.

Amphibolurus decresii (Duméril & Bibron)

Grammatophora decresii Duméril & Bibron, 1837, Erpét. Gén., **4**, p. 472, pl. xli, fig. 1: L'Ile de Decrès (*i.e.*, Kangaroo Island, South Australia).

♀ (M. C. Z. 10186) Boulder, W. A. (Australian Mus.) 1914.

♂ (M. C. Z. 10187) Port Lincoln, S. A. (Australian Mus.) 1914.

These specimens were received as *pictus*. At least the male appears to represent *decresii* though not agreeing well with the color of the figured type; moreover the type had 50 femoral and preanal pores while our male has only 35. This ♂ measures 166 (60+106) mm., the ♀ 137 (57+80) mm.

Amphibolurus pictus Peters

Amphibolurus pictus Peters, 1867 (1866), Monatsb. Akad. Wiss. Berlin, p. 88: South Australia.

Amphibolurus modestus Ahl, 1926, Zoöl. Anz. Leipzig, **67**, p. 187: Australia.

1 (M. C. Z. 35288) Between Boopeechee & Finniss River, nr. L. Eyre, S. A. (W. E. Schevill) 1932.

This beautiful male dragon is undoubtedly specifically identical with the subject of the colored plate of *pictus* given by Lucas and Frost in the Horn Report (1896, pl. x, fig. 1) and is substantially in agreement with Peters' very detailed original description. Femoral and preanal pores 45 in an uninterrupted series. This ♂ measures 177 (62+115) mm.

Amphibolurus reticulatus reticulatus (Gray)

Grammatophora reticulata Gray, 1845, Cat. Lizards Brit. Mus., p. 252: Western Australia.

1 (M. C. Z. 7747) Western Australia (Vienna Mus.) 1911.
3 (M. C. Z. 32962–4) Geraldton, W. A. (Harvard Exped.) 1931.

Femoral and preanal pores 37–49 in a continuous series. Larger ♂ (No. 32962) measures 198 (82+116) mm., and ♀ (No. 32963) 147 (62+85) mm.

Werner (1909, pp. 271–5) has contributed an important study of this variable species from which we gather that the range of femoral and preanal pores in his series was 32–50. Ahl (1926, p. 188) has described *tibialis* with "about 60 pores" based on a specimen whose exact locality is unknown. Its color pattern agrees closely with our No. 7747 and it may prove to be a synonym of *reticulatus*.

Amphibolurus reticulatus inermis (De Vis)

Grammatophora inermis De Vis, 1888 (1887), Proc. Linn. Soc. N. S. W. (2), **2**, p. 812: Central Queensland.

Amphibolurus reticulatus major Sternfeld, 1919, Mitt. Senckenb. Naturf. Gesell., **1**, p. 78: Hermannsburg Mission, Upper Finke River, Northern Territory.

17 (M. C. Z. 21879–88) Broome, W. A. (H. L. Clark) 1929.
4 (M. C. Z. 32987–90) Meekatharra, W. A. (Harvard Exped.) 1931.
2 (M. C. Z. 32991–2) Lake Violet, W. A. (P. J. Darlington) 1931.
1 (M. C. Z. 32993) Wiluna, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 32994) Yalgoo, W. A. (Hills) 1931.
1 (M. C. Z. 35252) Birchip Downs, N. T. (W. E. Schevill) 1932.
17 (M. C. Z. 35253–62) Teatreen Well, N. T. (W. E. Schevill) 1932.
21 (M. C. Z. 35263–72) Hermannsburg, N. T. (W. E. Schevill) 1932.

I regret having to refer the excellently defined race *major* to the synonymy of *inermis* but they appear to be in perfect agreement.

Femoral and preanal pores 16–26, average of forty males 22, average of a dozen Broome males also 22, a dozen Hermannsburg topotypes of *major* average 21; females possess pores but these are usually less dis-

tinct than in the males. The scattered nature of these pores and their reduced number immediately separate this big race from the typical form inhabiting the middle west coast.

The largest ♂ (No. 35263) measures 277 (116+161) mm., and ♀ (No. 35264) 201 (90+111) mm.

"Native name *Naia* near Teatree Well, *Kapália* at Hermannsburg. Most of the series dug from shallow burrows, not more than six inches deep and one to two feet long." (W.E.S.)

Amphibolurus darlingtoni Loveridge

Amphibolurus darlingtoni Loveridge, 1932, Proc. New England Zoöl. Club, **13**, p. 33: Mullewa, Western Australia.

♂ ♀ (M. C. Z. 32958–9) Mullewa, W. A. (P. J. Darlington) 1931.

The two paratype females have been donated to the Western Australian Museum and exchanged to the British Museum respectively.

"When disturbed on a sandy plain near town one of these lizards rushed off and buried itself in the sand, shortly afterwards it pushed its head out again. November 18, 1933." (P. J. D.).

Amphibolurus adelaidensis (Gray)

Grammatophora muricata var. *adelaidensis* Gray, 1841, in Grey's Journ. Exped. West. Austral., **2**, p. 439: Swan River, Western Australia.

Amphibolurus pulcherrimus Boulenger, 1885, Cat. Lizards Brit. Mus., **1**, p. 388, pl. xxx, fig. 2: Western Australia.

Amphibolurus pallidus Boulenger, 1885, Cat. Lizards Brit. Mus., **1**, p. 388, pl. xxx, fig. 3: Perth, Western Australia.

1 (M. C. Z. 24539) Geraldton, W. A. (J. Clark) 1927.

A. adelaidensis might possibly be treated as the western representative of *muricatus* and one suspects that the solitary record of *muricatus* from Western Australia collected by Mr. Gilbert should be referred to *adelaidensis* if its locality data is correct. Our material consists of a single juvenile measuring 60 (27+33) mm. It has both gulars and ventrals keeled, is very pale though showing the angular dorsal markings of *adelaidensis*. Zietz (1920, p. 196) has already united *pulcherrimus* with *adelaidensis* and *pallidus* scarcely seems worthy of distinction.

Amphibolurus diemensis (Gray)

Grammatophora muricata var. *diemensis* Gray, 1841, in Grey's Journ. Exped. West. Austral., **2**, p. 439: Tasmania.

Grammatophora angulifera Gray, 1844, Zoöl. Erebus and Terror, Rept., pl. xviii, fig. 3: Tasmania.

Amphibolurus muricatus Barbour (not of Shaw), 1914, Proc. Biol. Soc. Washington, **27**, p. 203.

1 (M. C. Z. 1109) Australia (No further history) N. D.
1 (M. C. Z. 2225) Sydney, N. S. W. (W. Keferstein) 1865.
1 (M. C. Z. 5510) Hobart, T. (Peabody Mus.) 1886.
1 (M. C. Z. 9488) Wentworth Falls, N. S. W. (H. L. Clark) 1913.
3 (M. C. Z. 32965–7) Mt. Kosciusko, N. S. W. (Harvard Exped.) 1931.
1 (M. C. Z. 32968) Kurrajong Heights, N. S. W. (W. E. Schevill) 1931.
1 (M. C. Z. 35273) Faulconbridge, N. S. W. (W. E. Schevill) 1932.
2 (M. C. Z. 35274–5) Mt. Wilson, N. S. W. (P. J. Darlington) 1932.
2 (M. C. Z. 35276–7) Blackheath, N. S. W. (P. J. Darlington) 1932.

This species has often been confused with its near, but larger, relative, *muricatus*. Partly, perhaps, because the key characters given by Boulenger (1885, p. 381) are somewhat inconstant and for *angulifer* (*i.e. diemensis*) call for the absence of a dorsal crest or serrated ridge. While actually this is the case, there is a series of enlarged, strongly keeled scales along the vertebral line, but while these are well-separated in *diemensis* their homologues in *muricatus* are contiguous so as to form a crest. In *muricatus* they lie between two similar ridges forming almost perfect parallel lines until converging upon the tail; in *diemensis* these ridges are strongly undulating or zigzag.

The adpressed hind limb reaches to the tympanum or to the posterior corner of the eye; femoral and preanal pores in the males 8–19. Young specimens are much speckled with brown below, adults less conspicuously so. Number 32965, taken December 10–14, 1931, only 130 mm. in total length, holds eggs measuring 14 x 9 mm. The largest ♂ (No. 2225) measures 178 (63+115) mm., and ♀ (No. 9488) 207 (70+137) mm.

Amphibolurus muricatus (Shaw)

Lacerta muricata Shaw, 1790, in White's Journ. Voyage N. S. W., App., p. 244, pl. xxxi, fig. 1: New South Wales.

1 (M. C. Z. 1076) Melbourne, V. (F. Müller) 1863.
6 (M. C. Z. 2868) Australia (No further history) N. D.
1 (M. C. Z. 5812) Australia (C. H. Foster) 1874.
1 (M. C. Z. 6299) Mt. Kosciusko, N. S. W. (Australian Mus.) 1890.
1 (M. C. Z. 6756) Queensland (T. Barbour don.) 1903.
1 (M. C. Z. 19629) Sydney, N. W. S. (Basel) Mus.) 1924.
1 (M. C. Z. 33010) Mt. Kosciusko, N. S. W. (Harvard Exped.) 1931.
1 (M. C. Z. 35278) Blackheath, N. S. W. (P. J. Darlington) 1932.
2 (M. C. Z. 35279–80) Hartley Vale, N. S. W. (P. J. Darlington) 1932.
1 (M. C. Z. 35281) Herveys Range, N. S. W. (W. E. Schevill) 1932.

The adpressed hind limb reaches to the tympanum or posterior corner of the eye; femoral and preanal pores in nine males 12–18, average 16. The largest ♂ (No. 2868) measures 321 (106+215) mm., and ♀ (No. 35280) 278 (92+186) mm.

Amphibolurus barbatus barbatus (Cuvier)

Agama barbatus Cuvier, 1829, Règne Animal. (2nd ed.), **2**, p. 35: Australia.
Amphibolurus vitticeps Ahl, 1926, Zoöl. Anz. Leipzig, **47**, p. 189: Australia.

skull (M. C. Z. 2219) Sydney, N. S. W. (W. Keferstein) 1865.
5 (M. C. Z. 2867, 2869) Australia (No history) N. D.
skeleton (M. C. Z. 3102) Melbourne, V. (F. Müller) 1864.
skeleton (M. C. Z. 4283) Australia (E. Gerrard) 1877.
1 (M. C. Z. 6300) Brisbane, Q. (Australian Mus.) 1890.
2 (M. C. Z. 7494–5) Rockhampton, Q. (T. Barbour don.) 1903.
skull (M. C. Z. 32236) Australia (No history) N. D.
1 (M. C. Z. 35282) The Coorong, S. A. (W. E. Schevill) 1932.
1 (M. C. Z. 35283) Soda Creek, Q. (W. E. Schevill) 1932.
1 (M. C. Z. 35284) Wallerawang, N. S. W. (W. E. Schevill) 1932.
1 (M. C. Z. 35285) 20 mi. N. of Alice Springs, N. T. (W. E. S.) 1932.
Soda Creek is N.W. of Hughenden.

Notwithstanding its author's belief that *vitticeps* is most closely related to *inermis* De Vis and that its ventral scales are "glatt," I believe *vitticeps* to be based on a young (176 mm.) example of the common Bearded Lizard.

Femoral and preanal pores in six males 15–20, rather fewer in females. The largest ♂ (No. 35284) measures 501 (225+276) mm., and ♀ (No. 35285) 521 (221+300) mm. The latter, shot on September 1932, is bloated with 22 eggs measuring approximately 30 x 16 mm.

"When the large female (No. 35285) was first seen running on light-colored sand it appeared to be practically all yellow except for the posterior half of the tail, which was ringed with black, and the anterior lateral and genal spines, which were red. She then hid under dead mulga branches and, except for belly and a few faint grey markings on the back, was completely black when picked up. On being preserved was all black above, except for knees, elbows, toes, fingers, pre-pelvic neural scutes, anterior marginal spines, genal spines, and most of head above mouth (except for supraorbital areas and a patch in the occipital region). These non-black areas showed pale yellow." (W. E. S.)

Amphibolurus barbatus minor Sternfeld

Amphibolurus barbatus minor Sternfeld, 1919, Mitt. Senckenb. Naturf. Gesell., **1**, p. 78: Hermannsburg Mission, Upper Finke River, Northern Territory.

Cotype (M. C. Z. 22418) Hermannsburg, N. T. (M. v. Leonhardi) 1910.
1 (M. C. Z. 31877) Broome, W. A. (H. L. Clark) 1929.
2 (M. C. Z. 35286–7) Teatree Well, N. T. (W. E. Schevill) 1932.

The Broome specimen, an old male, is slightly intermediate between this excellent race and the typical form, it shows something of a "beard" in the centre of the throat. This ♂ measures 370 (135+235) mm., while the Teatree ♂ measures 355 (122+233) mm., and ♀ 320 (117+203) mm.

Amphibolurus barbatus minimus Loveridge

Amphibolurus barbatus minimus Loveridge, 1933, Proc. New Engl. Zoöl. Club, **13**, p. 69: West Wallaby Island, Houtman's Albrolhos, Western Australia.

3 (M. C. Z. 32969-71) Geraldton, W. A. (W. E. Schevill) 1931.
10 (M. C. Z. 32972–79) West Wallaby Id., W. A. (G. M. Allen) 1931.

The above are the type series of this small western race which differs from the typical form in its much smaller size, the gravid female type measuring 335 mm., as against a gravid female *barbatus* of 521 mm.

At the time I described this race, I had overlooked the following interesting note by Mr. Schevill, written during his stay on West Wallaby Island, October 10–23, 1931.

"*Amphibolurus sp.*, called *barbatus* (Cuvier) by Alexander, Glauert, and others, but unlike Waite's figures, the most frequently seen of all local reptiles. It occurs all over the island in both sandy and rocky areas. Lighter phase in sand and open rocky country, darker in bush. Frequently found in or on top of bushes, as well as on the ground. (The same species was seen on the ground and in low bushes in the Geraldton dunes.) Showed great variation in intensity of markings, apparently to a slight degree, at least, voluntary. When alarmed or angry it extends ribs, exaggerating the width and depressed form of the body, at the same time opening the mouth wide, displaying the yellow interior." (W. E. S.)

Tympanocryptis lineata lineata Peters

Tympanocryptis lineata Peters, 1864 (1863), Monatsb. Akad. Wiss. Berlin, p. 230: near Adelaide, South Australia.

♂ (M. C. Z. 33017) Forrest, W. A. (Harvard Exped.) 1931.

Forrest is a station on the transcontinental railway; it is almost on the border of South Australia. Ventral scales almost smooth. Total length 143 (53+90) mm.

Tympanocryptis lineata centralis Sternfeld

Tympanocryptis lineata centralis Sternfeld, 1925, Abh. Senckenb. Naturf. Gesell., **38**, p. 234: Hermannsburg Mission, Upper Finke River, Northern Territory.

Cotype (M. C. Z. 21885) Hermannsburg, N. T. (M. v. Leonhardi) 1910.
♀ (M. C. Z. 35228) Hermannsburg, N. T. (W. E. Schevill) 1932.

The grounds on which Sternfeld based this race are somewhat slender. He believed that *centralis* had a longer tail than *lineata*. Thus the length from snout to anus in *lineata* is included in the length of tail 1.1 (Boulenger's S. Australian specimen) to 1.7 (M. C. Z. 33017) times. In the eight cotypes of *centralis* 1.2 to 1.5 times in the females, 1.5 to 1.6 times in the males. In addition *centralis* lacks the prominent, outer lateral, white lines of the typical form. Another character, observable in our scanty material, might be added. Our male *T. l. lineata* has almost smooth ventral scales, while those of the two female *T. l. centralis* are strongly keeled. The larger ♀ (No. 35228) measures 113 (50+63) mm. This lizard, taken in September, is distended with large eggs in which there are no signs of embryos. Lucas and Frost (1896, p. 132) state that from 9–12 eggs are laid in February or March.

Tympanocryptis cephalus Günther

Tympanocryptis cephalus Günther, 1867, Ann. Mag. Nat. Hist. (3), **20**, p. 52: Nicol Bay, Western Australia.

Tympanocryptis tetraporophora Lucas & Frost, 1895, Proc. Roy. Soc. Victoria **7**, p. 265: Adminga and Dalhousie, South Australia.

♀ (M. C. Z. 7496) Central Australia (W. A. Horn) 1910.

This specimen was received in exchange from the American Museum of Natural History in 1910.

Lucas and Frost differentiated their *tetraporophora* on the grounds of it possessing four pores, i.e. a preanal and femoral on either side. Later, they (1896, p. 131) published a note on additional material from the type localities, which are just across the border from the Northern Territory (formerly Central Australia). Zietz (1920, p. 198) considered both *cephalus* and *tetraporophora* synonyms of *lineata* but in that I think he was mistaken; one imagines from the literature that these related species may have been confused. Kinghorn (1932, p. 360)

resurrects *cephalus* as a race of *lineata*. I doubt if such a course is permissible on geographical grounds. His very interesting note contains important observations and extends the range to Ardmore in northwestern Queensland.

Nostril much nearer the eye than to the tip of the snout; upper head scales larger and with fewer keels than in *lineata;* being a female it has no pores. Total length 125+ (57+68+) mm., tip of tail missing.

Diporiphora bilineata Gray

Diporiphora bilineata Gray, 1842, Zoöl. Miscell., p. 54: Port Essington, Northern Territory.

Grammatophora calotella Günther, 1867, Ann. Mag. Nat. Hist., (3), **20**, p. 52: Cape York, Queensland.

Diporophora brevicauda De Vis, 1884, Proc. Roy. Soc. Queensl., **1**, p. 99: Cape York, Queensland.

Diporophora pentalineata De Vis, 1884, Proc. Roy. Soc. Queensl., **1**, p. 99: Cape York, Queensland.

Diporophora bilineata Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 6. Barbour, 1914, Proc. Biol. Soc. Washington, **27**, p. 203.

Physignathus nigricollis Lönnberg & Andersson, 1915, Svenska. Vetensk-Akad. Handl. Stockholm, **52**, No. 7, p. 4: Cooktown, Cape York, Queensland.

1 (M. C. Z. 6467) Queensland (Barrier Reef Exped.) 1896.
2 (M. C. Z. 9497–8) Prince of Wales Id., T. S. (H. L. Clark) 1913.
2 (M. C. Z. 10205–6) Mapoon, Q. (Australian Mus.) 1914.
11 (M. C. Z. 35215–21) Coen, Q. (P. J. Darlington) 1932.

On looking up Gray's original description of both genus and species, I note that he spells the genus Diporiphora; it will be regrettably necessary to revert to this spelling instead of Diporophora.

It is probable that No. 6467 is a topotype of *Physignathus nigricollis* Lönnberg and Andersson, for most of the Barrier Reef Expedition's mainland material came from Cooktown. After synonymising *nigricollis* with *bilineata* I came across a note by Longman (1916, p. 51) in which he makes a similar suggestion.

All our specimens are characterized by an absence of a gular fold. The smallest lizard (No. 35215) is uniformly plumbeous above so that it would appear that the dorsal blotches and light dorsolateral lines are a later development. The largest lizard (No. 9497) measures 213 (65+148) mm.

Diporiphora australis (Steindachner)

Calotelia australis Steindachner, 1867, Reise Oesterr. Freg. Novara., Rept., p. 29, pl. i, fig. 9: Australia.

Grammatophora macrolepis Günther, 1867, Ann. Mag. Nat. Hist., (3), **20**, p. 51: Australia.

Diporophora nuchalis De Vis, 1884, Proc. Roy. Soc. Queensl., **1**, p. 98: no locality mentioned except "central and south coast district" (? of Queensland).

Diporophora ornata De Vis, 1884, Proc. Roy. Soc. Queensl., 1, p. 99: locality as last.

1 (M. C. Z. 10162) Gayndah, Q. (Australian Mus.) 1914.

1 (M. C. Z. 10538) Queensland. (Queensland Mus.) 1914.

A gular fold; tail twice as long as the body. Larger lizard (No. 10162) measures 200+ (73+127+) mm., tip of tail missing.

Diporiphora winneckei Lucas & Frost

Diporiphora winneckei Lucas & Frost, 1895, Proc. Roy. Soc. Victoria, **8**, p. 3: Charlotte Waters, Northern Territory.

1 (M. C. Z. 22371) Hermannsburg, N. T. (M. v. Leonhardi) 1927.

3 (M. C. Z. 35222–4) Hermannsburg, N. T. (W. E. Schevill) 1932.

A gular fold; throat and abdomen prominently streaked with grey. Largest lizard (No. 35222) measures 212 (60+152) mm.

Physignathus gilberti gilberti (Gray)

Lophognathus gilberti Gray, 1842, Zoöl. Miscell., p. 53: Port Essington, Northern Territory.

Redtenbacheria fasciata Steindachner, 1867, Reise Oesterr. Freg. Novara. Rept., p. 31: Australia.

Physignathus incognitus Ahl, 1926, Zoöl. Anz. Leipzig, **67**, p. 190: Australia.

1 (M. C. Z. 28661) Groote Eylandt, N. T. (British Mus.)1929.

3 (M. C. Z. 31889–91) Broome, W. A. (H. L. Clark) 1929.

The young Groote Eylandt lizard was received from the British Museum as *gilberti;* it agrees with the Broome series in having the nostril situated a trifle nearer the end of the snout than to the eye. Boulenger (1885, p. 396) states of *gilberti*, however, "nostril a little nearer the orbit than to the tip of the snout". Ahl based his *incognitus* on a female in which the nostril was equidistant between the orbit and the end of the snout. To judge by our large series of *longirostris* this is an inconstant character within the genus Physignathus, it differs as between adult and young of *P. gilberti centralis* from the same locality.

Keels of the upper dorsal series forming parallel lines with the dorsal crest. Largest lizard (No. 31890) measures 320+ (100+220+) mm., tip of tail missing.

Physignathus gilberti centralis Loveridge

Physignathus gilberti centralis Loveridge, 1933, Proc. New Eng. Zoöl. Club, **13**, p. 71: Anningie, Northern Territory.

Type (M. C. Z. 35207) Anningie, N. T. (W. E. Schevill) 1932.

Anningie is about thirty miles in a westerly direction from Teatree Well.

The paratype No. 35208 has been sent to the Australian Museum, Sydney.

Characterized by the shorter hind limbs which only reach the eye; smaller ventral scales; dorsal crest extending on to the tail. Total length of ♂ type 273+ (103+170+) mm., tip of tail missing.

Physignathus longirostris (Boulenger)

Lophognathus longirostris Boulenger, 1883, Ann. Mag. Nat. Hist., (5), **12**, p. 225: Champion Bay and Nicol Bay, Western Australia.

2 (M. C. Z. 33015–6) Lake Violet, W. A. (W. E. Schevill) 1931.

2 (M. C. Z. 35195–6) Birchip Downs, N. T. (W. E. Schevill) 1932.

17 (M. C. Z. 35197–206) Hermannsburg, N. T. (W. E. Schevill) 1932.

Birchip Downs is 40 miles W. of Barrow Creek Tel. Stn.

I am undecided whether to employ the name *P. l. quattuorfasciatus* Sternfeld for these lizards of which the Hermannsburg series are topotypes; the Birchip Downs specimens are certainly of the same form, while those from Lake Violet appear indistinguishable. Reasoning from analogy one would expect *quattuorfasciatus* to be a valid race like the majority of Sternfeld's forms. In the absence of topotypical material of *longirostris* Boulenger I must leave the status of *quattuorfasciatus* an open question.

All our specimens, including those from Lake Violet, have the four stripes of Sternfeld's race and though Boulenger, in describing *longirostris* makes no mention of the faint lower ones, it is possible that he considered them of no significance. It is important to note that Boulenger had only one adult female and two young lizards as types, for there is a tendency to reduction of the number of femoral pores in females. The following data is now available:

5–8 femoral pores in Boulenger's cotypes of *longirostris*.

8–10 femoral pores in Sternfeld's cotypes from Hermannsburg.

6–11 femoral pores in the M.C.Z. series from Hermannsburg, average 8.7.

9–12 femoral pores in the M.C.Z. specimens from Birchip Downs.

7–8 femoral pores in M.C.Z. specimens from Lake Violet.

The shorter snout of *quattuorfasciatus* is inconstant, the nostril probably averages being equidistant between the end of the snout and the anterior corner of the orbit, in some it is a little nearer the orbit. That our material represents *longirostris* rather than *temporalis* of Port Essington seems certain for the clear, longitudinal, lateral stripes are not impinged upon by any dark, transverse bars. As the diameters of their tympana are equal to (in young) or larger than the eye-openings, they cannot represent *eraduensis* Werner.

These lizards were "often found in trees along the shores of Lake Violet. If surprised upon the ground they frequently took refuge in trees, where they climbed to a height of at least six feet, probably more." (W.E.S.)

Physignathus lesueurii (Gray)

Lophura lesueurii, Gray, 1831, in Griffith's Cuvier, Animal King., **9**, Syn., p. 60: "Paramatta" (New South Wales.)

Amphibolurus heterurus Peters, 1867, Monatsb. Akad. Wiss. Berlin, 1866 (1867), p. 86: Clarence River, New South Wales.

Amphibolurus branchialis De Vis, 1884, Proc. Roy. Soc. Queensl., **1**, p. 55: Brisbane, Queensland.

Gonyocephalus spinipes Barbour (not of Duméril), 1914, Proc. Biol. Soc. Washington, **27**, p. 203.

1 (M. C. Z. 4499) Queensland (H. A. Ward) N. D.
1 (M. C. Z. 9487) Kuranda, Q. (H. L. Clark) 1913.
1 (M. C. Z. 10176) Ourimbah, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 27218) Brooklana, N. S. W. (G. C. Crampton) 1928.
1 (M. C. Z. 35209) Blackheath, N. S. W. (P. J. Darlington) 1932.
1 (M. C. Z. 35210) Hartley Vale, N. S. W. (P. J. Darlington) 1932.
4 (M. C. Z. 35211–4) Lake Barrine, Q. (W. E. Schevill) 1932.

Femoral pores 14–23 on each side; curiously enough the lowest number was found on the largest old male (No. 35211) which measures 700+ (260+440+) mm., tip of tail missing, regenerating and forked.

Chlamydosaurus kingii Gray

Chlamydosaurus kingii Gray, 1827, in King's Voy. Austral., **2**, p. 425, pl. A: Port Nelson, Kimberley.

Chlamydosaurus Kingi Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, no. 1, p. 6.

1 (M. C. Z. 5204) Australia (No further history) N. D.
1 (M. C. Z. 5226) Australia (H. A. Ward) 1884.
4 (M. C. Z. 6465–6) Queensland (E. A. Olive) 1896.
1 (M. C. Z. 7493) Rockhampton, Q. (T. Barbour don.) 1903.
1 (M. C. Z. 35225) Coen, Q. (P. J. Darlington) 1932.

The largest Frilled Lizard (No. 35225) measures 638 (218+420) mm.

Moloch horridus Gray

Moloch horridus Gray, 1841, in Grey's Journ. Exped. West. Austral., **2**, p. 441, pl. ii: Western Australia.
1 (M. C. Z. 5131) York district, W. A. (H. St. George Ord) 1883.
1 (M. C. Z. 6980) South Australia (T. Barbour don.) 1903.
1 (M. C. Z. 12318) Interior of W. A. (Dr. A. Garrett) 1917.
1 (M. C. Z. 33011) Ooldea, S. A. (Australian Mus.) 1931.
3 (M. C. Z. 33012–4) Nr. Mullewa, W. A. (I. M. Dixson) 1931.
1 (M. C. Z. 35226) Birchip Downs, N. T. (W. E. Schevill) 1932.
1 (M. C. Z. 35227) Teatree Well, N. T. (W. E. Schevill) 1932.

The largest Thorny Devil is a female (No. 35227) bloated with eggs which measure approximately 25 x 15 mm., September, 1932. This ♀ measures 192 (112+80) mm.

VARANIDAE

Varanus salvator (Laurenti)

Stellio salvator Laurenti, 1768, Syn. Rept., p. 56: "Zeylania ad littora maris."
2 (M. C. Z. 6723) Australia (T. Barbour don.) 1903.

The larger measures only 388 (150+238) mm., but the species is represented in the collection by a score of monitors from the Philippine Islands, Sarawak, Borneo, and Java.

Varanus indicus (Daudin)

Tupinambis indicus Daudin, 1802, Hist. Rept., **3**, p. 46, pl. xxx: ? "Indiae orientalis."
2 (M. C. Z. 4433) Murray Is., T. S. (E. Gerrard) 1879.
1 (M. C. Z. 35030) Lankelly Creek, Q. (P. J. Darlington) 1932.
1 (M. C. Z. 35031) Rocky Scrub, McIlwraith Range, Q. (P. J. D.) 1932.

Both the last mentioned localities in the McIlwraith Ranges, northern Queensland. The largest monitor (No. 35031) measures 1005+(425+580+) mm., tip of the tail missing.

Varanus varius varius (Shaw)

Lacerta varia Shaw, 1790, in White's Journ. Voyage N. S. W., App. p. 253, pl.: New South Wales.

1 (M. C. Z. 5217) Victoria (H. A. Ward) 1874.
2 (M. C. Z. 19973–4) Australia (Zoöl. Soc. London) 1925.

The largest of these fine monitors (No. 19973) measures 1660 (640+1020) mm.

Varanus varius bellii Duméril & Bibron

Varanus bellii Duméril & Bibron, 1836, Erpét. Gén., p. 493, pl. xxxv: Australia.

1 (M. C. Z. 35032) Near Baldry, N. S. W. (W. E. Schevill) 1932.

This monitor from Baldry (Balderodgery on old maps) is darker on the sides of the face than is represented in Duméril's figure of the type. Its immaculate belly as well as its dorsal coloration is so totally different from that of the typical form that one suspects it may be a full species. Zietz (1920, p. 201) includes it with the typical form and gives their range as Western Australia! See also Procter (1923, p. 1072). Total length 1410 (510+900) mm.

"Shot out of a dead Eucalyptus about three miles west of Baldry." (W. E. S.)

Varanus gouldii (Gray)

Hydrosaurus Gouldii Gray, 1838, Ann. Nat. Hist., **1**, p. 394: Australia.

3 (M. C. Z. 2866) Australia (No further history) N. D.
1 (M. C. Z. 31898) Nr. Night Cliff, N. T. (H. L. Clark) 1929.
1 (M. C. Z. 33020) Mullewa, W. A. (W. E. Schevill) 1931.
1 (M. C. Z. 33021) Pindawa Stn., W. A. (J. McCallum Smith) 1931.
2 (M. C. Z. 33022–3) Lake Violet, W. A. (W. E. Schevill) 1931.
1 (M. C. Z. 35033) Flinders River, Q. (W. E. Schevill) 1932.
1 (M. C. Z. 35034) Coalbrook, Q. (W. E. Schevill) 1932.
1 (M. C. Z. 35035) Grampian Valley, Q. (L. A. Stevens) 1932.
1 (M. C. Z. 35036) E. of Julia Creek, Q. (W. E. Schevill) 1932.
1 (M. C. Z. 35037) Hermannsburg, N. T. (W. E. Schevill) 1932.
4 (M. C. Z. 35038–41) Birchip Downs, N. T. (W. E. Schevill) 1932.
2 (M. C. Z. 35042–3) Alice Springs, N. T. (W. E. Schevill) 1932.
1 (M. C. Z. 35044) Nr. Trewilga, N. S. W. (W. E. Schevill) 1932.

Night Cliff is near Darwin; Pindawa is 35 miles southeasterly from Mullewa; Lake Violet is three miles from Wiluna; Coalbrook and Grampian Valley are near Richmond; Trewilga is five miles south of Peak Hill.

Not one of these monitors has an immaculate belly as would appear to be the case with *V. giganteus* (Gray). On the other hand several

have transverse rows of large dorsal spots as in *giganteus*, and the distance from the anterior corner of the eye to the end of the snout is greater than from the anterior corner of the eye to the anterior border of the ear in the larger examples, in which respect they agree with *giganteus;* an age, rather than a specific character perhaps. On the other hand in none is the nostril more than twice as far from the orbit as from the end of the snout. The largest monitor (No. 35035) measures 1292 (640+652) mm.

"Native name *(I)luaitchirra* at Birchip Downs, where dug out of burrows, in September. The Trewilga specimen ran up a tree from which it was shot." (W. E. S.)

Varanus spenceri Lucas & Frost

Varanus spenceri Lucas & Frost, 1903, Proc. Roy. Soc. Victoria, **7**, p. 145: Tablelands 50 miles n.e. of Tennant's Creek, Central Australia.

Varanus ingrami Boulenger, 1906, Ann. Mag. Nat. Hist. (7), **18**, p. 440: Alexandria, Northern Territory.

Though this species is unrepresented in the collections of the Museum of Comparative Zoölogy, a perusal of the description leaves little doubt that Boulenger, in describing *ingrami* from a skin, overlooked Lucas and Frost's description of *spenceri*, of which I consider *ingrami* a synonym.

Varanus prasinus (Schlegel)

Monitor prasinus Schlegel, 1844, Abbild. Amphibien, p. 78: west coast of New Guinea.

1 (M. C. Z. 4435) Cornwallis Id., T. S. (E. Gerrard) 1877.

A very young example measuring 211 (85+126) mm. The Museum would welcome an example of the related *boulengeri* described from Coquet Island, Howich Group, by Kinghorn.

Varanus punctatus punctatus (Gray)

Odatria punctata Gray, 1838, Ann. Nat. Hist., **1**, p. 394: Sharks Bay, Western Australia.

Monitor tristis Schlegel, 1884, Abbild. Amphibien, p. 73: Swan River, Western Australia.

2 (M. C. Z. 35049–50) Teatree Well, N. T. (W. E. Schevill) 1932.

2 (M. C. Z. 35051–52) Hermannsburg, N. T. (W. E. Schevill) 1932.

The Teatree monitors are adult with dark heads and necks; their tails are uniformly black except at the base. The Hermannsburg specimens are young, one very young; the latter has the head punctate

with yellow spots, while its companion is already assuming the darker head and neck of the adults. These young reptiles also resemble our paratype of *orientalis* in the shape of their scales rather than those of the adults which are tectiform. The adult ♂ (No. 35049) measures 602+(252+350+) mm., tip of tail missing.

"Native name *Albóngara* at Teatree Well. Found in hollow trees." (W. E. S.)

Varanus punctatus orientalis Fry

Varanus punctatus var. *orientalis* Fry, 1913, Rec. Austral. Mus. Sydney, **10**, p. 18, figs. 7–10: Eidsvold, Upper Burnett River, Queensland.

1 (M. C. Z. 4136) Australia (E. Gerrard) 1877.
2 (M. C. Z. 4434) Murray Id., T. S. (E. Gerrard) 1874.
1 (M. C. Z. 7492) Rockhampton, Q. (T. Barbour don.) 1903.
Paratype (M. C. Z. 10267) Eidsvold, Q. (T. L. Bancroft) 1914.
1 (M. C. Z. 35048) Anakie, Q. (J. Kahler) 1932.

The Murray Island monitors were received as *timorensis* but on comparing them with examples of that species from Timor, collected and determined by Dr. Malcolm Smith, they were found to agree rather with the *punctatus* group. The adult ♂ possesses tufts of spinous scales near the anus and has 90 rows of abdominal scales between the anus and the gular fold. Boulenger, who doubtless identified these two lizards, recorded (1885, p. 323) *timorensis* from Murray Island. If these Murray Island specimens are correctly identified with *orientalis* of which No. 10267 is a paratype, Fry's characters do hold; the larger monitor (No. 4434) measures 494 (207+287) mm.

Varanus gilleni Lucas & Frost

Varanus gilleni Lucas & Frost, 1895, Proc. Roy. Soc. Victoria, **7**, p. 266: Between Glen Edith and Deering Creek, also Charlotte Waters, Northern Territory.

1 (M. C. Z. 33521) Finke River, N. T. (M. v. Leonhardi) 1932.
2 (M. C. Z. 35053–4) Hermannsburg, N. T. (W. E. Schevill) 1932.

Breast and belly, as well as the throat, spotted with brown. The largest monitor (No. 35053), a ♂ if one may judge by the group of small spines on either side of the anus, measures 294+(137+157+) mm., tip of tail missing.

Varanus caudolineatus Boulenger

Varanus caudolineatus Boulenger, 1885, Cat. Lizards Brit. Mus., **2**, p. 324, pl. xviii: Champion Bay, Western Australia.

1 (M. C. Z. 24546) Yalgoo, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 33018) Pindawa, W. A. (P. J. Darlington) 1931.
1 (M. C. Z. 33019) Mullewa, W. A. (P. J. Darlington) 1931.
Pindawa is 35 miles from Mullewa.

The expedition failed to secure examples of the closely related *brevicaudus* Boulenger. The largest of the three monitors listed above (No. 24546) measures 236 (108+128) mm.

Varanus eremius Lucas & Frost

Varanus eremius Lucas & Frost, 1895, Proc. Roy. Soc. Victoria, **7**, p. 267: Idracowra, Northern Territory.
1 (M. C. Z. 33522) Finke River, N. T. (M. v. Leonhardi) 1932.
7 (M. C. Z. 35055–61) Hermannsburg, N. T. (W. E. Schevill) 1932.

The Hermannsburg Mission is on the Upper Finke River in the former political area of Central Australia. M. von Leonhardi, in charge of the mission, collected for the Senckenberg Museum, from which our first examples of both *gilleni* and *eremius* were received. The largest monitor (No. 35055) measures 398 (145+253) mm.

Of number 35056, Mr. Schevill writes: "Shortly after being dropped into water, it vomited a mouse." (W. E. S.)

Varanus acanthurus brachyurus Sternfield

Varanus acanthurus brachyurus Sternfeld, 1919, Mitt. Senckenb. Naturf. Gesell., **1**, p. 78: Hermannsburg Mission, Upper Finke River, Northern Territory.
1 (M. C. Z. 29791) Broome, W. A. (H. L. Clark) 1929.
1 (M. C. Z. 35045) Alice Springs, N. T. (W. E. Schevill) 1932.
2 (M. C. Z. 35046–7) Birchip Downs, N. T. (W. E. Schevill) 1932.

The type locality of typical *acanthurus* is northwest Australia. That being the case one would expect the Broome lizard to be more or less typical, however, I am assured by Mr. W. E. Schevill and others that the term "northwest" is used in a very vague sense by residents in the populous regions around Perth and is often applied loosely to Western Australia north of the chief settled area. It is probable, therefore, that the type of *acanthurus* came from somewhere south of Broome.

The Broome specimen conforms to Sternfeld's definition of *brachyurus* and this is in line with other records which show that many central Australian forms extend westward to Broome. The head and body length of the Broome monitor are contained 1.31 times in the

length of the tail, the others 1.2 and 1.6 times. Sternfeld's type series ranged from 1.31 to 1.76 times as against 2.0 times in the typical form.

Sternfeld cites a second character, that of relative limb length, but is in error in stating that the hind limb of Boulenger's type is exactly half as long as the trunk without head and neck, for Boulenger's figures for the trunk are 135 mm., and 90 mm. for the hind limb. If the length of the hind limb is divided into the length from snout to anus it is 2.2 times in the type of *acanthurus;* 2.6 to 3.0 times in the four cotypes of *brachyurus;* 2.9 times for the Broome lizard.

Our largest monitor (No. 35046) measures 622 (350+272) mm.

"Native name *Kirrikirra* near Birchip Downs. ♂ and ♀ dug from shallow burrows one foot deep and two or three feet long." (W. E. S.)

SCINCIDAE

Egernia luctuosa (Peters)

Cyclodus (Omolepida) luctuosus Peters, 1866, Monatsb. Akad. Wiss. Berlin, p. 90: King George Sound, Western Australia.

4 (M. C. Z. 33101–4) Pemberton, W. A. (Harvard Exped.) 1931.

Midbody scale-rows 24–25; dorsals almost smooth. Largest skink (No. 33102) measures 325 (125+200) mm.

Kinghorn (1932, p. 359) discusses the interesting variations displayed by a topotype.

"Most of these skinks were taken in rat traps set at the edge of a swamp." (P. J. D.)

Egernia whitii whitii (Lacépède)

Scincus whitii Lacépède 1804, Ann. Mus. Paris, **4**, p. 192: Australia.

Lygosoma moniligera Duméril & Bibron, 1839, Erpét. Gén., **5**, p. 736: Australia.

1 (M. C. Z. 1078) Hobart, T. (J. W. Robertson) 1860.

1 (M. C. Z. 2133) Australia (A. A. Duméril) 1865.

1 (M. C. Z. 2221) Sydney, N. S. W. (W. Keferstein) 1865.

1 (M. C. Z. 6301) Mt. Kosciusko, N. S. W. (Australian Mus.) 1914.

3 (M. C. Z. 33121–3) Thredbo River, N. S. W. (Harvard Ex.) 1931.

The Thredbo River is near Mount Kosciusko.

Number 2133 is believed to be a cotype of *L. moniligera* Duméril & Bibron; in this connection see remarks under *E. napoleonis* (Gray).

Midbody scale-rows 32–38; dorsals smooth. The frontonasal, in contact with the frontal in the Hobart, Australia, and Sydney lizards, is widely separated in the four from Mt. Kosciusko. If, therefore,

these all represent one race, then this character, which is used by Kinghorn (1931, p. 88) for distinguishing *E. w. carnarae* from Canara, North West Cape, Western Australia, fails though *carnarae* is undoubtedly racially or specifically distinct from *whitii*. Largest skink (No. 33121) measures 219 (81+138) mm.

It would appear as if *E. dahlii* Boulenger (1896, p. 233) from Roebuck Bay, Western Australia, might be a synonym of *E. kintorei* Stirling and Zietz (1893, p. 171) from the northern part of the Victoria desert, south of the Barrow Range. As the latter authors only gave a skeleton description, however, promising a more detailed one later, it is impossible to decide. Zietz (1920, p. 203) referred *kintorei* to the synonymy of *whitii;* it is obviously a good race, more probably a full species.

Egernia inornata Rosén

Egernia inornata Rosén, 1905, Ann. Mag. Nat. Hist., (7), **16**, p. 139, fig. 3: West Australia.

Egernia striata Sternfeld, 1919, Mitt. Senckenb. Naturf. Gesell., **1**, p. 79: Hermannsburg Mission, Upper Finke River, Northern Territory.

2 (M. C. Z. 7497) Central Australia (Horn Expedition) 1896.

Cotypes (M. C. Z. 35525–6) Hermannsburg, N. T. (M. v. Leonhardi) 1908.

10 (M. C. Z. 35289–98) Teatree Well, N. T. (W. E. Schevill) 1932.

10 (M. C. Z. 35300–7) Hermannsburg, N. T. (W. E. Schevill) 1932.

At first I attempted to keep the Teatree Well series distinct as representing *inornata* with 40–46 midbody scale-rows, (the type had 42) but failed. Sternfeld's long series of cotypes ranged from 38–42 but these extremes were only represented by one example of each while the remaining nine had 40 midbody scale-rows. Two distinct color phases, a pale (deserticolor) and a dark (olive) occur at Hermannsburg, but do not appear separable on scale characters.

Midbody scale-rows 38–46, average 41, all smooth; prefrontals broadly or narrowly in contact, or narrowly separated. Largest skinks measure 228 mm., viz. (No. 7497) 93+135 mm., and (No. 35289) 105+123 mm.

The two specimens from Central Australia, received as *whitii*, agree in their color pattern with those described from Alice Springs in the Report on the Horn Expedition. They are brighter than the cotypes, but rather paler than the topotypes, of *striata*. Sternfeld claims that the tail of *striata* is much shorter than that of *whitii*. After eliminating those with damaged or regenerated tails, it was

found that the length from snout to anus is included in that of the tail from:

1.1 to 1.3 times in Sternfeld's 6 cotypes of *striata*
1.2 to 1.3 " " the 5 M. C. Z. topotypes of *striata*
1.3 to 1.4 " " the 2 Central Australian skinks
1.1 to 1.3 " " the 5 Teatree examples
1.3 to 1.4 " " the 2 M. C. Z. examples of *whitii*

so that at best the difference can be but an average one.

Egernia major (Gray)

Tropidolepisma major Gray, 1845, Cat. Liz. Brit. Mus., p. 107: Australia.
1 (M. C. Z. 35299) Ravenshoe, Q. (P. J. Darlington) 1932.

Midbody scale-rows 32, dorsals striated; supraciliaries 10. Total length 452 (176+276) mm.

Longman (1918, p. 37) considers that *bungana* De Vis (1888, p. 814) may be distinguished from *major* by different coloration and habits. De Vis separated his 665 mm. holotype from *major* (470 mm.) on the grounds of larger size, color, and a few trifling characters. I was inclined to think that the change in habits might be correlated with larger size of old specimens, but defer to Longman's personal acquaintance with both species.

Egernia striolata (Peters)

Tropidolepisma striolatum Peters, 1870, Monatsb. Akad. Wiss. Berlin, p. 642: Lake Elphinstone, Queensland.
1 (M. C. Z. 6852) Queensland (T. Barbour don.) 1903.
1 (M. C. Z. 10545) Darling Downs, Q. (Queensland Mus.) 1914.

Midbody scale-rows 30–32, dorsals tri- or quinquecarinate; supraciliaries 7; prefrontals narrowly or broadly in contact. Larger skink (No. 6852) measures 230 (105+125) mm.

Egernia formosa Fry

Egernia formosa Fry, 1914, Rec. W. Austral. Mus., **1**, p. 184, pl. xxvii: Perth, paratypes from Boulder, Western Australia.
14 (M. C. Z. 33067–77) West Wallaby Id., W. A. (Harvard Exped.) 1931.
2 (M. C. Z. 33078–9) Cottesloe Beach, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 33080) Pindawa, nr. Canna, W. A. (W. E. Schevill) 1931.

Cottesloe Beach is near Perth and these specimens are therefore practically topotypes.

Midbody scale-rows 28–32, dorsals smooth, average 30. Largest skink (No. 33070) measures 285 (90+195) mm.

Scanty or no reference has been made to this very distinct species in the literature since described by Fry from eight examples. Our series differ from the description in lacking a curved groove behind the nostril. One wonders if Fry was not mistaken on this point, perhaps from lack of comparative material of *luctuosa*. The same variability in head squamation, as figured by Fry, is to be noted in our series. Fry gives only 28 midbody scale-rows. The throats in our specimens lack brown reticulations.

"Most abundant in rocky areas though occasionally found in sandy saltbush country on West Wallaby Island." (W. E. S.)

Egernia kingii (Gray)

Tiliqua kingii Gray, 1839, Ann. Nat. Hist., **2**, p. 290: Australia.

1 (M. C. Z. 6754) Australia (T. Barbour don.) 1903.

8 (M. C. Z. 33081–8) West Wallaby Id., W. A. (Harvard Exped.) 1931.

Under this name, Boulenger confused three perfectly distinct species or forms. See further discussion below.

Midbody scale-rows 34–36 (on island) to 38 (No. 6754); dorsals tricarinate. Largest skink (No. 6754) measures 468 (228+240) mm., but tail regenerated.

"Seems more abundant in sandy country on West Wallaby Island. It is much more wary than *E. stokesii*, rarely stopping to look until in thick cover; relatively difficult to take alive. Has been taken in dog-tooth rock at edge of tidal flat, though generally found near bushy cover. Unlike *E. stokesii*, this species may cast its tail, though not nearly so readily as do *E. formosa* or the geckoes. It is quite strong and when taken up, writhes actively, using its claws (and teeth if possible) to good advantage. Though apparently much less abundant, in general the species seems to be more intelligent than "*E. stokesii;* in captivity it soon learns to take food directly from the hand, while *E. stokesii* was never observed to take any food, even when left within reach for some hours." (W. E. S.)

Egernia nitida (Gray)

Tropidolepisma nitida Gray, 1845, Cat. Liz. Brit. Mus., p. 106: Australia.

2 (M. C. Z. 24549–50) Augusta, W. A. (W. S. Brooks) 1927.

8 (M. C. Z. 24551–8) Manjimup, W. A. (W. S. Brooks) 1927.

2 (M. C. Z. 24559–60) Pemberton, W. A. (W. S. Brooks) 1927.

1 (M. C. Z. 24561) Perth, W. A. (W. S. Brooks) 1927.

5 (M. C. Z. 33089–93) Margaret River, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 33094) Walleliffe, W. A. (W. E. Schevill) 1931.
6 (M. C. Z. 33095–100) Pemberton, W. A. (Harvard Exped.) 1931.
Walleliffe is near Margaret River.

Distinguished from *E. kingii* by its much smaller size, as judged by gravid females, and distinctive coloration; from *E. napoleonis* (Gray) by sharper keeling of the dorsals and by coloration.

Midbody scale-rows 32–38 (32 Perth only, 38 Margaret River only); dorsals very strongly tricarinate. Largest skink (No. 33091) measures 228 (103+125) mm.

The Manjimup skinks were taken "under logs by clearing on February 4, 1927" (W. S. B.) at which time some of the females were gravid.

Egernia napoleonis (Gray)

Tiliqua napoleonis Gray, 1839, Ann. Nat. Hist., **2**, p. 290: Australia.
Egernia pulchra Werner, 1910, in Michaelsen & Hartmeyer's, Fauna Südwest-Austral. **2**, p. 470, fig. 8: Torbay, Western Australia.
1 (M. C. Z. 2133, part) Australia (A. A. Duméril) 1865.
8 (M. C. Z. 24488–91, 24562–5) Denmark, W. A. (W. S. Brooks) 1927.

Number 2133 may be a cotype of *Tropidolopisma dumerilii* Duméril & Bibron. It was catalogued a decade after it was received together with a juvenile example of *Lygosoma moniligera* Duméril & Bibron. The latter species is a synonym of *E. w. whitii* and may be distinguished from *napoleonis* by its smooth dorsals; otherwise the striking color pattern of *whitii* is common also to *napoleonis* which would appear to be localised in the Denmark-Albany area where so many peculiar forms occur.

E. napoleonis was described by Gray in the paragraph following the description of *E. kingii*. Duméril & Bibron made a composite of the two (and *nitida*?) and redescribed it under the name of *Tropidolepisma dumerilii* varieties A, B, C, and D. Boulenger followed their action in lumping the forms, but under the name of *kingii*. Evidently he considered *napoleonis* to be the young of *kingii* but that this is not the case is obvious from the gravid, embryo-bearing females in the Denmark series which are but little more than half the size of average *kingii*.

Midbody scale-rows 34–38; dorsals bi- or tricarinate. Largest skink (No. 24489) measures 293 (107+186) mm.

Gravid females taken "under logs in burnt land on hill." January 23, 1927. (W. S. B.)

Egernia cunninghami (Gray)

Tiliqua cunninghami Gray, 1832, Proc. Zoöl. Soc. London, p. 40: West Australia, lat. 29°.

1 (M. C. Z. 2514) New South Wales (G. Krefft) 1870.
1 (M. C. Z. 33055) Threadbo River, N. S. W. (P. J. Darlington) 1931.

Threadbo River is at Mount Kosciusko. I should like to have been able to compare these skinks with topotypical Western Australian specimens. I am not sure of the status of the closely allied *E. lohmanni* Werner which was described from a single specimen without locality. The description of the caudal scales read like those of a regenerated tail.

Midbody scale-rows 38 (No. 2514) to 48; dorsals unicarinate. Larger specimen (No. 33055) measures 368 (210+158) mm.

Egernia stokesii (A. Duméril)

Silubosaurus stokesii A. Duméril, 1851, Cat. Méthod. Coll. Rept. Paris, p. 180: Houtman's Abrolhos and Western Australia.

18 (M. C. Z. 33105–19) West Wallaby Id., W. A. (Harvard Ex.) 1931.
1 (M. C. Z. 33120) Morawa, W. A. (J. MacCallum Smith) 1931.

Midbody scale-rows 32–36, average 33; dorsals spinose; frontonasal in contact with the rostral; upper caudal scales unicuspid, rarely bi- or tricuspid (for *e.g.* No. 33113). Largest skink (No. 33120) measures 233 (166+67) mm.

Longman, having examined the type of *Silubosaurus zellingi* De Vis, states that it is undoubtedly synonymous with the present species.

"*Egernia stokesii* occurs alike in all kinds of country all over West Wallaby Island. Shows none of the bluff or aggression of *Amphibolurus;* in sandy country it scuttles for cover in a bush or mutton-bird burrow. When uncovered in rocky country, where several of different sizes are frequently found under one stone, scuttles either beneath the same or another stone or a bush—occasionally attempting to climb inside trouser leg! The distribution of all color phases appears to be quite haphazard, all being found in various associations. The stones between which they pass the day sometimes show quite a polish." (W. E. S.)

Egernia depressa (Günther)

Silubosaurus depressus Günther, 1875, Zoöl. Erebus and Terror, Rept., p. 15: Swan River, Western Australia.

1 (M. C. Z. 10165) Western Australia (Australian Mus.) 1914.
1 (M. C. Z. 10166) Boulder, W. A. (Australian Mus.) 1914.

1 (M. C. Z. 33056) Yalgoo, W. A. (Hills) 1931.
6 M. C. Z. 33057–62) Wiluna, W. A. (D. Crofts) 1931.
4 (M. C. Z. 33063–6) Mullewa, W. A. (P. J. Darlington) 1931.

Midbody scale-rows 32–36, average 34; dorsals trispinose; frontonasal separated from the rostral except in No. 33060; upper caudal scales tricuspid except in the very young (No. 33060), the development of the lateral cusps is well shown in this series. Largest skink (No. 10165) measures 143 (102+41) mm. to tip of terminal spine.

Trachysaurus rugosus (Gray)

Trachysaurus rugosus Gray, 1827, in King's Voy. Austral., **2**, p. 430: King George Sound, Western Australia.

1 (M. C. Z. 9325) Australia (Amsterdam Mus.) 1914.
1 (M. C. Z. 18428) Australia (T. Barbour don.) 1924.
4 (M. C. Z. 24453–6) Denmark, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 24457) Augusta, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 26651) Bunbury, W. A. (T. S. Ledyard) 1927.
1 (M. C. Z. 29792) Largs Bay, S. A. (C. Walton) 1930.
1 (M. C. Z. 33046) Near Mingenew, W. A. (W. E. Schevill) 1931.
1 (M. C. Z. 33047) Swan View, W. A. (P. J. Darlington) 1931.
1 (M. C. Z. 33048) Mullewa, W. A. (P. J. Darlington) 1931.
1 (M. C. Z. 33049) Walleliffe, W. A. (W. E. Schevill) 1931.
1 (M. C. Z. 33050) Pemberton, W. A. (P. J. Darlington) 1931.
1 (M. C. Z. 33051) Mullewa, W. A. (W. E. Schevill) 1931.

Largest skink, a male (No. 26651), measures 344 (265+79) mm.

"Copros of Mullewa specimen contained fragments of large weevils November 9, 1931." (P. J. D.)

Tiliqua scincoides (Shaw)

Lacerta scincoides Shaw, 1790, in White's Journ. Voyage N. S. W., app., p. 242, pl.: Australia.

1 (M. C. Z. 10552) S. Queensland (Queensland Mus.) 1914.
1 (M. C. Z. 31894) Near Broome, W. A. (H. L. Clark) 1929.
1 (M. C. Z. 31895) Darwin, N. T. (H. L. Clark) 1929.
1 (M. C. Z. 33054) Kurrajong Heights, N. S. W. (W. E. Schevill) 1932.
1 (M. C. Z. 35308) Coen, Q. (P. J. Darlington) 1932.

Midbody scale-rows 34; supraoculars 3–6; supraciliaries 3–6; temporals greatly elongate; fore limb shorter than the head. Largest skink (No. 31895) measures 502 (322+180) mm.

Tiliqua nigrolutea Gray

Tiliqua nigroluteus Gray, 1831, in Griffith's Cuvier Animal King., **9**, Syn., p. 68: Australia.

Skull & 4 (M. C. Z. 1077) Hobart, T. (J. W. Robertson) 1862.
1 (M. C. Z. 25930) Western Australia (F. Werner) 1928.

Midbody scale-rows 28–30; supraoculars 4; supraciliaries 5; temporals not greatly enlarged. Largest skink (No. 1077) measures 397 (270+127) mm.

Tiliqua occipitalis occipitalis (Peters)

Cyclodus occipitalis Peters, 1863, Monatsb. Akad. Wiss. Berlin, p. 231: Adelaide, South Australia.

2 (M. C. Z. 33052–3) Mullewa, W. A. (P. J. Darlington) 1931.

Midbody scale-rows 40; supraoculars 2–3; supraciliaries 5–6; auricular lobules 3–4; frontonasal separated from the frontal. Bands on body 4, on tail 3–4. Larger skink (No. 33052) measures 413 (295+118) mm.

Tiliqua occipitalis multifasciata Sternfeld

Tiliqua occipitalis multifasciata Sternfeld, 1919, Mitt. Senckenb. Naturf. Gesell., **1**, p. 79: Hermannsburg Mission, Upper Finke River, Northern Territory.

Tiliqua occipitalis auriculare Kinghorn, 1931, Rec. Austral. Mus. Sydney, **18**, p. 88: Broome, Western Australia.

2 (M. C. Z. 31892–3) Broome, W. A. (H. L. Clark) 1929.
2 (M. C. Z. 35309–10) Birchip Downs, N. T. (W. E. Schevill) 1932.
1 (M. C. Z. 35311) Mt. Peake, N. T. (W. E. Schevill) 1932.
1 (M. C. Z. 35312) Anningie, N. T. (W. E. Schevill) 1932.
2 (M. C. Z. 35313–4) Teatree Well, N. T. (W. E. Schevill) 1932.
2 (M. C. Z. 35315–6) Hermannsburg, N. T. (W. E. Schevill) 1932.

Birchip Downs is 40 miles west of Barrow Creek Telegraph Station; Mt. Peake 50 miles in a northwesterly direction from Teatree Well; Anningie is 30 miles west of Teatree Well. All lie about 150 miles northerly of Hermannsburg Mission in what was formerly known as Central Australia.

It will be observed that our Hermannsburg specimens are topotypes of *multifasciata* while our Broome material is topotypic of *auriculare*. The two alleged races appear indistinguishable, a further instance of the homogeneity of the Broome and central Australian fauna. The type of *auriculare* had 45 midbody scale-rows.

Midbody scale-rows 39–41; auricular lobules usually 5, sometimes 3 or indistinguishable; the frontonasal is separated from the frontal in every specimen which agree closely with Sternfeld's description. Bands on body 12–15, on tail 10–12. Largest skink (No. 35310) measures 365 (250+115) mm.

"Native name *Lulga* near Anningie. Dug from shallow burrow at Birchip Downs. Most of those from west of Teatree Well were found strolling about in the daytime. One vomited a mixture of seeds, small white split ones predominating, into the sand." (W. E. S.)

Hemisphaeriodon gerrardii (Gray)

Hinulia gerrardii Gray, 1845, Cat. Liz. Brit. Mus., p. 75: Australia.
Tiliqua longicauda De Vis, 1888 (1887), Proc. Linn. Soc. N. S. W. (2) **2**, p. 816: Rockhampton and Johnstone River, Queensland.
1 (M. C. Z. 9015) Rockhampton, Q. (Kny-Scheerer) 1908.
1 (M. C. Z. 10177) Cudgeon, N. S. W. (Australian Mus.) 1914.

Cudgeon is on the Tweed River. The Rockhampton skink is topotypic of *longicauda* (De Vis) but was received as *T. scincoides*! I have checked the description of *longicauda* with our specimen and confirm the action of other workers in referring it to the synonymy of *gerrardii*.

Midbody scale-rows 30–33; an enormous crushing tooth on either side of the lower jaw. Larger skink (No. 9015) measures 295 (145+150) mm.

(Macrogongylus brauni Werner)

Macrogongylus brauni Werner, 1901, Zoöl. Anz., pp. 298–299; figs. 1 and 2: "New Holland."

This genus and species, based on an old specimen in the Königsberg Museum believed to have come from New Holland, must be considered a synonym of *Celestus occiduus* (Shaw) of Jamaica, West Indies. I am indebted to Dr. Thomas Barbour for advising me to try the genus Celestus after I had suggested that Macrogongylus was not a scincid and extralimital to the scope of this paper.

Sphenomorphus ocellatus (Boulenger)

Lygosoma ocellatum Boulenger, 1896, Ann. Mag. Nat. Hist. (6), **18**, p. 233: Roebuck Bay, north Western Australia.
Lygosoma ocelliferum Boulenger, 1896, Ann. Mag. Nat. Hist. (6), **18**, p. 342: *n.n.* for *ocellatum* preoccupied in Lygosoma but not in Sphenomorphus.

Lygosoma (Hinulia) breviunguis Kinghorn, 1932, Rec. Austral. Mus., **18**, p. 300, fig. 1: Carnarvon district, North West Cape.

3 (M. C. Z. 35351–3) Hermannsburg, N. T. (W. E. Schevill) 1932.

Midbody scale-rows 24–28; supraoculars 4. Largest skink (No. 35351) measures 190 (89+101) mm.

These only differ from Boulenger's description of his holotype, which species has been reported from Hermannsburg by Sternfeld (1925, p. 246) in possessing 3 instead of 2 pairs of nuchals; 3–5 ear lobules instead of 4–5; 34–38 midbody scale-rows instead of 36; 22–25 lamellae beneath the fourth toe instead of 22; the digits of the adpressed limbs sometimes fail to meet.

They agree well with Kinghorn's figure of *breviunguis* which had 36 midbody scale-rows and is an undoubted synonym of *ocellatum*.

It seems probable that one of the color varieties listed by Lucas and Frost (1896, p. 138) under *Egernia whitii*, may be referable to this species which was at that time undescribed.

Sphenomorphus australis australis (Gray)

Tiliqua australis Gray, 1839, Ann. Nat. Hist., **2**, p. 291: Australia.

Lygosoma lesueurii Duméril & Bibron, 1839, Erpét. Gén., **5**, p. 733: Australia.

1 (M. C. Z. 3222) Australia (No history) N. D.

4 (M. C. Z. 10180–3) Ipswich, Q. (Australian Mus.) 1914.

1 (M. C. Z. 35354) Mt. Carbine, Q. (P. J. Darlington) 1932.

10 (M. C. Z. 35364–73) Hermannsburg, N. T. (W. E. Schevill) 1932.

Midbody scale-rows 28–34, average 30; supraoculars 4, 5 on left side of No. 35354 only; prefrontals forming a median suture except in No. 10181. Largest skink (No. 10180), a male, measures 279 (90+189) mm.

Boulenger rejected the name *australis* as being preoccupied in the genus Lygosoma. It is not, however, in Sphenomorphus. It is unfortunate that this change must be made.

As might be expected, in the matter of coloration the Hermannsburg series occupy an intermediate position between the Queensland *australis* and the Western Australian *inornatus*.

Sphenomorphus australis inornatus (Gray)

Hinulia inornata Gray, 1845, Cat. Liz. Brit. Mus., p. 78: Swan River, Western Australia.

1 (M. C. Z. 24566) Yalgoo, W. A. (R. C. Richardson) 1926.

Midbody scale-rows 30; supraoculars 4. Length from snout to anus 75 mm., tail regenerating.

Differs from the Queensland form in color and pattern. Whether it can be retained as a western race seems extremely doubtful in view of Boulenger (1887, p. 226) listing a specimen from Cape York.

Sphenomorphus leonhardii (Sternfeld)

Lygosoma (*Hinulia*) *taeniolatum* White, var. *maculata* Rosén, 1905, Ann. Mag. Nat. Hist. (7), **16**, p. 140: West Australia.

Lygosoma (*Hinulia*) *leonhardii* Sternfeld, 1919, Mitt. Senckenb. Naturf. Gesell., **1**, p. 79: Hermannsburg Mission, Upper Finke River, Northern Territory.

Cotype (M. C. Z. 33529) Hermannsburg, N. T. (M. v. Leonhardi) 1908.
49 (M. C. Z. 35364–73) Hermannsburg, N. T. (W. E. Schevill) 1932.

Midbody scale-rows 26–30 (but only a dozen counted); supraoculars 4 (in whole series); prefrontals in contact in 41 skinks, separated in 9, so that Sternfeld was misled by his material into saying that the prefrontals were usually separated by the frontonasal and frontal forming a suture; rostral and frontonasal separated in 27, in contact in 21, while in 2 skinks a small azygous scale occupies this area. Largest skink (No. 35364) measures 213 (72+141) mm.

Rosen's holotype of *maculata*, collected by Dr. N. Holst in 1896, was also an example with the prefrontals separated. The specific name *maculata* is preoccupied both in Sphenomorphus and Lygosoma (in its broader usage) by *maculata* Blyth of India. It seems possible that the series of skinks from Broome and the St. George Range, referred to *lesueurii* by Lönnberg and Andersson (1913, p. 8), are actually referable to *leonhardii*. It is important to ascertain the relationship of *T. essingtoni* Gray which may be more nearly related to this form than to *taeniolatus* (Shaw).

Sphenomorphus spaldingi (Macleay)

Hinulia spaldingi Macleay, 1877, Proc. Linn. Soc. N. S. W., **2**, p. 63: Endeavour River.

Lygosoma dorsale Boulenger, 1887, Cat. Liz. Brit. Mus., **3**, p. 226, pl. xii, fig. 1: Fly River, New Guinea.

6 (M. C. Z. 35374–9) Coen, Q. (P. J. Darlington) 1932.

Midbody scale-rows 26–28; supraoculars 3; prefrontals broadly, or narrowly, in contact, or well separated. Largest skink (No. 35374) measures 312 (99+213) mm.

Sphenomorphus leae brooksi Loveridge

Sphenomorphus leae brooksi Loveridge, 1933, Occ. Pap. Boston Soc. Nat. Hist., **8**, p. 95: Perth, Western Australia.

Holotype (M. C. Z. 25055) Perth, W. A. (W. S. Brooks) 1927.

Midbody scale-rows 26; prefrontals forming a long median suture; lamellae beneath the fourth toe sharply keeled, 26. Total length 103 (47+56) mm.

Sphenomorphus quattuordecimlineatus (Sternfeld)

Lygosoma (Hinulia) quattuordecimlineatum Sternfeld, 1919, Mitt. Senckenb. Naturf. Gesell., **1**, p. 80: Hermannsburg Mission, Upper Finke River, Northern Territory.

1 (M. C. Z. 35380) Hermannsburg, N. T. (W. E. Schevill) 1932.

Midbody scale-rows 30 (28 in type); supraoculars 4; prefrontals in contact. Total length 150 (51+99) mm.

This topotype is the first entire example recorded.

Sphenomorphus taeniolatus taeniolatus (Shaw)

Lacerta taeniolata Shaw, 1790, in White's Journ. Voy. N. S. W., p. 245, pl. xxxii, fig. 1: New South Wales.

8 (M. C. Z. 2520, 6730, 16276–7) New South Wales (Various) 1870, 1903, 1922.

4 (M. C. Z. 2220, 6302, 19611) Sydney, N. S. W. (Various) 1865, 1890, 1924.

1 (M. C. Z. 10542) Southern Queensland (Queensland Mus.) 1914.

1 (M. C. Z. 35381) Mt. Wilson, N. S. W. (P. J. Darlington) 1932.

Midbody scale-rows 25–28; prefrontals separated; 4 labials anterior to the subocular. Largest skink (No. 6302) measures 208 (65+143) mm.

The action of Zietz (1920, p. 206) in synonymizing half-a-dozen species with this name, is quite unjustifiable. Nor can they be regarded as races if that was his intention.

Sphenomorphus colletti (Boulenger)

Lygosoma colletti Boulenger, 1896, Ann. Mag. Nat. Hist. (6), **18**, p. 234: Roebuck Bay, Western Australia.

1 (M. C. Z. 33273) Caron, W. A. (Harvard Expedition) 1931.

1 (M. C. Z. 33274) Meekatharra, W. A. (P. J. Darlington) 1931.

1 (M. C. Z. 33275) Wiluna, W. A. (P. J. Darlington) 1931.

Midbody scale-rows 24–26 (24 in type); lamellae beneath fourth toe 23–27 (23 in type). Largest skink (No. 33275) measures 113 (47+66) mm.

Though falling under *taeniolatus* in Boulenger's key (1887, p. 212), to judge by its color pattern this skink appears to be the Western Australian representative of the Queensland *strauchii*. It is sufficiently well-differentiated from both, however, to be regarded as a full species. The frontonasal is in contact with the frontal in all three, with the rostral in two skinks, barely separated in No. 33275; two moderate ear lobules are more usual than "one large opercle-like scale on its anterior border". Boulenger makes no mention of the prominent vertical barring on the flanks which is characteristic of our examples, possibly our series are subspecifically distinct from *colletti*. There are indications of the seven dark longitudinal streaks in No. 33274 but in the others four streaks are obsolete, leaving only three dark and six white lines running the full length of the body.

Sphenomorphus schevilli Loveridge

Sphenomorphus schevilli Loveridge, 1933, Occ. Pap. Boston Soc. Nat. Hist., **8**, p. 96: Army Downs, 35 miles northerly of Richmond, Queensland.

Holotype (Queensland Museum) Army Downs, nr. Richmond, Q. (W. E. Schevill) 1932.

Midbody scale-rows 40; prefrontals separated by a small interspace; lamellae beneath the fourth toe unicarinate, 24. Total length 207 (80+127) mm.

Sphenomorphus labillardieri (Gray)

Tiliqua Labillardii Gray, 1839, Ann. Nat. Hist., **2**, p. 289: Australia.

1 (M. C. Z. 2222) Australia (W. Keferstein) 1865.
1 (M. C. Z. 7742) Western Australia (F. Werner) 1911.
2 (M. C. Z. 24686–7) Mt. Melville, W. A. (W. S. Brooks) 1927.
2 (M. C. Z. 24688–9) Denmark River, W. A. (W. S. Brooks) 1927.
13 (M. C. Z. 24690–702) Augusta, W. A. (W. S. Brooks) 1927.
21 (M. C. Z. 24703–10) Manjimup, W. A. (W. S. Brooks) 1927.
25 (M. C. Z. 24711–35) Pemberton, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 33276) Pemberton, W. A. (Harvard Exped.) 1931.
29 (M. C. Z. 33277–300) Margaret River, W. A. (Harvard Exped.) 1931.

Midbody scale-rows 24–30 (24 in 3 specimens, 30 in No. 24703 only) Pemberton and Margaret River skinks not counted; frontonasal forming sutures with both rostral and frontal; frontal in contact with

two supraoculars only (every specimen examined for these characters). Largest skink (No. 24700) measures 194 (72+122) mm.

Gray's original spelling of the specific name was undoubtedly a *lapsus* for the generally accepted corrected form, the man's name being Labilliardière.

Sphenomorphus tryoni (Longman)

Lygosoma (Hinulia) tryoni Longman, 1918, Mem. Queensl. Mus., **6**, p. 38, pl. xiii: Macpherson Ranges, 3,000 feet, South Queensland.

9 (M. C. Z. 35382–9) Macpherson Ranges, Q. (P. J. Darlington) 1932.

Taken at an altitude of between 3,000 and 4,000 feet.

Midbody scale-rows 34–40; frontonasal forming sutures with both rostral and frontal; lamellae under fourth toe 17–19; adpressed limbs overlap; tail longer than the head and body. Largest skink (No. 35382) measures 220 (105+115) mm.

This series of topotypes upholds in every respect Mr. Longman's diagnosis of this very distinct species. The coloration is perhaps more variable than indicated in his description which was based on two skinks; tranverse barring is common.

Sphenomorphus quoyii quoyii (Duméril & Bibron)

Lygosoma quoyii Duméril & Bibron, 1839, Erpét. Gén., **5**, p. 728: Australia.
Sphenomorphus quoyi Barbour, 1914, Proc. Biol. Soc. Washington, **27**, p. 204.

1 (M. C. Z. 9486) Kuranda, Q. (H. L. Clark) 1913.
1 (M. C. Z. 10169) Camden, N. S. W. (Australian Mus.) 1914.
3 (M. C. Z. 10170–1, 10174) Wentworth Falls, N. S. W. (Aus. Mus.) 1914.
1 (M. C. Z. 10172) Cootamundra, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10173) Kerr's Creek, N. S. W. (Australian Mus.) 1914.
3 (M. C. Z. 35390–2) Mt. Wilson, N. S. W. (P. J. Darlington) 1932.
3 (M. C. Z. 35393–5) Blackheath, N. S. W. (P. J. Darlington) 1932.
1 (M. C. Z. 35396) Cascade, N. S. W. (P. J. Darlington) 1932.
1 (M. C. Z. 35397) Barrington Tops, N. S. W. (P. J. Darlington) 1932.

Midbody scale-rows 36–40, average 38; frontonasal forming a suture with the rostral, also with the frontal excepting in Kuranda, Camden, Cootamundra, Kerr's Creek, Cascade, Barrington Tops, and one of the Mt. Wilson skinks; all these are typical in having the prefrontals in contact; adpressed limbs overlap; lamellae under fourth toe 23–30, average 25. Largest skink (No. 10169) measures 295 (104+191) mm.

Sphenomorphus quoyii tympanum (Lönnberg & Andersson)

Lygosoma tympanum Lönnberg & Andersson, 1913, Svenska Vetensk.-Akad. Handl. Stockholm, **52**, No. 3, p. 9: "said to have been collected near Melbourne."

Lygosoma (Hinulia) quoyi kosciuskoi Kinghorn, 1932, Rec. Austral. Mus., **18**, p. 359: Mt. Kosciusko, 3,000 to 7,000 feet, New South Wales.

10 (M. C. Z. 33301–10) Mt. Kosciusko, N. S. W. (Harvard Exped.) 1931.

Midbody scale-rows 36–42, average 39; frontonasal forming a suture with the rostral and also with the frontal, except in Nos. 33301, 33303 and 33307, where the prefrontals are in contact; adpressed limbs overlap or the toes may reach to the elbow of the forelimb; lamellae under fourth toe 18–23. Largest skink (No. 33309) measures 200 (87+113) mm.

If I am correct in synonymizing *kosciuski* with *tympanum*, it is the greatest pity in view of the uncertainty attaching to the type locality of the latter. It might be possible that *tympanum* can be regarded as an intermediate between typical *quoyii* and *kosciuskoi* for Lönnberg and Andersson state of *tympanum* "underparts yellowish white, chin and throat spotted with grey." The Kosciusko specimens on the other hand are most readily distinguished from *quoyi* by their undersurfaces being so heavily streaked with grey. In our material of typical *quoyi* the belly is almost immaculate. Perhaps too much reliance cannot be placed upon this character in view of Boulenger's (1887, p. 230) statement that "the throat and sometimes also the belly, with longitudinal series of black dots." The smaller number of lamellae beneath the fourth toe would appear to be the most reliable distinguishing character.

"Taken in Diggers Creek at about 5,000 feet. Near the water, sometimes on rocks jutting into the stream. Occasionally takes to the water when pursued." (W.E.S.)

Sphenomorphus tenuis tenuis (Gray)

Tiliqua tenuis Gray, 1831, in Griffith's Cuvier, Animal King., **9**, Syn., p. 71: No locality (Subsequently given as Australia).

Lygosoma murrayi Boulenger, 1887, Cat. Lizards Brit. Mus., **3**, p. 232, pl. xiii, fig. 1: Queensland.

Lygosoma tamburinense Lönnberg & Andersson, 1915, Svenska Vetensk.-Akad. Handl. Stockholm, **52**, No. 7, p. 5: Mt. Tambourine, Queensland.

Lygosoma (Hinulia) tenuis intermedia Kinghorn, 1932, Rec. Austral. Mus., **18**, p. 358: numerous localities on the north coast of New South Wales.

1 (M. C. Z. 2529) New South Wales (G. Krefft) 1870.
1 (M. C. Z. 27219) Brooklana, N. S. W. (G. C. Crampton) 1928.
4 (M. C. Z. 35398–401) Cascade, N. S. W. (P. J. Darlington) 1932.

Midbody scale-rows 30–32, average 31; frontonasal forming sutures with the rostral and frontal; 3 pairs of scales bordering the parietals except in No. 2529 where there are 4; adpressed limbs overlap. Largest skink (No. 35398) measures 220 (98+122) mm.

Boulenger (1887, p. 231) gives 20–25 lamellae under the fourth toe for *tenuis*, more recent material in the British Museum extends the range to 17–25; Kinghorn's *intermedia* had 17–20; Lönnberg's *tamburinense* is said to have 15 but a topotype of the latter in the British Museum has 18–19. Our New South Wales material listed above ranges from 16–20. The type of the northern race *brachysoma* had 20, our northern Queensland material listed below is from 16–21.

Lönnberg and Andersson give Mt. Tambourine as being in north Queensland, the Wilkins specimen is labelled Mt. Tambourine, southeast Queensland. The only name of the sort that I have been able to locate on the Times Atlas is "Tamborine" in southeast Queensland. It seems probable therefore, that Lönnberg and Andersson were mistaken in locating it in north Queensland.

I have examined the types of *tenuis* and *murrayi*. The latter has been synonymized with the former by Procter (1923, p. 1072). It was separated from *tenuis* by Boulenger on the grounds that the "ear-opening is a little larger than the eye-opening; 34 scales round the body." On examining it I find that the ear-opening is a little *smaller* than the eye-opening, and that there are only 32 scales at midbody, though 34 or even 38 can be counted anteriorly as is the case with typically colored *tenuis*. *L. murrayi* was founded on a large individual comparable both in size and coloring to the skink from Mt. Tambourine which also has 32 midbody scale-rows.

Both Brooklana and Cascade are close to Dorrigo, which is one of the type localities for *intermedia*. In regard to the post-parietal scales which Boulenger rejects as nuchals but which Kinghorn calls nuchals—either position seems tenable—considerable variation in their development occurs in New South Wales material which does not differ in this respect from the Queensland series referred to *brachysoma*.

Sphenomorphus tenuis brachysoma (Lönnberg & Andersson)

Lygosoma tenue Garman (not of Gray), 1901, Bull. Mus. Comp. Zoöl., **39**, p. 7.
Lygosoma brachysoma Lönnberg & Andersson, 1915, Svenska Vetensk.-Akad. Handl. Stockholm, **52**, No. 7, p. 5: Atherton, north Queensland.

4 (M. C. Z. 6477, 6479) Cooktown, Q. (E. A. Olive) 1896.
1 (M. C. Z. 6747) Queensland (T. Barbour don.) 1903.
1 (M. C. Z. 35402) Lankelly Creek, Q. (P. J. Darlington) 1932.
Lankelly Creek is in the McIlwraith Ranges.

Midbody scale-rows 28-30, average 29; frontonasal forming a suture with the rostral, and also with the frontal excepting in two of the Cooktown series where the prefrontals are in contact; 3 pairs of scales bordering the parietals; adpressed hind limbs overlap. Largest skink (No. 6477) measures 156 (70+86) mm.

Distinguished from the typical form by the smaller ear opening of the northern specimens. The dark individual from Lankelly Creek has the coloring of *brachysoma*, the rest agree with that of *tamburinense*.

The Lankelly Creek skink differs from the description of *brachysoma* in possessing 28 (instead of 30) midbody scale-rows, 3 (instead of 4) pairs of much enlarged scales called nuchals by Lönnberg and Andersson; and in the adpressed hind limb reaching to the elbow (instead of to the axilla); 19 (instead of 21) lamellae beneath the fourth toe. For further discussion on relationships see under *S. t. tenuis*.

Sphenomorphus isolepis isolepis (Boulenger)

Lygosoma isolepis Boulenger, 1887, Cat. Liz. Brit. Mus., **3**, p. 234, pl. xv, fig. 1: Nicol Bay and Swan River, Western Australia.
♂ (M. C. Z. 6749) North Western Australia (T. Barbour don.) 1903.

Midbody scale-rows 30; lamellae beneath fourth toe 22. Total length 140 (64+76) mm., but tail regenerated.

This specimen agrees in every detail with Boulenger's description excepting that the tail, being regenerated, is not once and two thirds as long as the body; also the left nuchal is divided so that 3 scales border the left parietal, the normal 2 on the right. This arrangement caused the specimen to be identified by the dealer who supplied it to the donor as *L. pallidum* (Günther), a species which was also described from Nicol Bay.

Kinghorn (1932, p. 358) has recently described a race from Forest River, East Kimberley under the name of *S. i. forresti*. It differs principally in its shorter limbs which, when adpressed, fail to meet by the length of a forearm.

Sphenomorphus pardalis (Macleay)

Hinulia pardalis Macleay, 1877, Proc. Linn. Soc. N. S. W., **2**, p. 63: Barrow Island, northeast Australia.

Mocoa nigricaudis Macleay, 1877, Proc. Linn. Soc. N. S. W., **2**, p. 63: Darnley Island, Torres Straits.

Lygosoma (Hinulia) elegantulum Peters & Doria, 1878, Ann. Mus. Genova, **13**, p. 344: Somerset, Australia.

Homolepida crassicauda Barbour (not of Duméril), 1914, Proc. Biol. Soc. Washington, **27**, p. 204.

1 (M. C. Z. 9485) Darnley Island, T. S. (H. L. Clark) 1913.
1 (M. C. Z. 10199) Bloomfield River, Q. (Australian Mus.) 1914.
1 (M. C. Z. 35403) Lake Barrine, Q. (P. J. Darlington) 1932.
3 (M. C. Z. 35404–6) Rocky Scrub, McIlwraith Ranges, Q. (P. J. D.) 1932.
2 (M. C. Z. 35407–8) Lankelly Creek, Q. (P. J. Darlington) 1932.
1 (M. C. Z. 35409) Mt. Spurgeon, Q. (P. J. Darlington) 1932.
1 (M. C. Z. 35410) Mt. Carbine, Q. (P. J. Darlington) 1932.
1 (M. C. Z. 35411) Coen, Q. (P. J. Darlington) 1932.

The Bloomfield River specimen was received as *Omolepida crassicaudum*, that species, however, has 22 midbody scale-rows.

Midbody scale-rows 24–30 (24 in one Rocky Scrub skink only, 30 in the Mt. Spurgeon skink only), average 27; frontonasal forming sutures with the rostral and frontal; usually 3 (2–4) but often an azygous arrangement of scales bordering the parietals posteriorly, such as 2 on one side, 3 on the other, or 2 and 4 in No. 35410; adpressed limbs do not nearly meet; lamellae beneath the fourth toe 16–20, average 18. Largest skink (No. 35407) measures 186 (68+118) mm.

I follow Zietz (1920, p. 208) in referring *elegantulum* to the synonymy; judged by a comparison of the descriptions the course seems justifiable. I venture to add *nigricaudis* on the strength of our No. 9485 which is a topotype and does not differ in any structural character but only in details of coloring. It lacks the concentration of dots on the base of the tail which caused Macleay to name it *nigricaudis* but it is certainly conspecific with the rest of our series.

Sphenomorphus atromaculatus (Garman)

Lygosoma atromaculatum Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 8: Barrier Reef and Queensland.

2 Cotypes (M. C. Z. 6475) Barrier Reef, Q. (A. G. Mayer) 1896.
3 Cotypes (M. C. Z. 6478) Cooktown, Q. (E. A. Olive) 1896.
23 (M. C. Z. 35412–34) Coen, Q. (P. J. Darlington) 1932.

Midbody scale-rows 24 (every individual counted); frontonasal forming sutures with the rostral and frontal; scales bordering the parietals posteriorly on right and left sides respectively 2+2 (in 13 skinks), 2+3 (in 10), 3+2 (in 2), 3+3 (in 3); adpressed limbs do not nearly meet. Largest skink (No. 35412) measures 142 (63+79) mm.

This skink is very similar to *S. pardalis* and must be extremely difficult to distinguish without comparative material. It is well named, for the aggregation of black markings along the flanks are, perhaps, its most distinguishing feature. The unusual constancy in a skink of a fixed number of midbody scale-rows is interesting; in this connection it may be noted that a single *pardalis* was also taken at Coen but was eliminated by its larger size and absence of characteristic *atromaculatus* markings quite apart from its 26 midbody scale-rows. It will also be noted that there is a single skink with 24 midbody scale-rows referred to *pardalis*. Here again I have no doubts as to its correct relegation to that species. Possibly *atromaculatus* has but recently been subject to speciation.

Sphenomorphus fasciolatus fasciolatus (Günther)

Hinulia fasciolata Günther, 1867, Ann. Mag. Nat. Hist. (3), **20**, p. 47: Rockhampton and Port Curtis, Queensland.

Hinulia ambigua De Vis, 1888 (1887), Proc. Linn. Soc. N. S. W., **2**, p. 817: Charleville, southwest Queensland.

1 (M. C. Z. 6734) Queensland (T. Barbour don.) 1903.

Midbody scale-rows 36, smooth; frontonasal forming sutures with the rostral and frontal; adpressed limbs just meet; lamellae beneath the fourth toe 21. Total length 199 (98+101) mm.

I have no misgivings in referring *ambigua* De Vis to the synonymy of *fasciolatus*.

Sphenomorphus fasciolatus intermedius (Sternfeld)

Lygosoma (*Hinulia*) *fasciolatum intermedium* Sternfeld, 1919, Mitt. Senckenb. Naturf. Gesell., **1**, p. 81: Hermannsburg Mission, Upper Finke River, Northern Territory.

1 (M. C. Z. 32800) Mullewa, W. A. (I. M. Dixson) 1931.

Cotype (M. C. Z. 33530) Hermannsburg, N. T. (M. v. Leonhardi) 1908.

3 (M. C. Z. 35435–7) Hermannsburg, N. T. (H. Heinrich) 1932.

6 (M. C. Z. 35438–43) Hermannsburg, N. T. (W. E. Schevill) 1932.

1 (M. C. Z. 35444) Birchip Downs, N. T. (W. E. Schevill) 1932.

Midbody scale-rows 32–34, obtusely keeled; frontonasal forming sutures with the rostral and frontal; adpressed hind limbs just meet or fail to do so. Largest skink (No. 35438) measures 185 (80+105) mm.

This skink, which Sternfeld made a race of *fasciolatus*, is so nicely intermediate between *fasciolatus* (with which it agrees in the range of

midbody scale-rows) and *monotropis* (with which it agrees in its obtusely keeled scales and color pattern) that rational treatment demands that *monotropis* (Boulenger) be also regarded as a race of *fasciolatus*. It is the extreme western representative and characterized by possessing only 28–30 midbody scale-rows.

Sphenomorphus tigrina (De Vis)

Hinulia tigrina De Vis, 1888 (1887) Proc. Linn. Soc. N. S. W. (2), **2**, p. 817: Geraldton, Queensland.

Hinulia domina De Vis, 1888 (1887), Proc. Linn. Soc. N. S. W. (2), **2**, p. 818: Queensland.

1 (M. C. Z. 35445) Millaa Millaa, Q. (P. J. Darlington) 1932.

Midbody scale-rows 28; prefrontals forming a very broad suture; interparietal as large as a frontoparietal; 3 scales border each parietal posteriorly; fourth toe of the adpressed hind limb reaches the elbow of the fore limb; lamellae beneath the fourth toe 21. Total length 159 (82+77) mm.

This species appears to be at most but a race of *maindromi* (Sauvage) of New Guinea, the type of which agrees with that of *domina* in possessing 30 midbody scale-rows; upper border of rostral pointed (finely truncated in our skink); posterior border of frontonasal straight (obtusely angular in our skink). De Rooij (1915, p. 178) states that there are 5 pairs of nuchals (four in our skink and of these the first pair is divided) in *maindromi*. De Vis does not think these scales sufficiently differentiated to call them nuchals in either *tigrina* or *domina*.

The type of *tigrina* had 29 midbody scale-rows and 23 lamellae beneath the fourth toe; otherwise our skink agrees substantially with De Vis description.

The type of *domina* had 30 midbody scale-rows and 22 lamellae beneath the fourth toe. In other respects it agrees with the description of *tigrina*.

I would respectfully suggest that the skink from Mt. Tambourine, with 30 midbody scale-rows and 23 lamellae beneath the fourth toe, referred by Lönnberg and Andersson (1915, p. 5) to *Lygosoma rufum* Boulenger of the Aru Islands, should more properly be identified with *Sphenomorphus tigrina* (De Vis).

Emoia cyanogaster (Lesson)

Scincus cyanogaster Lesson, 1830, Zoöl. in Duperrey's Voy. autour du Monde . . . La Coquille, **2**, part 1, p. 47: Ualan, or Kusaie, Island of the Caroline Archipelago.

Leiolepisma cyanogaster Barbour, 1914, Proc. Biol. Soc. Washington, **27**, p. 204.
1 (M. C. Z. 9470) Mer, Murray Is., T. S. (H. L. Clark) 1913.

Midbody scale-rows 26; lamellae beneath the fourth toe 71. Total length 261 (83+178) mm.

Leiolopisma mustelina (O'Shaughnessy)

Mocoa mustelina O'Shaughnessy, 1874, Ann. Mag. Nat. Hist. (4), **15**, p. 299: Sydney, New South Wales.
1 (M. C. Z.10239) Bundanoon, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10240) Tarana, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 35449) Hartley Vale, N. S. W. (P. J. Darlington) 1932.
3 (M. C. Z. 35450–2) Mt. Wilson, N. S. W. (P. J. Darlington) 1932.
1 (M. C. Z. 35453) Cascade, N. S. W. (P. J. Darlington) 1932.
1 (M. C. Z. 37162) Blackheath, N. S. W. (P. J. Darlington) 1932.

Tarana, Hartley Vale and Blackheath are in the Blue Mountains. Specimens from Mt. Wilson were taken between 3,000 and 3,800 feet.

Midbody scale-rows 22–24; suture between rostral and frontonasal as broad as the frontal; frontoparietals 2; fourth upper labial below the orbit; limbs pentadactyle; lamellae beneath the fourth toe 14–20. Largest skink, a male, (No. 35450) measures 132 (52+80) mm.

Leiolopisma challengeri (Boulenger)

Lygosoma challengeri Boulenger, 1887, Cat. Liz. Brit. Mus., **3**, p. 268: Queensland.
Mocoa spectabilis De Vis, 1888 (1887), Proc. Linn. Soc. N. S. W., (2), **2**, p. 819: Gympie, Queensland.
2 (M. C. Z. 35455–6) Barrington Tops, N. S. W. (P. J. Darlington) 1932.
1 (M. C. Z. 35457) Millaa Millaa, Q. (P. J. Darlington) 1932.
1 (M. C. Z. 35458) Mt. Spurgeon, Q. (P. J. Darlington) 1932.

The Barrington Tops skinks were taken at an altitude of 3,000 feet.

Midbody scale-rows 22–26; suture between rostral and frontonasal as broad as the frontal; frontoparietals 2; fourth upper labial below the orbit; limbs pentadactyle; lamellae beneath the fourth toe 14–20. Largest skink (No. 35455) measures 144 (58+86) mm.

De Vis states that his type possessed 22 midbody scale-rows as is the case with our Mt. Spurgeon specimen. Boulenger's type on the other hand had 26, our skinks from Barrington Tops have 24–26. There is not the slightest doubt that *spectabilis* is a straight synonym of *challengeri;* Longman, however, recognized the former (1918, p. 38).

Leiolopisma paraeneum (Ahl)

Lygosoma (*Leiolepisma*) *pseudotropis* Werner, 1903, Zoöl. Anz., **26**, p. 247: New South Wales.

Lygosoma paraeneum Ahl, 1925, Zoöl. Anz., **65**, p. 20: (*n.n.* for *pseudotropis* Werner, preoccupied in Leiolopisma.)

♀ (M. C. Z. 35454) Dorrigo, N. S. W. (W. Heron) 1932.

Midbody scale-rows 26; suture between rostral and frontonasal as broad as the frontal; frontoparietals 2; fourth upper labial below the orbit; limbs pentadactyle; lamellae beneath the fourth toe 20. Length from snout to anus 54 mm., tail in process of regeneration.

Werner's type had 24 midbody scale-rows, otherwise our specimen so closely conforms to his description both in structural characters as well as minute details of coloration that it might well have been the skink he had before him.

This species only differs from *challengeri* in the ear-opening being a trifle smaller than the transparent palpebral disk and in having the parietals bordered posteriorly by two pairs of scales; in all our *challengeri* they are bordered by three pairs of scales. I am inclined to think than *paraeneum* should be regarded as a southern race, or perhaps a lowlands form, of *challengeri*.

Leiolopisma cuprea (Gray)

Ablepharus cupreus Gray, 1839, Ann. Nat. Hist., **2**, p. 335: no locality.

Mocoa lichenigera O'Shaughnessy, 1874, Ann. Mag. Nat. Hist., (4), **15**, p. 298: Lord Howe Island.

18 (M. C. Z. 35459–69) Lord Howe Island, N. S. W. (R. Baxter) 1932.

Midbody scale-rows 36–46; average 42 (only No. 35460 has 36, three skinks only with 46); suture between rostral and frontonasal narrower than the frontal; frontoparietals 2; supraoculars 4; fifth (sixth in No. 35461 only) upper labial below the centre of the orbit (right sides only examined) limbs pentadactyle; lamellae beneath the fourth toe 15–19, average 16.8. Largest skink (No. 35459) measures 163 (83+80) mm.

Boulenger retained *cuprea* as distinct on account of its combination of 3 supraoculars and 36 midbody scale-rows. In other respects it agreed with *lichenigera* of which Boulenger (1887, p. 269) had only two examples, these possessed 42 midbody scale-rows. Presuming that the 3 supraoculars of the type of *cuprea* were abnormal, I suggest uniting *lichenigera* with that species.

This fine series were captured by placing fish oil in a drum sunk level with the surface of the ground. Presumably the skinks were attracted by the insects which, I imagine, would assemble; in attempting to capture them the skinks fell into the drum.

? Leiolopisma aeneum (Girard)

Cyclodina aenea Girard, 1857, Proc. Acad. Nat. Sci. Philad., p. 196: New Zealand (Bay of Islands).

2 (M. C. Z. 33212–3) Sherbrook Forest, V. (Harvard Exped.) 1931.
2 (M. C. Z. 33214–5) Donna Buang, V. (P. J. Darlington) 1931.

Midbody scale-rows 26; frontoparietals 2; adpressed limbs fail to meet, pentadactyle; lamellae under the fourth toe 17–19. Largest skink (No. 35212) measures 113 (52+61) mm.

While closely related to *entrecasteauxii*, and probably referred to that species by previous authors dealing with Victorian lizards, our four specimens differ from *entrecasteauxii* in having but one pair of nuchals as well as fewer midbody scale-rows. On the other hand they agree well with the description of *aeneum* as given by Boulenger who, however, only had New Zealand examples. As I have no topotypic material with which to compare these skinks it is with some misgivings that I refer them to *aeneum* which, I believe, has never before been recorded from the Australian mainland. They differ from *paraeneum* in that the length from snout to forearm is contained twice in the distance between fore and hind limbs, as well as in other ways. I should welcome an investigation of this record by some Australian herpetologist in possession of more material than is at my disposal.

Leiolopisma entrecasteauxii Duméril & Bibron

Lygosoma entrecasteauxii Duméril & Bibron, 1839, Erpét, Gén., **5**, p. 717: Australia.

3 (M. C. Z. 10211-3) Mt. Kosciusko at 3-5000 ft., N.S.W. (Austral. Mus.) 1914.
2 (M. C. Z. 33216-7) Mt. Kosciusko at 6,500 ft., N.S.W. (W. E. Schevill) 1931.
1 (M. C. Z. 33233) Mt. Kosciusko at 3,000 ft., N.S.W. (Harvard Exped.) 1931.
14 (M. C. Z. 33218-32) Mt. Kosciusko at 5,400-6,000 ft., N.S.W. (") 1931.
1 M. C. Z. 35470) Barrington Tops at 3,000 ft., N.S.W. (P. J. Darlington) 1932.

Midbody scale-rows 28–32, average 29; suture between rostral and frontonasal narrower than the frontal; prefrontals separated; transparent disk in lower eyelid almost as large as the eye; adpressed limbs usually fail to meet, or just meet, pentadactyle; lamellae beneath the fourth toe 17–19. Largest skink (No. 33216) measures 129 (60+69) mm.

Leiolopisma trilineata (Gray)

Tiliqua trilineata Gray, 1839, Ann. Nat. Hist., **2**, p. 291: Australia.
5 (M. C. Z. 33238–42) Margaret River, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 33243) Pemberton, W. A. (W. E. Schevill) 1931.
2 (M. C. Z. 33244–5) Mt. Kosciusko, N. S. W. (Harvard Exped.) 1931.

Midbody scale-rows 24–28; frontoparietal single (in No. 33244 the interparietal is semifused with the frontoparietal also); supraciliaries 5–6 (only No. 33243 with 6); adpressed limbs do not nearly meet, pentadactyle; lamellae beneath the fourth toe 17–20. Largest skink, a female, (No. 33245) measures 158 (71+87) mm.

Leiolopisma metallica (O'Shaughnessy)

Mocoa metallica O'Shaughnessy, 1874, Ann. Mag. Nat. Hist., (4), **15**, p. 299: Tasmania.
1 (M. C. Z. 10244) Mt. Wellington, T. (Australian Mus.) 1914.
5 (M. C. Z. 24571–5) Augusta, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 24576) Causeway, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 33236) Darling Range, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 35476) Millaa Millaa, Q. (P. J. Darlington) 1932.
3 (M. C. Z. 35477–9) Mt. Spurgeon, Q. (P. J. Darlington) 1932.

Causeway and the Darling Range are both near Perth.

Midbody scale-rows 26–28; frontoparietals fused; supraciliaries 5–7 (5 in Western Australia, 6 in Tasmania, 7 in Queensland specimens); adpressed limbs barely meet or just overlap, pentadactyle; lamellae beneath the fourth toe 16–24 (16 in Tasmania, 18–23 in Western Australia, 19–24 in Queensland specimens). Largest skink (No. 10247) measures 59 mm. from snout to anus, tail broken.

L. metallica can be readily distinguished from *trilineata* by the adpressed limbs almost meeting or overlapping in the former, they are widely separated in *trilineata*. From the smaller *guichenoti* on the other hand, by the suture between rostral and frontonasal being narrower than the frontal in *metallica*, as broad, or almost as broad, as the frontal in *guichenoti*.

Leiolopisma guichenoti (Duméril & Bibron)

Lygosoma guichenoti Duméril & Bibron, 1839, Erpét. Gén., **5**, p. 713: Australia.
?*Mocoa delicata* De Vis, 1888 (1887), Proc. Linn. Soc. N. S. W., (2), **2**, p. 820: Warro, central Queensland.

1 (M. C. Z. 2153) Australia (A. A. Duméril) 1865.
2 (M. C. Z. 2224) Sydney, N. S. W. (W. Keferstein) 1865.
1 (M. C. Z. 10251) Fish River, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10252) Goulburn, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10253) Penrith, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10254) Woodford, N. S. W. (Australian Mus.) 1914.
2 (M. C. Z. 33234–5) Kurrajong Heights, N. S. W. (W. E. Schevill) 1932.
1 (M. C. Z. 35475) Hartley Vale, N. S. W. (P. J. Darlington) 1932.
3 (M. C. Z. 35476–8) Blackheath, N. S. W. (P. J. Darlington) 1932.
1 (M. C. Z. 35479) Cascade, N. S. W. (P. J. Darlington) 1932.
1 (M. C. Z. 35480) Dorrigo, N. S. W. (P. J. Darlington) 1932.

The skinks from Kurrajong Heights, Blue Mountains, were taken at an altitude of 1800 feet. The Fish River at Tarana, Woodford, Hartley Vale, and Blackheath are also all in the Blue Mountains.

Midbody scale-rows 26–30; frontoparietal single; supraciliaries 5–7 (5 in only one Sydney skink); adpressed limbs just meet, pentadactyle; lamellae beneath the fourth toe 17–26. Largest skink (No. 2224) measures 108 (40+68) mm., though there are others with slightly longer snout to anus measurements.

As *guichenoti* has moderately enlarged preanals there would not seem to be any reason for keeping *delicata* De Vis distinct. Though De Vis speaks of direct comparison with *guichenoti* possibly it was one of the very closely related species that he had.

Leiolopisma pretiosa (O'Shaughnessy)

Mocoa pretiosa O'Shaughnessy, 1874, Ann. Mag. Nat. Hist., (4), **15**, p. 298: Tasmania.
4 (M. C. Z. 10158–60, 10232) Tasmania (Australian Mus.) 1914.

Midbody scale-rows 40–44 (Boulenger's two specimens had 34–38); frontoparietal single; adpressed limbs just overlap, pentadactyle; lamellae under the fourth toe 18–21. Largest skink (No. 10232) measures 130 (63+67) mm.

Kinghorn's distinct, though closely related *L. weeksae* from Mt. Kosciusko and the Blue Mountains, also has 40–44 midbody scale-rows but a pair of frontoparietals and 2 pairs of nuchals. Our *pretiosa* have a single frontoparietal, three of our skinks have 1 pair of nuchals, one has none. In other respects they agree with the *tabulated* (not compared with the whole description) characters of *weeksae* with which Kinghorn contrasts *entrecasteauxii*.

Leiolopisma ocellata (Gray)

Mocoa ocellata Gray, 1844, Zoöl. Erebus & Terror, Rept., p. 8, pl. vii, fig. 3: no locality.

1 (M. C. Z. 1085) Hobart, T. (J. W. Robertson) 1862.
1 (M. C. Z. 10231) Tasmania. (Australian Mus.) 1914.

The second specimen was received as *microlepidota* (O'Shaughnessy), a synonym of *pretiosa;* they differ in the number of midbody scale-rows, the type of *microlepidota* having 38.

Midbody scale-rows 52–55; frontoparietal single; adpressed limbs overlap, pentadactyle; lamellae under the fourth toe 21–22. Larger skink (No. 1085) measures 128 (65+63) mm.

Leiolopisma fusca (Duméril & Bibron)

Heteropus fuscus Duméril & Bibron, 1839, Erpét. Gén., **5**, p. 759: Waigou Island and Rawack.

Lygosoma fuscum Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 7.

Leiolepisma fuscum Barbour, 1914, Proc. Biol. Soc. Washington, **27**, p. 204.

5 (M. C. Z. 6480) Cooktown, Q. (E. A. Olive) 1896.
1 (M. C. Z. 6481) Cairns, Q. (A. G. Mayer) 1896.
2 (M. C. Z. 6482) Queensland (A. G. Mayer) 1896.
2 (M. C. Z. 9129–30) Mossman, Q. (J. C. Kershaw) 1913.
9 (M. C. Z. 9457–60, 9464–9) Mer, Murray Is., T. S. (H. L. C.) 1913.
1 (M. C. Z. 9484) Darnley Id., T. S. (H. L. Clark) 1913.
1 (M. C. Z. 9491) Badu or Mulgrave Id., T. S. (H. L. Clark) 1913.
8 (M. C. Z. 37163–9) Coen, Q. (P. J. Darlington) 1932.

Midbody scale-rows 34–36 (but only first ten specimens listed, counted); dorsals strongly or weakly tricarinate; transparent disk in lower eyelid not larger than the ear-opening; frontoparietal single; interparietal 1; digits 4; toes 5.

Leiolopisma vertebralis (De Vis)

Hetcropus vertebralis De Vis, 1888 (1887), Proc. Linn. Soc. N. S. W., (2), **2**, p. 821: Chinchilla, Darling Downs, Queensland.

2 (M. C. Z. 37170–1) Coen, Q. (P. J. Darlington) 1932.

Midbody scale-rows 36–38; dorsals weakly tricarinate, each keel being broken up into a series of points; frontoparietal single; interparietal 1; adpressed limbs overlap, the toes of the hind limb reaching to the axilla; fingers 4; toes 5; lamellae beneath the fourth toe 29–31. Larger skink (No. 37170) measures 114 (46+68) mm.

Leiolopisma bicarinata (Macleay)

Heteropus bicarinatus Macleay, 1877, Proc. Linn. Soc. N. S. W., **2**, p. 68: Hall Sound, New Guinea.

Heteropus albertisii Peters & Doria, 1878, Ann. Mus. Genova, **13**, p. 362: Yule Island and Mt. Epa, New Guinea.

Leiolepisma albertisii Barbour, 1914, Proc. Biol. Soc. Washington, **27**, p. 204.

Leiolepisma peronii Barbour (not of Duméril & Bibron), 1914, Proc. Biol. Soc. Washington, **27**, p. 204.

21 (M. C. Z. 9436–56) Mer, Murray Is., T. S. (H. L. Clark) 1913.
1 (M. C. Z. 9489) Kuranda, Q. (H. L. Clark) 1913.
1 (M. C. Z. 9492) Darnley Id., T. S. (H. L. Clark) 1913.

Midbody scale-rows 28–32; dorsals strongly bicarinate; transparent disk in lower eyelid as large as, but not "much larger" than the ear-opening; frontoparietal single; interparietal 1; digits 4; toes 5. Largest skink (No. 9443) measures 130 (44+86) mm.

I follow Zietz (1920) in referring *albertisii* to the synonymy of *bicarinata* though the meagre color description of the latter does not tally well with that shown by the above material.

Leiolopisma rhomboidalis (Peters)

Heteropus rhomboidalis Peters, 1869, Monatsb. Akad. Wiss. Berlin, p. 446: Port Mackay, Queensland.

1 (M. C. Z. 9132) Mossman, Q. (J. C. Kershaw) 1913.
1 (M. C. Z. 35481) Cucania, Q. (W. Kerns) 1932.
2 (M. C. Z. 35482–3) Lake Barrine, Q. (P. J. Darlington) 1932.

Midbody scale-rows 32–34; dorsals obtusely tricarinate; transparent disk in lower eyelid not larger than the ear-opening; frontoparietal single; no interparietal; adpressed limbs strongly overlapping; digits 4; toes 5; lamellae beneath the fourth toe 22–27. Largest skink (No. 35402) measures 109 (42+67) mm.

Leiolopisma peronii (Duméril & Bibron)

Heteropus peronii Duméril & Bibron, 1839, Erpét. Gén., **5**, p. 760: Ile de France.

Myophila vivax De Vis, 1884, Proc. Roy. Soc. Queensl., **1**, p. 77: Brisbane, Queensland.

Heteropus lateralis De Vis, 1885 (1884), Proc. Roy. Soc. Queensl., **1**, p. 168: Moreton Bay, Queensland.

Heteropus blaekmanni De Vis, 1885 (1884), Proc. Roy. Soc. Queensl., **1**, p. 168: Port Curtis, Queensland.

Lygosoma devisii Boulenger, 1890, Proc. Zoöl. Soc. London, p. 79: (*n.n.* for *lateralis* De Vis as preoccupied in the genus Lygosoma.)

7 (M. C. Z. 35484–90) Coen, Q. (P. J. Darlington) 1932.

Midbody scale-rows 28–30; dorsals strongly bicarinate; transparent disk in lower eyelid much larger than the ear-opening; frontoparietal single; interparietal 1; digits 4; toes 5; lamellae beneath the fourth toe 24–28. Largest skink (No. 35484) measures 123 (46+77) mm.

Leiolopisma pectoralis (De Vis)

Carlia melanopogon Gray, 1844, Zoöl. Erebus & Terror, Rept., pl. vii, fig. 1: Port Essington, Northern Territory.

Heteropus pectoralis De Vis, 1885, Proc. Roy. Soc. Queensl., **1**, p. 169: Warro, Port Curtis, Queensland.

Heteropus mundus De Vis, 1885, Proc. Roy. Soc. Queensl., **1**, p. 172: Port Curtis, Queensland.

2 (M. C. Z. 31900–1) Port Darwin, N. T. (H. L. Clark) 1929.

23 (M. C. Z. 35491–9) Coen, Q. (P. J. Darlington) 1932.

1 (M. C. Z. 35500) Rutherford, Q. (W. E. Schevill) 1932.

Rutherford is on the Sellheim River, about eighty-five miles southwest of Bowen.

Midbody scale-rows 26–32; dorsals strongly or very faintly tricarinate; transparent disk in the lower eyelid much larger than the ear-opening; frontoparietal single; interparietal 1; digits 4; toes 5; lamellae beneath the fourth toe 21–27. Largest skink (No. 35491) measures 91 (41+50) mm.

Carlia melanopogon Gray is preoccupied in the genus Leiolopisma by *Heteropus* (*Carlia*) *melanopogon* Peters & Doria (1878).

After very careful reflection I have decided that in *pectoralis* and *mundus* we are dealing with a species somewhat similar to the related *fusca* in that it shows wide variation in the degree of keeling of the dorsal scales. It will be noted that the types of both *pectoralis* and *munda* came from Port Curtis. At first I thought that the Coen series represented two species for they were readily split into two groups, 13 of them being strongly keeled (*pectoralis* type) and 10 almost smooth (*munda* type). In coloration, range of scale counts and other characters, the two groups proved indistinguishable so that again we have the two types occurring in the same locality. Again there is *melanopogon*, which is of the smooth type, coming from Port Essington while our two skinks from relatively nearby Port Darwin, are of the strongly keeled type. Seeing that the two occur together over such a wide area it seems to me justifiable to consider that they are not specifically distinct.

Leiolopisma maccooeyi (Ramsay & Ogilby)

Lygosoma maccooeyi Ramsay & Ogilby, 1890, Rec. Austral. Mus., **1**, p. 8: Brawlin, near Cootamundra, New South Wales.

Cotype (M. C. Z. 6304) Cootamundra, N. S. W. (Australian Mus.) 1890.
1 (M. C. Z. 10215) Dubbo, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10216) Brawlin, N. S. W. (Australian Mus.) 1914.

Midbody scale-rows 32; dorsals smooth; transparent disk in lower eyelid much larger than the ear-opening; frontoparietal single; interparietal 1; digits 4; toes 5; lamellae beneath the fourth toe 21–23. Largest skink (No. 10215) measures 129 (50+79) mm.

Leiolopisma novaeguineae (Meyer)

Lygosoma (Carlia) Novae Guineae Meyer, 1875 (1874), Monatsb. Akad. Wiss. Berlin, p. 132: New Guinea.

Lygosoma laeve Oudemans, 1894, in Semon's Zoöl. Forsch. in Austral., Jena, **8**, p. 144: Cooktown, Queensland.

Lygosoma aeratum Garman, 1901, Bull. Mus. Comp. Zoöl. **39**, p. 7: Cooktown, Queensland.

Holotype (M. C. Z. 6476) Cooktown, Q. (E. A. Olive) 1896.
1 (M. C. Z. 9131) Mossman, Q. (J. C. Kershaw) 1913.
2 (M. C. Z. 37160–1) Coen, Q. (P. J. Darlington) 1932.

Midbody scale-rows 22–26; dorsals smooth; transparent disk as large as, or larger than the exposed ear-opening; frontoparietal single; interparietal 1; adpressed limbs just meet; digits 4; toes 5; lamellae beneath the fourth toe 18 in Garman's type. Largest skink (No. 37160) measures 76 (31+45) mm.

Oudemans' type had 24 midbody scale-rows, Garman's 22. Oudemans states that the palpebral disk is a little smaller than the ear-opening; in Garman's skink the ear is almost obscured by the circle of overlapping lobules. I have compared our three Queensland specimens with a good series from Obi Island in the Moluccas and fail to see any good reason for keeping them distinct though Garman's type differs from the rest in possessing a dark grey vertebral band. Held in certain lights there appears to be an indication of such a band in some of the other specimens.

Riopa rufescens (Shaw)

Lacerta rufescens Shaw (part), 1802, Gen. Zoöl., **3**, 1, p. 285: "Arabia, Egypt, and the European Islands."

2 (M. C. Z. 4432) Murray Islands, T. S. (E. Gerrard) 1879.

Midbody scale-rows 28. Larger skink measures 284 (137+147) mm.

Omolepida branchiale (Günther)

Hinulia branchialis Günther, 1867, Ann. Mag. Nat. Hist. (3), **20**, p. 47: Champion Bay, Western Australia.

1 (M. C. Z. 33247) Nannekine, W. A. (Max Micke) 1931.

2 (M. C. Z. 33248–9) Mullewa, W. A. (P. J. Darlington) 1931.

Nannekine is fifteen miles southwest of Canna.

Midbody scale-rows 24–26; supraoculars 3; digits 5; toes 5; they agree well with Boulenger's plate (1887, pl. xxvi, fig. 2). Largest skink (No. 33247) measures 151 (81+70) mm.

Omolepida melanops (Stirling & Zietz)

Lygosoma melanops Stirling & Zietz, 1893, Trans. Roy. Soc. S. Austral., **16**, p. 173, pl. vi, fig. 3: between Everard and Barrow Ranges, Central Australia.

Lygosoma gastrostigma Boulenger, 1898, Proc. Zoöl. Soc. London, p. 922, pl. lvii, fig. 2: Nicol Bay at Sherlock River, Western Australia.

O. melanops is *not* a synonym of *branchiale* as listed by Zietz (1920, p. 214) though possibly intended in a subspecific sense following Werner's (1910, p. 479) reference to it as "a variety." Boulenger's type had 26 midbody scale-rows.

The St. Francis Island, South Australia, records listed under *branchiale* by Zietz are doubtless referable to *woodjonesi* Procter (1923, p. 80) differing in the possession of 28 midbody scale-rows.

Omolepida casuarinae casuarinae (Duméril & Bibron)

Cyclodus casuarinae Duméril & Bibron, 1839, Erpét. Gén., **5**, p. 749: Australia.

Hemisphaeridion tasmanicum Lucas & Frost, 1894, Proc. Linn. Soc. N. S. W., (2), **8**, p. 227: about Lake St. Clair, Tasmania.

1 (M. C. Z. 10193) Long Bay, N. S. W. (Australian Mus.) 1914.

1 (M. C. Z. 33250) Daner's Gap, N. S. W. (R. J. Tillyard) 1931.

Daner's Gap is at an altitude of about 5,400 feet on Mt. Kosciusko. The skink from this locality was taken in a nest of *Myrmecia pilosula*.

Midbody scale-rows 22–26, latter number on No. 33250; supraoculars 3; digits 5; toes 5; distance between end of snout and fore limb is contained twice (No. 10193) to two and a half times (No.33250) in the distance between fore and hind limb. Larger skink (No. 10193) measures 167 (95+72) mm.

Omolepida casuarinae petersi (Sternfeld)

Lygosoma (Homolepida) petersi Sternfeld, 1919, Mitt. Senckenb. Naturf. Gesell., **1**, p. 81: Hermannsburg Mission, Upper Finke River, Northern Territory.

3 (M. C. Z. 35338–40) Hermannsburg, N. T. (W. E. Schevill) 1932.

Midbody scale-rows 24–26; supraoculars 3 (Sternfeld counts them as 4 but in reality they do not differ from New South Wales material in this respect; Boulenger treats the last in the row as an upper postocular); digits 5; toes 5; distance between end of snout and forelimb is contained two and a third to two and a half times in the distance between fore and hind limb. Largest skink (No. 35338) measures 173 (90+83) mm.

Though Sternfeld proposed *petersi* as a new name for *Lygosoma mülleri* Peters (preoccupied in Lygosoma, though not in Omolepida, by *Scincus mülleri* Schlegel), I incline to the idea that he was mistaken in supposing that *mülleri* Peters, which came from South Australia and possessed 24–26 midbody scale-rows, is identical with his Hermannsburg material from the centre of the continent.

O. c. petersi may be recognized by the presence of one or more ear lobules and its uniformly brown dorsal coloring. All the other characters cited by Sternfeld break down, or are at most only average characters; even the elongated body appears to be matched by that of our Mt. Kosciusko skink.

Omolepida australe (Gray)

Lygosoma australis Gray, 1839, Ann. Nat. Hist., **2**, p. 332: Australia.

2 (M. C. Z. 10209–10) Western Australia (Australian Mus.) 1914.
3 (M. C. Z. 24567–8) Manjimup, W. A. (W. S. Brooks) 1927.
2 (M. C. Z. 24569–70) Augusta, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 33246) Margaret River, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 35341) Nr. Denmark, W. A. (W. S. Brooks) 1927.

Midbody scale-rows 20–22, only No. 10209 with 22 but undoubtedly conspecific; digits 5; toes 5; lamellae beneath the fourth toe 18–21. Largest skink (No. 10210) measures 195 (70+125) mm.

The Manjimup specimens, taken on February 4, 1927, are gravid females holding large embryos. Both they and the Augusta skinks were "found beneath logs." (W. S. B.).

Omolepida punctulatum (Peters)

Lygosoma punctulatum Peters, 1871, Monatsb. Akad. Wiss. Berlin, p. 646, pl. —, fig. 5: Port Bowen, Queensland.

Lygosoma heterodactylum Günther, 1876, Journ. Mus. Godeffroy, **12**, p. 45: Peak Downs, Queensland.

1 (M. C. Z. 5250) "? Australia" (H. A. Ward) 1884.

Midbody scale-rows 20; digits 5; toes 5; lamellae beneath the fourth toe 14. Total length 103 (60+43) mm.

Omolepida crassicaudum (A. Duméril)

L(ygosoma) crassicaudum A. Duméril, 1851, Cat. Méthod. Coll. Rept. Paris, p. 172: Australia and Oceania.

1 (M. C. Z. 36944) Australia (H. A. Ward) 1932.

Midbody scale-rows 22. Total length 118 (47+71) mm.

O. mjöbergi was differentiated on the basis of the broad sutures formed by the frontonasal with the rostral and the frontal (moderately broad in the figure of Duméril's type, "narrow" in Boulenger's redescription in the Catalogue of Lizards (1887, **3**, p. 325)), and by the fewer lamellae beneath the fourth toe, 12–15 instead of 15–18. I have seen the specimen of *mjöbergi* from Ravenshoe, northern Queensland with 13 subdigital lamellae referred to by Procter (1923, p. 1073). While these distinctions sound somewhat trivial, actually the two skinks are very distinct, *mjöbergi* being very much the larger.

Our specimen shows a moderately broad suture between the rostral and frontonasal but only the narrowest possible point of contact between the frontonasal and the frontal. It has *only* 12 lamellae beneath the fourth toe. Otherwise it agrees with the description of *mjöbergi*.

It disagrees with Boulenger's description of *crassicaudum* in that the distance between the end of the snout and the forelimb is contained only 1¾, instead of 2–2½ times, in the length between axilla and groin; lamellae beneath fourth toe 12, instead of 15–18.

In this connection attention might be directed to the extraordinary superficial similarity of the longer limbed *Sphenomorphus pardalis* (Macleay) inhabiting the same regions and often mistaken for *Omolepida crassicaudum*.

Hemiergis peronii (Fitzinger)

Seps peronii Fitzinger, 1826, Neue Classif. Rept., p. 53: Kangaroo Id., S. A.

Lygosoma (Hemiergis) quadridigitatum Werner, 1910, in Michaelsen and Hartmeyer's Fauna Südwest Austral., **2**, p. 480.

4 (M. C. Z. 10234–7) Port Lincoln, S. A. (Australian Mus.) 1914.
1 (M. C. Z. 10238) Perth, W. A. (Australian Mus.) 1914.
2 (M. C. Z. 24578–9) Mt. Melville, W. A. (W. S. Brooks) 1927.
42 (M. C. Z. 24611–35) Denmark River, W. A. (W. S. Brooks) 1927.
23 (M. C. Z. 24636–60) Manjimup, W. A. (W. S. Brooks) 1927.
25 (M. C. Z. 24661–85) Pemberton, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 33169) ?Margaret River, W. A. (Harvard Exped.) 1931.
28 (M. C. Z. 33170–97) Pemberton, W. A. (W. E. Schevill) 1931.

Midbody scale-rows 18–21 (only a few from the larger series were counted but all in the smaller); limbs tetradactyle (in this and all other species of the genus every individual's hands and feet were examined in search of *woodfordi* Lucas and Frost, a species which has four fingers and three toes). Largest skink (No. 33169) measures 226 (61+165) mm.

Werner (1910, p. 480) proposed *quadridigitatum* as a new name for *peronii* under the belief that the latter was preoccupied in the genus Lygosoma by *peronii* Duméril & Bibron (1839). However, it was the latter which required renaming in Lygosoma and this was done by Zietz (1920, p. 212) by giving precedence to De Vis' name *blackmanni* (1885). The name *peronii* is not preoccupied in Hemiergis.

Hemiergis tridactylum (Boulenger)

Lygosoma peronii, var. *tridactylum* Boulenger, 1915, Ann. Mag. Nat. Hist., (8), **16**, p. 65: Yallingup, south Western Australia.
60 (M. C. Z. 24586–610) Augusta, W. A. (W. S. Brooks) 1927.
8 (M. C. Z. 33159–66) Margaret River, W. A. (Harvard Exped.) 1931.
2 (M. C. Z. 33167–8) Walleliffe, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 35342) Manjimup, W. A. (W. S. Brooks) 1927.

Midbody scale-rows 18–20 (of the Augusta series only a few counted); limbs tridactyle, third toe much longer than the second. Largest skink (No. 24595) measures 149 (60+89) mm.

Parker (1926, p. 205) has given good reasons for treating this skink as a full species, rather than as a race of *peronii*.

Hemiergis decresiense (Fitzinger)

Zygnis decresiensis Fitzinger, 1826, Neue Classif. Rept., p. 53: Kangaroo Id., S. A.
4 (M. C. Z. 33155–8) Mt. Lofty, S. A. (W. M. Wheeler) 1931.

Midbody scale-rows 24–26; limbs tridactyle, second toe only slightly longer than the third. Largest skink (No. 33156) measures 103 (49+54) mm.

Hemiergis quadrilineatum (Duméril & Bibron)

Chelomeles quadrilineatus Duméril & Bibron, 1839, Erpét. Gén., **5**, p. 774: Australia.

1 (M. C. Z. 10214) 80 mi. s. of Perth, W. A. (Australian Mus.) 1914.
2 (M. C. Z. 24580–1) north of Perth, W. A. (W. S. Brooks) 1927.
4 (M. C. Z. 24582–5) Balcatta Beach, W. A. (W. S. Brooks) 1927.
5 (M. C. Z. 33201–5) Rottnest Island, W. A. (Harvard Exped.) 1931.
6 (M. C. Z. 33206–11) King's Park, Perth, W. A. (Harvard Exped.) 1931.

Midbody scale-rows 18–20 (only No. 24582 with 20); limbs didactyle. Largest skink (No. 33208) measures 125 (50+75) mm.

Siaphos maccoyi Lucas and Frost

Siaphos maccoyi Lucas & Frost, 1894, Proc. Roy. Soc. Victoria (new series), **6**, p. 85, pl. ii, figs. 2 and 2a: Brandy Creek and fourteen other localities in Victoria.

?*Hemiergis initiale* Werner, 1910, in Michaelsen & Hartmeyer's Fauna Südwest-Austral., **2**, p. 480: Lion Mill and Jarrahdale, south Western Australia.

1 (M. C. Z. 10242) Walhalla, V. (Australian Mus.) 1914.
3 (M. C. Z. 33198–200) Mill Grove, V. (Harvard Exped.) 1931.
2 (M. C. Z. 33270–1) Snowy River, N. S. W. (P. J. Darlington) 1931.
1 (M. C. Z. 33272) Mt. Dandenong, V. (W. E. Schevill) 1931.

Mill Grove is on Dee Creek near Melbourne. Snowy River, about 3,000 feet, on Mt. Kosciusko. If I am correct in referring Werner's *initiale* to the synonymy of *maccoyi*, it involves a considerable extension of the range westward.

Midbody scale-rows 18–20 (Werner's types were 20–22); limbs pentadactyle; tympanum minute, scarcely discernible in Mill Grove specimens. Largest skink (No. 10242) measures 102 (45+57) mm.

Lönnberg and Andersson (1913, p. 10) have some notes on variation in this species.

Siaphos graciloides (Lönnberg & Andersson)

Lygosoma graciloides Lönnberg & Andersson, 1913, Svenska. Vetensk.-Akad. Handl. Stockholm, **52**, No. 3, p. 10: Yandina, at foot of Blackall Range, southern Queensland.

Lygosoma scharffi Boulenger, 1915, Ann. Mag. Nat. Hist., (8), **16**, p. 64: One Tree Hill, Brisbane, Queensland.

This skink with 20 midbody scale-rows, 4 digits and 5 toes, has been twice described. Boulenger had a single example, Lönnberg, 3.

Siaphos equalis (Gray)

Seps equalis Gray, 1825, Ann. Philos., (2), **10**, p. 202: no locality stated.

1 (M. C. Z. 5248) No locality (No history) N. D.
1 (M. C. Z. 6303) Clarence River, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10188) Uralla, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10189) Hartley Vale, N. S. W. (Australian Mus,) 1914.
2 (M. C. Z. 10190–1) Salisbury, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 27328) Dorrigo, N. S. W. (G. C. Crampton) 1928.
2 (M. C. Z. 33268–9) National Park, N. S. W. (P. J. Darlington) 1932.
1 (M. C. Z. 35343) Salisbury, N. S. W. (P. J. Darlington) 1932.
4 (M. C. Z. 35344–7) Cascade, N. S. W. (P. J. Darlington) 1932.

Midbody scale-rows 18–22; limbs tridactyle, second toe slightly longer than the third; lamellae beneath the median toe 3–6. Largest skink (No. 5248) measures 139+(69+70+) mm. No. 35343 has an entire tail, and measures 130 (48+82) mm.

Numbers 10189–10191 were received as *Hemiergis decresiense*, a species which they closely resemble. Apart from the scaly lower eyelid, a character which is often somewhat obscured, the two may be distinguished as follows:—

Midbody scale-rows 18–22, average 20; lamellae beneath median toe 3–6. Total length 137 mm..... *equalis*
Midbody scale-rows 24–26, average 24; lamellae beneath median toe 7–9. Total length 103 mm..... *decresiense*

In both color and markings these two skinks are alike. Undoubtedly Hemiergis and Siaphos are very closely related and to eliminate errors of redescription it might be advisable to unite them.

Rhodona microtis (Gray)

Mocoa microtis Gray, 1845, Cat. Liz. Brit. Mus., p. 83: Swan River, Western Australia.

1 (M. C. Z. 24577) Manjimup, W. A. (W. S. Brooks) 1927.
1 (M. C. Z. 33267) Pemberton, W. A. (W. E. Schevill) 1931.

Midbody scale-rows 20; frontal as long as frontoparietals and interparietal together; digits 5; toes 5. Larger skink (No. 24577) measures 101 (51+50) mm.

The Manjimup skink, taken beneath a log on February 3, 1927, is gravid.

Rhodona bougainvillii (Gray)

Riopa Bougainvillii Gray, 1839, Ann. Nat. Hist., **2**, p. 332: Australia.
1 (M. C. Z. 10212) Port Lincoln, S. A. (Australian Mus.) 1914.

Midbody scale-rows 20; frontal longer than frontoparietals and interparietal together; digits 5; toes 5; Total length 79 (46+33) mm.

Rhodona planiventralis desertorum (Sternfeld)

Lygosoma (Rhodona) planiventrale desertorum Sternfeld, 1919, Mitt. Senckenb. Naturf. Gesell., **1**, p. 82: Hermannsburg Mission, Upper Finke River, Northern Territory.
1 (M. C. Z. 35348) Hermannsburg, N. T. (W. E. Schevill) 1932.

Midbody scale-rows 22; digits 2; toes 3. Total length 134 (77+57) mm.

Sternfeld's type had 20 midbody scale-rows, a character which he claimed differentiated it from the typical form but disproved by our specimen having 22. The race, however, holds good on the basis of its shorter limbs as borne out by this skink. It might be advisable to remeasure the limbs of the type of *planiventralis* in the National Museum, Melbourne. Werner's *macropisthopus* has even shorter limbs than *desertorum*.

Many other species of this genus have been described in recent years. Those not represented in this collection, are:

	Digits	*Toes*	*Scales*
R. tetradactyla Lucas & Frost, 1875, Tempe Downs, N. T.	4	4	20
R. terdigitata (Parker), 1926, Flinders Id., S. A.	3	3	20
R. planiventralis Lucas & Frost, 1902, W. Australia.	2	3	22
R. macropisthopus (Werner), 1903, Queensland.	2	3	20
R. walkeri (Boulenger), 1891, Roebuck Bay, W. A.	2	2	20
R. picturata (Fry), 1914, Boulder, W. A.	Bud	2	18–20
R. wilkinsi (Parker), 1926, Torrens Creek, Q.	0	2	18–20

Rhodona gerrardii Gray

Rhodona punctata var. *gerrardii* Gray, 1864, Proc. Zoöl. Soc. London, p. 296: Swan River, Western Australia.
1 (M. C. Z. 24471) Yalgoo, W. A. (R. C. Richardson) 1926.
2 (M. C. Z. 33253–4) Dalgaranger Stn., W. A. (G. E. Nicholls) 1931.
4 (M. C. Z. 33255–8) Mullewa, W. A. (Harvard Exped.) 1931.
Dalgaranger is 50 miles N.E. of Yalgoo.

Midbody scale-rows 20; digits 1; toes 2. Largest skink (No. 33255) measures 161 (82+79) mm.

Mullewa skinks were taken beneath stones in September.

Rhodona punctatovittata Günther

Rhodona punctatovittata Günther, 1867, Ann. Mag. Nat. Hist., (3), **20**, p. 47: Queensland.

1 (M. C. Z. 10207) Curlewis, N. S. W. (Australian Mus.) 1914.

1 (M. C. Z. 10208) Narramine, N. S. W. (Australian Mus.) 1914.

Midbody scale-rows 18; digits 1; toes 2. Larger skink (No. 10208) measures 155 (88+67) mm.

Rhodona nichollsi Loveridge

Rhodona nichollsi Loveridge, 1933, Occ. Pap. Boston Soc. Nat. Hist., **8**, p. 97: Dalgaranger Station, 50 miles N.E. of Yalgoo, Western Australia.

Holotype (M. C. Z. 33252) Dalgaranger Stn., W. A. (G. E. Nicholls) 1931.

Midbody scale-rows 22; forelimb a bud, half as long as an adjacent scale; hind limb didactyle. Total length 127 (63+64) mm.

Rhodona miopus (Günther)

Soridia miopus Günther, 1867, Ann. Mag. Nat. Hist., (3), **20**, p. 49: Champion Bay, Western Australia.

3 (M. C. Z. 33259–61) Geraldton, W. A. (Harvard Exped.) 1931.

These specimens are topotypic. It will be noted that *lineata* also occurs at Geraldton.

Midbody scale-rows 20; forelimb a bud; toes 1 but Number 33259 undoubtedly shows a rudimentary stump of a second toe. Largest skink (No. 33259) measures 149 (88+61) mm.

Rhodona bipes Fischer

Rhodona bipes Fischer, 1882, Arch. für Naturg, **48**, p. 292, pl. xvi, figs. 10–15: Nicol Bay, Western Australia.

1 (M. C. Z. 32251) Wiluna, W. A. (Harvard Exped.) 1931.

1 (M. C. Z. 35349) Hermannsburg, N. T. (W. E. Schevill) 1932.

1 (M. C. Z. 35350) Anningie, N. T. (W. E. Schevill) 1932.

Anningie is about 30 miles W. of Teatree Well.

Midbody scale-rows 18 (Wiluna) to 20; forelimb absent; toes 2; frontoparietals and interparietal fused into a single shield. Largest skink (No. 35349) measures 99 (61+38) mm., but tail regenerated.

Lönnberg & Andersson (1913, p. 11) record 12 examples from Broome and the St. George Range in the interior of Kimberly district.

Rhodona lineata (Gray)

Soridia lineata Gray, 1839, Ann. Nat. Hist., **2**, p. 336: Australasia.
Lygosoma praepeditum Boulenger, 1887, Cat. Liz. Brit. Mus., **3**, p. 337: *n.n.* for *lineata* preoccupied in genus Lygosoma.
1 (M. C. Z. 33262) Geraldton, W. A. (P. J. Darlington) 1931.
4 (M. C. Z. 33263–6) West Wallaby Id., W. A. (W. E. Schevill) 1931.

Midbody scale-rows 16; forelimb absent; toes 1; frontoparietals and interparietal fused into a single shield. Largest skink (No. 33265) measures 56 mm. from snout to anus, the tail is in process of regeneration.

It would appear that even if this skink is referred to the genus Lygosoma, the name *capensis* A. Smith should be employed rather than *praepeditum* proposed by Boulenger.

Lygosoma darlingtoni Loveridge

Lygosoma darlingtoni Loveridge, 1933, Occ. Pap. Boston Soc. Nat. Hist., **8**, p. 98: Millaa Millaa, Queensland.
Holotype (Queensland Museum) Millaa Millaa, Q. (P. J. Darlington) 1932.

Midbody scale-rows 22; limbs short, pentadactyle; lamellae beneath the fourth toe, 14. Total length 190 (75+115) mm.

Lygosoma reticulatum (Günther)

Chelomeles reticulatus Günther, 1873, Ann. Mag. Nat. Hist., (4), p. 146: Clarence River, New South Wales.
1 (M. C. Z. 10256) Palmers Island, N. S. W. (Australian Mus.) 1914.

Midbody scale-rows 24; limbs tridactyle. Length from snout to anus 147 mm., tail in process of regeneration.

Lygosoma verreauxii (A. Duméril)

Anomalopus verreauxii A. Duméril, 1851, Cat. Méthod. Coll. Rept. Paris, p. 185: Tasmania.
S(iaphus) simplex Cope, 1864, Proc. Acad. Nat. Sci. Philad., p. 229: Australia.
2 (M. C. Z. 10263–4) Gayndah, Q. (Australian Mus.) 1914.
1 (M. C. Z. 10543) S. Queensland (Queensland Mus.) 1914.

Midbody scale-rows 20; forelimb tridactyle, except on the right side of No. 10263 where it is obvious that the digits have been worn down; hind limb undivided. Largest skink (No. 10263) measures 211 (77+134) mm.

Lygosoma lentiginosus (De Vis)

Anomalopus lentiginosus De Vis, 1888 (1887), Proc. Linn. Soc. N. S. W., (2), **2**, p. 823: Brisbane, Queensland.

Lygosoma verreauxii var. *biunguiculata* Oudemans, 1894, in Semon's Zoöl. Forsch. in Austral., Jena, **8**, p. 144: Burnett River, Queensland.

Lygosoma bancrofti Longman, 1916, Mem. Queensl. Mus., **5**, p. 49: Upper Dawson River, Queensland.

1 (M. C. Z. 10228) Tamworth, N. S. W. (Australian Mus.) 1914.

1 (M. C. Z. 10229) Moree, N. S. W. (Australian Mus.) 1914.

Midbody scale-rows 20–23 (Tamworth); forelimb didactyle; hind limb undivided. Larger skink (No. 10228) measures 228 (110+118) mm.

Received from the Australian Museum as *L. truncatum* (Peters), these skinks differ from Boulenger's (1887, p. 343) description (which was based on Peters' original as Boulenger had no specimens) in the following points:

Frontal forming a suture with the first two supraoculars (*not* first supraciliary and first supraocular); clearly 4 (not 3) supraoculars; a pair of temporals and 5 or 6 scarcely differentiated scales border the parietals posteriorly (not a pair of temporals and a pair of nuchals); forelimb didactyle (not undivided). On this last character alone one might have postulated that Peters' type from Moreton Bay, Queensland had one claw worn off but for the fact that Longman (1916, p. 49) has recorded a second specimen from Moreton Island.

In this same paper, Longman describes *L. bancrofti* from a single skink but rejecting its synonymy with *lentiginosus* because Boulenger had synonymized the latter with *verreauxii* and because *lentiginosus* agreed with *verreauxii* in the possession of a white nuchal collar. It should be noted, however, that what De Vis states, is "a trace of a pale band across the occiput conspicuous in the young." As *lentiginosus* appears to be a further stage of degeneration from *verreauxii*, it is quite probable that the young would exhibit traces of the occipital band of the ancestral form though they might lose them when adult.

Lygosoma frontalis (De Vis)

Ophioscincus frontalis De Vis, 1888 (1887), Proc. Linn. Soc. N. S. W. (2), **2**, p. 823: Geraldton (since renamed Innisfail), Queensland.

1 (M. C. Z. 35448) Yungaburra, Q. (W. J. Davis) 1932.

Yungaburra is near Atherton. We are deeply indebted to Mr. W. J. Davis for this welcome gift to the Harvard Expedition.

Midbody scale-rows 31 (30 in the type); no limbs. Length from snout to anus 77 mm., tail truncated.

L. frontalis was synonymized with *L. ophioscincus* Boulenger; itself a synonym of *australis* (Peters) when Lygosoma is used in the present restricted sense. *L. ophioscincus* was proposed by Boulenger as a new name for *australis* in Lygosoma, preoccupied by *Sphenomorphus australis* (Gray), 1838, which Boulenger calls *Lygosoma lesueurii* Duméril & Bibron, 1839.

Peters does not state how many midbody scale-rows his *australis* had, but Boulenger possessed a topotype from the same source as Peters' type and gives it as 22. The coloration is also different from that of *frontalis*. Our specimen agrees with the latter both in number of scale-rows and in coloration.

Ablepharus boutonii virgatus Garman

Ablepharus virgatus Garmans, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 10: Cooktown, Queensland.

Cryptoblepharus boutonii peronii Barbour, 1914, Proc. Biol. Soc. Washington, **27**, p. 204.

1 (M. C. Z. 4114) Island in Torres Straits (E. Gerrard) 1877.
Holotype (M. C. Z. 6485) Cooktown, Q. (E. A. Olive) 1896.
8 (M. C. Z. 9475–83) Mer, Murray Is., T. S. (H. L. Clark) 1913.
1 (M. C. Z. 9490) Darnley Island, T. S. (H. L. Clark) 1913.
1 (M. C. Z. 9496) Prince of Wales Id., T. S. (H. L. Clark) 1913.

Midbody scale-rows 20–26, average 22.5. Largest skink (No. 9480) measures 92 (38+54) mm., the holotype (No. 6485) measures 77 (40+37) mm.

This series agrees closely with the diagnosis given in Mertens' (1931, p. 113) most excellent revision of the races of *A. boutonii;* the only exception is the Darnley Island skink with 26 scale-rows, the average remains 22, as stated by Mertens.

Ablepharus boutonii metallicus Boulenger

Ablepharus boutonii var. *metallicus* Boulenger, 1887, Cat. Liz. Brit. Mus., **3**, p. 347: North Australia.

Ablepharus eximius Garman (part; not of Girard), 1901, Bull. Mus. Comp. Zoöl., **39**, p. 10.

Ablepharus boutoni australis Sternfeld, 1918, Abhand. Senckenb. Naturf. Gesell., **36**, p. 424: Hermannsburg Mission, Upper Finke River, Northern Territory.

1 (M. C. Z. 6483) Nr. Cooktown, Q. (A. G. Mayer) 1896.
1 (M. C. Z. 31899) Nr. Emery Point, N. T. (H. L. Clark) 1929.
1 (M. C. Z. 33125) Geraldton, W. A. (P. J. Darlington) 1931.
1 (M. C. Z. 35317) Forest Creek, Q. (W. E. Schevill) 1932.

Emery Point is near Darwin; Forest Creek is near Iffley which is 115 miles south of Normanton, Queensland.

Midbody scale-rows 22–28. Largest skink (No. 35317) measures 99 (46+53) mm.

Number 6483 is the specimen referred by Garman to *eximius* together with true Fijian *eximius* brought back by the Barrier Reef Expedition. If it truly came from "near Cooktown" then it is a topotype of Garman's race *virgatus*. However, that is a very well defined race with which No. 6483 does not agree and it does conform to *metallicus*. It might be remembered that it was not catalogued until four years after its receipt and then as "*A. peronii* Cocteau." I prefer to suggest the possibility of an error as to its locality data.

One might have expected the Geraldton skink to have conformed to the Western Australian *plagiocephalus* but it appears indistinguishable from the other *metallicus*. Of this race Mertens had only the two cotypes of *australis* Sternfeld from Hermannsburg. These had a midbody scale-row count of 22–24, the Geraldton specimen has 28.

Ablepharus boutonii plagiocephalus (Cocteau)

Scincus plagiocephalus Cocteau, 1836, Études Scinc. Cryptoblep. de Péron, (p. 7), pl. : Tasmania and Baie des Chiens Marins, Australia.

Tiliqua Buchananii Gray, 1839, Ann. Nat. Hist., **2**, p. 291: Australia.

Ablepharus boutoni punctatus Sternfeld, 1918, Abhand. Senckenb. Naturf. Gesell., **36**, p. 424: Western Australia.

1 (M. C. Z. 33124) Gorge, Hornsby, N. S. W. (Harvard Exped.) 1931.
1 (M. C. Z. 35318) Herveys Range, N. S. W. (W. E. Schevill) 1932.

Midbody scale-rows 22–24. Larger skink (No. 33124) measures 81 (35+46) mm.

I follow Mertens (1931, p. 116) in using this name and in the synonymy given above. While the Herveys Range specimen conforms to the color description given by Mertens, the other is almost uniformly black above, except for the pair of very sharply defined, white, dorsolateral lines originating in the supraocular region.

ABLEPHARUS LINEOOCELLATUS LINEOOCELLATUS Duméril & Bibron

Ablepharus lineo-ocellatus Duméril & Bibron, 1839, Erpét, Gén., **5**, p. 817: Australia.

1 (M. C. Z. 24548) Augusta, W. A. (W. S. Brooks) 1927.
2 (M. C. Z. 33131–2, 33237) Perth, W. A. (Harvard Exped.) 1931.
3 (M. C. Z. 33133–5) Rottnest Id., W. A. (Harvard Exped.) 1931.
6 (M. C. Z. 33137–42) West Wallaby Id., W. A. (Harvard Exped.) 1931.
8 (M. C. Z. 33143–50) Walleliffe, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 33151) Bridgetown, W. A. (Harvard Exped.) 1931.
1 (M. C. Z. 35337) Hermannsburg, N. T. (W. E. Schevill) 1932.
Wallcliffe is near Margaret River.

Midbody scale-rows 24–30 (only No. 33137 with 30), average 26; supranasals absent in all except Nos. 33131 and 33134; No. 24548 has an incomplete groove on the right side above the nostril. Largest skink (No. 33139) measures 125 (46+79) mm.

The typical form may be distinguished from the eastern race by its *usually* lacking supranasals and a lower *average* number of midbody scale-rows.

ABLEPHARUS LINEOOCELLATUS ANOMALUS (Gray)

Morethia anomalus Gray, 1844, Zoöl. Erebus & Terror, Rept., p. 4, pl. v, fig. 1: Western Australia.

1 (M. C. Z. 5253) No locality (H. A. Ward) 1884.
2 (M. C. Z. 5784) "S. W. Australia?" (Peabody Mus.) N. D.
1 (M. C. Z. 10245) Boggabri, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 10246) Dubbo, N. S. W. (Australian Mus.) 1914.
2 (M. C. Z. 10247–8) Moloch, N. S. W. (Australian Mus.) 1914.
2 (M. C. Z. 10249–50) Bathurst, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 35319) Mt. Coolon, Q. (W. E. Schevill) 1932.
The locality Moloch, clearly entered in our register, may possibly be Molong?

Midbody scale-rows 28–30, average 28.6; supranasals present in all. Largest skink (No. 5784) measures 55 mm. from snout to anus, tail missing.

It is unfortunate that the type of *anomalus* happened to be one of the rare Western individuals with supranasals present; I am restricting its use here to the eastern skinks which are characterized by the almost invariable presence of supranasals and a higher average number of midbody scale-rows.

Number 5784 (2 examples) were registered as "*Morethia anomalus* Gray" with "? S. W. Australia" for locality. Later "Types of *Panaspis*

aeneus Cope" was added. *Panaspis aeneus*, however, had 24 midbody scale-rows, frontoparietals and interparietal distinct, and was identified by Boulenger as a southwest African species. At the time of its description Cope was uncertain whether the type came from southwest Australia or southwest Africa. Our two specimens have little in common with the description of *aeneus*.

Ablepharus taeniopleurus Peters

Ablepharus (*Morethia*) *taeniopleurus* Peters, 1874, Monatsb. Akad. Wiss. Berlin, p. 375: Port Bowen, Queensland.

Ablepharus lineo-ocellatus var. *ruficaudus* Lucas & Frost, 1895, Proc. Roy. Soc. Victoria, **7**, p. 269: Reedy Hole, Northern Territory.

1 (M. C. Z. 35320) Pelican Bore, Queensland (W. E. Schevill) 1932.

2 (M. C. Z. 35321–2) Coen, Cape York, Q. (P. J. Darlington) 1932. Pelican Bore is on Charlotte Plains near Hughenden.

Midbody scale-rows 26–28. Largest skink (No. 35321) measures 112 (40+72) mm.

A. ruficaudus appears to have been differentiated from *lineoocellatus* by just those characters which separate the latter from *taeniopleurus*. Our fresh material possess red tails and agree well with the excellent colored plate of the type of *ruficaudus* given by Lucas & Frost (1896, pl. x, fig. 3) in the report on the Horn Expedition.

Ablepharus greyii (Gray)

Menetia greyii Gray, 1844, Zoöl. Erebus & Terror, Rept., pl. v, fig. 4: Western Australia.

2 (M. C. Z. 10296, 11802) Warren, N. S. W. (Australian Mus.) 1914.

1 (M. C. Z. 33127) Caron, W. A. (Harvard Exped.)1931.

2 (M. C. Z. 33128–9) Meekatharra, W. A. (Harvard Exped.) 1931.

1 (M. C. Z. 33130) Geraldton, W. A. (P. J. Darlington) 1931.

Midbody scale-rows 22–24; frontoparietal single; interparietal distinct; digits 4; toes 5. Largest skink (No. 33128) measures 79 (31+48).

Ablepharus burnetti Oudemans

Ablepharus burnetti Oudemans, 1894, in Semon's Zoöl. Forsch. in Austral., Jena, **8**, p. 145: Burnett River, Queensland.

Ablepharus heteropus Garman, 1901, Bull. Mus. Comp. Zoöl., **39**, p. 9: Great Barrier Reef, Queensland.

Holotype (M. C. Z. 6486) Great Barrier Reef, Q. (Barrier Reef Exped.) 1896.

Midbody scale-rows 24; frontoparietal single; interparietal distinct digits 4; toes 5. Total length 57 (26+31) mm.

Ablepharus timidus De Vis

Ablepharus timidus De Vis, 1888 (1887), Proc. Linn. Soc. N. S. W. (2), **2**, p. 824: Charleville, Queensland.

Ablepharus rhodonoides Lucas & Frost, 1896, Proc. Linn. Soc. N. S. W., **21**, p. 281: Mildura, Victoria.

2 (M. C. Z. 10217–8) Moloch, N. S. W. (Australian Mus.) 1914.
1 (M. C. Z. 33152) Lake Violet, W. A. (W. E. Schevill) 1931.
2 (M. C. Z. 33153–4) Mullewa, W. A. (Harvard Exped.) 1931.

Midbody scale-rows 20; digits 3; toes 3. Largest skink (No. 10217) measures 86 (46+40) mm.

Ablepharus elegans (Gray)

Miculia elegans Gray, 1844, Zoöl. Erebus & Terror, Rept., pl. v, fig. 3: Western Australia.

1 (M. C. Z. 33126) West Wallaby Id., W. A. (W. E. Schevill) 1931.
1 (M. C. Z. 33136) Rottnest Island, W. A. (P. J. Darlington) 1931.

Midbody scale-rows 16; rostral well separated from the frontonasal; digits 4; toes 4. Larger Skink (No. 33126) measures 84 (38+46) mm.

Ablepharus distinguendus Werner

Ablepharus distinguendus Werner, 1910, in Michaelsen & Hartmeyer's Fauna Südwest-Austral., **2**, p. 490: Obelisk Hill, Fremantle, Western Australia.

1 (M. C. Z. 24547) Geraldton, W. A. (J. Clark) 1927.

Midbody scale-rows 20; rostral in contact with the frontonasal; digits 4; toes 4. Total length 84 (37+47) mm.

Werner has separated *distinguendus* from *elegans* on the basis of its possessing 18 midbody scale-rows and the posteriorly angular rostral being in contact with the frontonasal; also color. On geographical grounds one would have expected the West Wallaby and Rottnest Island forms to have conformed rather to the Fremantle species than to *elegans*.

Tropidophorus queenslandiae De Vis

Tropidophorus queenslandiae De Vis, 1890, Proc. Linn. Soc. N. S. W., (2), **4**, p. 1034: Herberton and Bellenden Ker, Queensland.

2 (M. C. Z. 10289–90) Mt. Bartle Frere, Q. (Australian Mus.) 1914.
2 (M. C. Z. 35323–4) Mt. Spurgeon, Q. (P. J. Darlington) 1932.
2 (M. C. Z. 35325–6) Lake Barrine, Q. (P. J. Darlington) 1932.
12 (M. C. Z. 35327–36) Millaa Millaa, Q. (P. J. Darlington) 1932.

Midbody scale-rows 34–38, average 35.5; frontoparietals 2; a pair of enormously enlarged preanals; upper head shields strongly rugose; dorsals and ventrals strongly keeled. Largest skink (No. 35323) measures 176 (86+90) mm.

In recent years this interesting rain-forest form has been recorded from Atherton by Lönnberg & Andersson (1915, p. 4) and from Ravenshoe by Procter (1923, p. 1073). The smaller nuchal scalation marks it off as very distinct from its Papuan allies.

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EXPLANATION OF PLATE

EXPLANATION OF PLATE

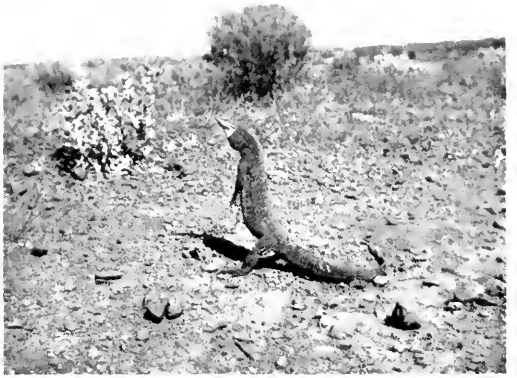
Fig. 1. Major Guildford W. de Teliga with *Crocodylus johnstoni* from Flinders River, Queensland. This was the largest of the series collected by the Harvard Australian Expedition of 1931–1932. The characteristic shadeless coolibah and gutta-percha vegetation is well shown. Saxby River, east of Mt. Fort Bowen.

(Photo by W. E. Schevill, July 30, 1932)

Fig. 2. A monitor lizard (*Varanus gouldii*) at bay assuming characteristic defensive attitude. Although this photograph shows the lizard with the mouth closed, it is generally kept open in a threatening manner under such circumstances. Wiluna, Western Australia.

(Photo by G. M. Allen, Oct. 3, 1931)

1



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Bulletin of the Museum of Comparative Zoology
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No. 7. — CRITICAL NOTES ON MIDDLE AMERICAN BIRDS

BY A. J. VAN ROSSEM
California Institute of Technology

CAMBRIDGE, MASS. U. S. A.
PRINTED FOR THE MUSEUM
DECEMBER, 1934

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MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE

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No. 7. — *Critical Notes on Middle American Birds*

By A. J. van Rossem
California Institute of Technology

A. NOTES ON SOME SPECIES AND SUBSPECIES OF GUATEMALA BIRDS

With the recent appearance of Mr. Ludlow Griscom's "Distribution of Bird-Life in Guatemala", we have for the first time a comprehensive report on the birds of that country. Accurate, well written, and generally admirable, it has served not only as a summation of past work but, more important still, it provides a much needed stimulus to the prosecution of further work, not only in Guatemala but in the whole of the Central American field.

When the present writer visited various museums in Europe in the summer of 1933, one of the chief objects was to examine as many types of Central American birds as possible, looking not only to the stabilization of nomenclature but also to a better understanding of the geographic behavior of some of the species of birds concerning which we have very little accurate knowledge. This paper is a commentary on certain of the bird types examined, together with some notes on distribution and some necessary changes in Mr. Griscom's list. I wish to emphasize that no derogatory criticism is implied in any single case. Material which was not seen by Mr. Griscom has, naturally enough, made some changes necessary, but I may say that given the same data accessible to Mr. Griscom I should, in almost every instance, have reached the same conclusions.

Oceanodroma socorroensis Townsend

On the night of June 25–26, 1933, when the S.S. Winnepeg, on which I was a passenger, was 145 miles northwest of San José de Guatemala and about 5 miles off shore, a Socorro Petrel flew on board. It was a male with testes completely dormant and with the plumage in heavy moult. This seems to be not only the first record of any species of petrel for Guatemala but extends the (casual ?) range of this species several hundreds of miles south of the southernmost previously known station.

Sula dactylatra californica Rothschild

Two blue-faced boobies which were seen just off San José de Guatemala on June 26, 1933, were most probably of this race.

Burhinus bistriatus

Ridgway (Birds No. & Mid. Amer., Pt. 8, p. 22, footnote) has already noted the characters of Central American representatives of this species, but he had only three specimens and preferred to defer the formal bestowal of a name until further material verified the differences he observed.

Although the thick-knee is a fairly abundant bird in most localities where it occurs it does not seem to be common in collections. I have examined only 14 from various localities in Mexico, (from Tonala, Chiapas, north to Vera Cruz and Guerrero), and 17 from Central America. On the basis of these 31 specimens there are definite racial differences apparent and the Central American birds are therefore named as

Burhinus bistriatus vigilans subsp. nov.

Type. ♀ adult, no. 22739, Dickey collection at the California Institute of Technology; Hacienda El Pelón, altitude 500 feet, Guanacaste, Costa Rica, July 21, 1928; collected by Austin Smith.

Subspecific characters. Similar to *Burhinus bistriatus bistriatus* (Wagler) of southern Mexico, but upperparts, neck and chest darker and more fulvescent, and with the mesial streaking of all feathers blacker and wider; general size very similar to that of *bistriatus*, but tarsus and toes averaging decidedly longer.

Range. Open grassland or plains from northwestern Costa Rica north, chiefly on the Pacific side, to extreme northwestern Guatemala.

Remarks. A specimen from Huamuchal in northwestern Guatemala (British Museum) is best referable to *vigilans*. Though a single bird from Tonala, Chiapas, is apparently *bistriatus*, a series from there might prove to be intermediate. However, two Chivela, Oaxaca (Mus. Comp. Zoöl.) birds are definitely *bistriatus*.

Wagler's type of *Charadrius bistriatus* is in the Zoölogical Museum at Berlin and is a typical Mexican bird in color and size. It was collected by Ferdinand Deppe at San Mateo, a rather ambiguous locality since there are at least five towns of that name in the territory covered by Deppe on his first trip to Mexico.

Measurements

12 *bistriatus*	tarsus,	112.0—120.0;	middle toe minus claw,	34.0—38.0
14 *vigilans*	"	118.0—131.0;	"	"	"	"	36.0—41.0

Coccyzus minor

For many years the name of *minor* has been applied, subspecifically, by American ornithologists to the mangrove cuckoo of eastern and interior Central America and eastern Mexico in a purely tentative fashion, because no specimens of *minor* were available for comparison. I know of no specimens in the collections in America and was able to examine abroad only one at the Musée d'Histoire Naturelle in Paris, one at the Zoölogical Museum in Berlin (Cabanis' type of *Coccyzus helviventris*), and five in that greatest of all tropical American collections, the British Museum. These seven skins are from the following localities: "Guyane", 2; British Guiana, 2; Trinidad, 1; "Brazil", 1; and "Bogota", 1. The last named individual is a Bogota trade skin which may have come from the northern coast of Colombia, though the species has never been reported, authentically, from that country. At any rate it is of the same race as the other four British Museum specimens, two of which are virtual topotypes of *minor* from British Guiana.

Typical *minor*, as represented by these seven specimens, is the palest of all the many races of the mangrove cuckoo. Its nearest comparison is with *maynardi* of the Bahamas, Cuba, and the southern coast of Florida, but it is even paler below and has the chest and throat pale gray, with only a tinge of buff. The size, too, is similar in both races, though the tail of *minor* seems to be slightly shorter and the bill slightly longer. The seven specimens of *minor*, only one of which, a male, is sexed, measure: wing 128–140; tail, 142–158; exposed culmen, 28.0–32.0; tarsus, 27.0–30.5; outer anterior toe, minus claw, 19.2–21.0 mm. The auricular streak in *minor* is narrow, relatively inconspicuous, and is dark slate-color, not blackish.

The mangrove cuckoo of Central America and Mexico, the dark colored, buff throated race which is described in detail by Ridgway (Birds of No. and Mid. Amer., Pt. 7, p. 21) under the name of "*Coccyzus minor minor* Gmelin ?" is without a name and I propose for it

Coccyzus minor continentalis subsp. nov.

Type. ♀ adult, nearly ready to lay, no. 19180, Dickey collection at the California Institute of Technology; Volcán de Santa Ana, altitude 4500 feet, Dept. Sonsonate, El Salvador, May 16, 1927; collected by A. J. van Rossem, original no. 12060.

Subspecific characters. Similar to *Coccyzus minor palloris* Ridgway of the Pacific lowlands of Central America and Mexico in lacking any

grayish tinge on the throat and chest, but coloration everywhere darker; pileum concolor with the back or nearly so; underparts ochraceous buff, slightly deeper posteriorly; upperparts grayish brown.

Range. Panama, north through Central America, to northeastern Mexico, including Buctotz, Ruatan, the Corn and probably other Atlantic coast islands.

Remarks. The race *palloris* is apparently confined, in Central America at least, to the mangrove association of the Pacific Coast, and is replaced a few miles inland by the very different *continentalis*. Whether this same manner of distribution persists further north I do not know.

In spite of Ridgway's remarks (l.c. p. 22, footnote) concerning a specimen from Alta Mira, Tamaulipas, I am unable to distinguish a specimen from Tampico (British Museum) from other east-Mexican and Central American mangrove cuckoos. In fact the 45 specimens examined from the range of *continentalis* are remarkably uniform in coloration in spite of the more than 1500 miles of latitude and the wide variety of climatic conditions encountered.

Coccyzus minor cozumelae subsp. nov.

Type. Adult, sex unknown, no. 97.4.1.49, British Museum; Cozumel Island off the coast of Quintana Roo, Mexico, January, 1886; collected by G. F. Gaumer.

Subspecific characters. Coloration similar to that of *Coccyzus minor dominicae* Shelley, the darkest previously known race of this species, but upperparts slightly darker and browner: size very much smaller, in this respect similar to *Coccyzus minor continentalis* of the neighboring mainland.

Range. Cozumel Island.

Remarks. The two Gaumer-taken specimens in the British Museum are apparently the only specimens of this race which exist in collections. However the characters are so outstanding that they should receive a name.

Specimens from the neighboring Yucatan Peninsula (Izamal; Temax; Chichen Itza) and those from Buctotz, Ruatan and the Corn Islands appear to be identical with *continentalis* from other parts of the range of that race. I can only conclude that *cozumelae* is of Antillean, rather than of mainland origin, a conclusion which is supported by the major part of the avifauna of Cozumel.

Measurements of the two unsexed specimens of *cozumelae* are as follows: wing, 130–134; tail, 152–156; exposed culmen, 27.5–29.3 mm.

Dromococcyx phasianellus

Spix's type of *Macropus phasianellus* from Rio Tocantins, Brazil, is in the Zoölogische Staatssammlung at Munich. An examination of this type showed it to be so much paler than any Central American example of this species which I had ever seen that I took occasion to check up on the characters of this very rare bird when visiting such museums as possessed any specimens. In all, I have seen 11 Brazilian skins of the pheasant cuckoo, 1 in Munich, 2 in Berlin and 8 in the British Museum. These show beyond a doubt that Brazilian specimens are paler dorsally and have very much paler and redder crests than those from Colombia north to southern Mexico. Of this latter race I have seen 22 from Colombia, Panama, Costa Rica, Honduras, El Salvador, Guatemala, Yucatan, and Vera Cruz.

The earliest name applied to the northern race is *Dromococcyx mexicanus* of Bonaparte (Comptes Rendus, **42**, May, 1856, 957), a *nomen nudum* which, though frequently employed by Sclater and others, has never, apparently, been validated by a single word of description. *Cuculus macrourus* of Verreaux and Des Murs (Rev. et Mag. de Zoöl., 1849, p. 277), was based primarily on Brazilian skins and is a synonym of *phasianellus*. Therefore, *Dromococcyx rufigularis* Lawrence (Proc. Acad. Nat. Sci. Phila., 1867, p. 233), based on a young bird from Guatemala, is the earliest valid name. The pheasant cuckoo of Colombia north to southern Mexico should, therefore, be known as *Dromococcyx phasianellus rufigularis* Lawrence.

A single specimen (British Museum) from Sapucay, Paraguay, is darker dorsally than the darkest *rufigularis* examined and is more cinnamomeus on the breast than any specimen of either race. Paraguay birds probably constitute a third race, in which case the name *Geophilus jasijateri* of Bertoni (Aves Nuev. Paraguay, 1901, p. 43) is available.

[Caprimulgus salvini badius (Bangs and Peck)]

The two specimens recorded by Griscom (l.c. p. 192) as *badius* are simply age-reddened but otherwise normal examples of *Caprimulgus vociferus chiapensis*. While there is every probability that *badius* does occur in the lowlands of eastern Guatemala, no authentic specimens are known from anywhere in the country and the species should be removed from the list of Guatemala birds.

Trogon caligatus

The *Trogon sallaei* of Bonaparte (Comptes Rendus, **42**, 1856, p. 955) described from Vera Cruz, Mexico, has been applied to various species of trogons, but always more or less tentatively. That author describes two birds, a male and a female, but the first and main description is that of the male. While at the Musée d'Histoire Naturelle in Paris I examined all the small trogons which were then in the collection but the male type seems to have disappeared. The female cotype, however, is still there, a mounted bird in a fair state of preservation except for soot stain. The yellow parts of the plumage are, of course, faded to creamy white through age and exposure. This bird, number 1856–1022, belongs to the northern race of gartered trogon which at present bears the name of *Trogon caligatus braccatus* (Cabanis and Heine).

Bonaparte's description of the male is perfectly intelligible when applied to the *young* male gartered trogon with first year rectrices, but is practically indeterminable if one tries to fit it to an adult male of any of the orange- or yellow-bellied species.

Since Bonaparte's name has several year's priority over *braccatus*, the gartered trogon of northern Central America and southern Mexico should be known as *Trogon caligatus sallaei* Bonaparte.

Empidonax affinis affinis (Swainson)

Over fifty years ago Salvin (Cat. Birds Strickland Coll., 1882, p. 314) pronounced the type of Swainson's *Tyrannula affinis* to be the same species which subsequently was named *Empidonax fulvipectus* by Lawrence, but this identification was rejected, for one reason or another, by Ridgway and other American authors. However, a re-examination of Swainson's type in the collection of Cambridge University verifies Salvin's contention. The authorities at Cambridge very kindly allowed me to take this specimen to the British Museum where there was ample material for accurate subspecific determination, and I can state positively that *affinis* and *fulvipectus* are one and the same subspecies. The type is a typical Bullock skin, and though in a fair state of preservation is flattened and considerably distorted. It is not marked as to sex but the wing and tail measurements appear to place it, definitely, as a female. The measurements are: wing, 65.0; tail, 57.0; exposed culmen, 11.8; width at nostrils, 4.0; tarsus, 15.5; middle toe minus claw, 9.1 mm. The locality given by Swainson,

"Maritime parts of Mexico", is, of course, most improbable and I suggest that the much more likely Temascaltepec be substituted.

I thoroughly agree with Griscom that *trepidus* and *pulverius* are races of "*fulvipectus*" and the three forms should stand as

Empidonax affinis affinis (Swainson)
Empidonax affinis trepidus Nelson
Empidonax affinis pulverius Brewster

Empidonax griseus is certainly very closely related to this assemblage but until more is known about its breeding range it would be unsafe to assume specific identity. In this regard it would seem that Swainson's *Tyrannula obscura* must, sooner or later, supplant *griseus* as a name for the Gray Flycatcher. Now that the proper application of *affinis* is known the comparative diagnosis of *obscura* can scarcely apply to any other flycatcher. I could not find the type of *obscura* at Cambridge.

Empidonax difficilis salvini Ridgway

Through what unfortunate combination of circumstances the name of *Empidonax bairdi* Sclater ever became attached to the dark green race of western flycatcher which breeds in Mexico it is not possible at this date to determine. However, I fear that the fault, in some measure at least, lies on this side of the water, for Mr. W. L. Sclater tells me that practically all of the identifications of small American flycatchers in the British Museum collection are the result of exchange of specimens and notes between Salvin, Godman, and his father with the Smithsonian Institution. It is hardly fair, though, to lay the blame on anyone for it is only recently that many of the differentiating characters in this group have been understood and their significance appreciated, and, in spite of the exchange of ideas between English and American ornithologists of the past century, it is obvious that they were very far apart when it came to the genus *Empidonax*!

In the present instance Sclater's diagnosis (Proc. Zoöl. Soc. Lond., 1858, p. 301) of *bairdi* clearly applies to *affinis*, including specific mention of the long narrow bill, and is utterly inappropriate for any flycatcher of the *difficilis* group. Therefore, it was no surprise to find that the type is a typical example of *Empidonax affinis affinis*. The type is number 58.9.27.15 in the British Museum collection and attached to it is the original Sallé tag which reads, "♂ Parada 42/ 10 bre. 57 [i.e. October, 1857]. On the reverse is "Empidonax bairdi, Selat./ Type." This specimen was part of the collection reported on

by Sclater as being received by Sallé from Boucard who, at that time, was working in the high mountains of Oaxaca, at La Parada (10,000 ft.) and at San Miguel de Las Peras. It is worth recording that the type of *bairdi* was the only small flycatcher in the collection except for a single *Empidonax fulvifrons*, and two "*Empidonax* . . .", which were later made the types of *Mitrephanes phaeocercus*.

Mr. Griscom's tentative application of the name *Empidonax difficilis salvini* Ridgway is entirely justified by the series in the British Museum. The only character I can find to separate Guatemala winter specimens of *salvini* from summer birds of "*bairdi*" from Mexico is the lighter and brighter shade of green. This is a purely seasonal character which is common to all races of *difficilis*, and there is no reason to doubt that *salvini* is simply "*bairdi*" on its wintering ground. At any rate *Empidonax bairdi* Sclater is a pure synonym of *Empidonax affinis affinis* (Swainson).

Stelgidopteryx ruficollis fulvipennis (Sclater)

The status of *Cotyle fulvipennis* Sclater has always been a matter of uncertainty, for the name was based on a young bird. Most authors have assumed it to be a specimen of *serripennis* taken in migration, an assumption evidently followed by Griscom in his recent revision (Proc. New Eng. Zoöl. Club, 11, 1929) since he makes no reference to the name. Still more recently Oberholser has used it for the Mexican and Central American race, usually called *salvini*, on the grounds that Bangs had at one time shown it to be applicable. Bangs, however, in a subsequent publication (Bull. M. C. Z., **67**, No. 15, 1927, p. 479) did not consider his use of the name justified and reversed his previous position.

As it turns out Bangs was correct in his first supposition, for the type of *Cotyle fulvipennis* is a young bird with wing quills still extensively sheathed, so much so in fact that it was probably collected directly from the nest. At any rate the name can now be definitely allocated to the race which breeds from Vera Cruz southward through western Central America and which should be called *Stelgidopteryx ruficollis fulvipennis* (Sclater), and *Stelgidopteryx salvini* Ridgway becomes a synonym.

The type is number 84.5.15.90 in the British Museum and is labelled, on a Sclater tag, as follows: "Stelgidopteryx fulvipennis/84.5.15.90/ Jalapa. de Oca". On the reverse is: "Type of Cotyle fulvipennis/ Scl. P. Z. S. 1859/250a of A. C. p. 364."

Xanthoura luxuosa

As long ago as 1857, Schlegel (Mus. Pays-Bas, No. 32, p. 53) showed that Bonaparte's type of *Xanthoura guatimalensis* belonged to the

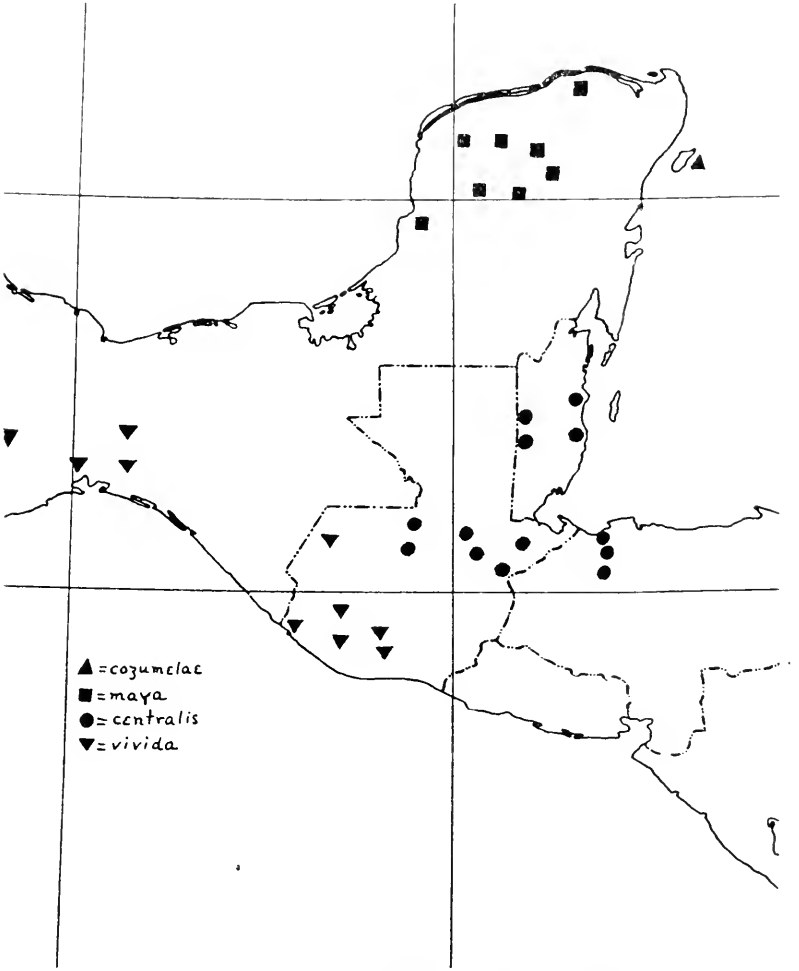

Fig. 1 — Ranges of four subspecies of *Xanthoura luxuosa* in Central America.

species *yncas* of South America. In 1879, Sclater (Ibis, p. 88, in text) reached the same conclusion, partly because of Bonaparte's description but chiefly because he possessed a Venezuelan specimen identified

by Bonaparte himself as *guatimalensis*. So far as I am aware no one since Schlegel's day has critically examined the type of this bird at the Natural History Museum at Leiden, until I had the opportunity to do so in September, 1933.

It is a mounted bird in fair condition and bears the following label: "type X Guatimalensis/ Cyanocorax yncas/ ad: Cat.4/Mr. v Lansberg. ? de Guatimala." All of its characters are those of the central Venezuela race of *Xanthoura yncas*, and there is no reasonable doubt that it was collected at or near Caracas, from which locality there are many Lansberg skins in the Leiden Museum. Fortunately there is a still earlier name available for the Venezuelan race so that the utterly incongruous name of *guatimalensis* need not be used for this South American bird. It is *Pica chloronota* of Wagler (Isis von Oken, Heft 7, 1829, col. 749), a composite of two species; but the first and main part of the description clearly diagnoses the Venezuela race of *yncas*.

A review of all the Central American green jays in the British Museum, the Museum of Comparative Zoölogy, The American Museum of Natural History, and the U. S. National Museum, shows that there are four well-defined forms of the species *luxuosa* south of the Isthmus of Tehuantepec. There is by no means sufficient material more than to roughly outline the ranges, but localities from which specimens have been examined personally are indicated on the accompanying map.

Xanthoura luxuosa vivida Ridgway

Xanthoura luxuosa vivida Ridgway, Auk, **17**, Jan., 1900, 28 (Pluma, Oaxaca).

Subspecific characters. Size large as compared to the other Central American races; median underparts greenish yellow; sides green; under tailcoverts pure yellow or nearly so.

Range. Southern Oaxaca and Chiapas, south to central western Guatemala.

Remarks. Both Ridgway (Birds No. and Mid. Amer., Pt. 3, 1904, p. 310) and Griscom (l.c. p. 403) have commented on the variability of Guatemalan specimens of this race and also that they average more yellow below and lighter green above. These tendencies are simply indicative of intergradation with the race of eastern Guatemala, Honduras, and British Honduras. Specimens of *vivida* have been examined from Oaxaca (Pluma; Santo Domingo; Cacoprieto; Santa Efigenia), Chiapas (Guichicovi), and Guatemala (Hacienda California; Nenton; Retalhuleu; Savana Grande; Zapote; Patio Bolas).

Xanthoura luxuosa maya subsp. nov.

Type. ♀ adult, no. 15266, Mus. Comp. Zoöl. (Bangs Collection); Rio Lagartos, Yucatan, June 1, 1893; collected by W. W. Brown, Jr.

Subspecific characters. Size small,—decidedly smaller than *Xanthoura luxuosa virida* and *Xanthoura luxuosa centralis* (see postea); underparts bright yellow, sometimes tinged with green laterally.

Range. Yucatan and Campeche, and probably at least the northern part of Quintana Roo.

Remarks. 19 specimens have been examined from Campeche (Campeche; Aposote); and Yucatan ("Northern Yucatan"; Merida; Tabi; Izamal; Peto; Rio Lagartos; San Felipe; Chichen Itza).

Xanthoura luxuosa cozumelae subsp. nov.

Type. Unsexed adult, no. 86.9.9.862, British Museum; Cozumel Island, off the coast of Quintana Roo, Mexico, skin undated but taken in January, 1886; collected by G. F. Gaumer.

Subspecific characters. Size small, and in this respect resembling *Xanthoura luxuosa maya* of the neighboring mainland; underparts bright yellow; upper parts, including blue on head, paler than in any other Central American race of this species; blue on head reaching only to nape and not extending over hindneck as in other races.

Range. Cozumel Island.

Remarks. The two specimens in the British Museum are apparently the only examples of the Cozumel Island race in any collection. Griscom did not find the species present in 1926 and it is possible that it has become extinct since 1886, the year of Gaumer's last visit.

Xanthoura luxuosa centralis subsp. nov.

Type. ♂ adult, Dickey collection at the California Institute of Technology; Secanquim, Alta Vera Paz, Guatemala, January 15, 1926; collected by A. W. Anthony, original no. 3009.

Subspecific characters. Similar in coloration to *Xanthoura luxuosa maya* of Yucatan and Campeche, but size decidedly larger.

Range. Northwestern Honduras, north through eastern and parts of central Guatemala to British Honduras.

Remarks. Specimens from the most easterly portion of the range are almost invariably pure yellow below, while those from central Guatemala frequently have more or less green on the sides, and this tendency increases as one approaches the range of *virida*.

Fifty-one specimens of this race have been examined from Honduras (San Pedro; Omoa; Chamelicon), Guatemala (Secanquim; Gualan; Coban; Cajabon; Chama; Isabal; Choctum; Chisec), and British Honduras (Manatee District; Cayo District; Belize; Makal).

It is to be remarked that comparison of the upper parts has been given in only one instance,—that of *cozumelae* in comparison with *maya, centralis* and *vivida*. The dorsal plumage of this species changes with wear from green or yellowish green to bluish green or even greenish blue. The race *vivida* is apparently darker and duller dorsally than any of the other races, season for season, and *maya* appears to be, on an average, bluest of the four when in worn plumage.

In the following table of measurements I have been obliged to ignore sex or else throw out the greater part of the specimens in the British Museum, very few of which have the sex indicated on the tags. However there is very little sex difference so far as size goes, and some specimens sexed as males are smaller than others sexed as females. I must refer here, also, to the measurements recorded by Ridgway (l.c.) for Yucatan specimens of "*guatimalensis*." Those of Yucatan females accord very closely with my own, taken from (presumably) the same specimens in the U. S. National Museum, and equally close results were obtained in the case of the three Honduras birds. But I get no such size for the five Yucatan males as is given by him and it would appear that an error has crept in somewhere.

Measurement averages

	Wing	Tail	Culmen from base	Depth of bill at nostril	Middle toe minus claw	Tarsus
12 *cozumelae*	104	120	27.0	9.2	19.1	34.2
19 *maya*	108	124	27.3	9.3	19.6	34.1
42 *centralis*	115	132	31.2	10.5	21.7	36.1
11 *vivida*	121	138	32.3	11.1	22.0	39.2

Pheugopedius pleurostictus

Griscom's prediction that an examination of Sclater's type of *Thryothorus pleurostictus* would prove it to belong to a race distinct from the one which occurs on the Pacific coast of northern Central America is verified. The type is a small bird (wing, 56.5; tail, 45.0) with very light-colored, sparsely barred underparts, collected by Skinner at an unknown locality in the arid interior of Guatemala.

This specimen is correctly figured in Sclater's Catalogue of American Birds, save that the upperparts are more rufescent than in the illustration. Attached to the type is the Sclater Museum tag which reads as follows: "*Thryophilus pleurostictus*/ Guatemala. Skinner." On the reverse appears: "Type of P.L.S./ Ibis, 1860, p. 30." Apparently no British Museum number has ever been given to this specimen, nor is there a British Museum label attached at this time.

Through the kindness of Dr. Witmer Stone I have been able to inspect a series of five examples of the banded wren taken at Gualan in 1915 by Rhoads and Poole. These agree in size and coloration with the type, and therefore Griscom's designation of Gualan as a restricted type locality for *pleurostictus* is entirely proper.

The larger, heavily barred, duller colored race of banded wren which ranges from central Oaxaca, south along the Pacific coast to western El Salvador is at present unnamed and therefore I propose for it

PHEUGOPEDIUS PLEUROSTICTUS OBLITUS subs. nov.

Type. ♂ adult, no. 18843, Dickey collection at the California Institute of Technology; Barra de Santiago, Dept. of Ahuachapan, El Salvador, April 13, 1927; collected by A. J. van Rossem, original no. 11711.

Subspecific characters. Resembles *Pheugopedius pleurostictus pleurostictus* (Sclater) of arid interior Guatemala, but size decidedly larger, flanks and tertials more heavily barred, and dorsal coloration duller and less rufescent. Comparison with other races is noted beyond. Measurements of the type are: wing, 66.5; tail, 56.5; exposed culmen, 16.9; tarsus, 22.8; middle toe minus claw, 15.0 mm.

Range. Pacific coast of southern Mexico and northern Central America, from Oaxaca south to extreme southwestern El Salvador.

Remarks. This race is the "*pleurostictus*" of Ridgway, 1904, and of authors generally, but not of Sclater. It is remarkably uniform throughout its range (see also Griscom, p. 291), and I can detect no differences whatever between specimens from points so far separated as southern Oaxaca and southwestern El Salvador.

With the definition of the newly named western race there are now four known subspecies of this wren in Central America. These may be characterized as follows:

Size larger (wing of males averaging about 65 mm; of females, about 60 mm.)

Dorsal coloration duller and less rufescent; flanks and tertials more heavily barred; tail longer (males averaging 55 mm; females 50 mm).

Pheugopedius pleurostictus oblitus van Rossem

Pacific coast from Oaxaca to El Salvador.

Dorsal coloration brighter and more rufescent; flanks and tertials less heavily barred; tail shorter (males averaging 49 mm; females 45 mm).

Pheugopedius pleurostictus ravus (Ridgway)

Pacific coast of Nicaragua and northern Costa Rica.

Size smaller (wing of males averaging about 61 mm; of females, 56 mm).

Dorsal coloration slightly paler; flanks sparsely barred.

Pheugopedius pleurostictus pleurostictus (Sclater).

Motagua Valley in interior Guatemala.

Dorsal coloration slightly darker; flanks heavily barred.

Pheugopedius pleurostictus lateralis (Dickey and van Rossem).

Eastern and northern El Salvador, southern Honduras, and possibly northwestern Nicaragua.

None of these four races can be considered as intermediate, for *pleurostictus* occupies an isolated position, and *lateralis*, whose range lies, in part, between *oblitus* and *ravus* is smaller than either and is even more heavily barred on the flanks.

As I have several times affirmed in the past, *Thryophilus* and *Pheugopedius* are so gradually connected that there is no point in attempting to maintain the former as a distinct genus.

Mimus gilvus

Griscom's suspicion (p. 301) that Cabanis' type of *Mimus gracilis* from Honduras would prove, on examination, to be the Central American rather than the Yucatan race is well founded. The type is in the Zoölogical Museum in Berlin, where I examined it in August, 1933. It is a mounted bird in good condition, with the plumage slightly worn as though it had been taken in early spring before the breeding season. All the characters are those of the Central American, not the Yucatan race. There is a definitely brownish tinge to the whole bird, some of which, but not all, may be due to "foxing"; the white on the outermost rectrices measures only 40 mm. along the

vanes; the wing coverts are edged with white 2 mm. wide, and the secondaries and scapulars have wide grayish white edgings. Thus the Central American mockingbird must be known as

Mimus gilvus gracilis Cabanis

M[imus] gracilis Cabanis, Mus. Hein., **1**, Jan., 1851, p. 83, footnote (Honduras).

The race of the Yucatan Peninsula is left without a name and I propose

Mimus gilvus clarus subsp. nov.

Type. ♂ adult, 60596, Museum of Comparative Zoölogy; Camp Mengel, Quintana Roo, Mexico, March 19, 1912; collected by J. L. Peters.

Subspecific characters. Similar to *Mimus gilvus gracilis* Cabanis of Central America, but color everywhere clearer gray, with little or no brownish tone; outer webs of lateral rectrices more extensively white; edgings on wings barely indicated or obsolete.

Range. The Yucatan Peninsula and British Honduras.

Remarks. This is the "*gracilis*" of Ridgway and other recent authors but not of Cabanis.

After careful examination of nine mockingbirds from Cozumel Island, including the type, I believe that Ridgway was wrong in rejecting his own race *Mimus gilvus leucophaeus* (Proc. U. S. Nat. Mus., 10, Aug. 6, 1888, 506). These nine Cozumel Island specimens are even more purely gray than *clarus* and are decidedly paler everywhere. They average a little smaller, as shown by Ridgway's measurements, but the chief character is that of pallid coloration.

Polioptila caerulea

Bonaparte's *Culicivora mexicana* (Consp. Avium, **1**, 1850, 316) was based on a specimen from Mexico in the Berlin Museum. The only individual of this species which was in the museum in Bonaparte's time which agrees with the diagnosis is a mounted bird (no. 4046) collected by Deppe at Oaxaca. Dr. Hellmayr (Novit. Zoöl., **7**, 1900, 535, in text) has previously noted this same specimen, and also another in the Berlin Museum from Cocoyac. However, this latter bird does not agree with the specific statement "fronte concolor", and cannot even be considered a cotype.

Deppe's bird, taken at Oaxaca, which is the sole basis of the name *mexicana* is marked as "mas." However it is actually a female in winter plumage of *Polioptila caerulea caerulea*, collected, of course, as a winter visitant to the locality. Although the manner in which this individual is mounted makes it appear smaller than mounted United States specimens of *caerulea* in the same museum, the measurements are normal for the race. Those of the wing and tail are 48.5 and 49.5, respectively. The small race which occurs in the lowlands of southeastern Mexico and which reaches Guatemala in winter must receive a name, since *mexicana* is a synonym of *caerulea*. I suggest

Polioptila caerulea deppei subsp. nov.

Type. ♂ adult, in full nuptial plumage, no. 13712, Museum of Comparative Zoölogy; Rio Lagartos, Yucatan, Mexico, April 13, 1893; collected by W. W. Brown, Jr.

Subspecific characters. Similar to *Polioptila caerulea caerulea* (Linnaeus) of the southeastern United States, but coloration paler and more grayish (less bluish) both above and below; forehead of adult males in breeding plumage more narrowly black; black superciliary streaks in vivid contrast to the white or grayish white (not gray) lores; size slightly smaller, and tail shorter than the wing instead of the reverse. Measurements of the type are: wing, 48.0; tail, 45.0 mm.

Dendroica auduboni goldmani Nelson

In the British Museum is a series of five specimens of this beautiful warbler, three males and two females. These birds were all collected at 10,000 feet altitude at Hacienda Chancol, Guatemala, by W. B. Richardson between the dates of June 13 and 17, 1897. The dates and the plumage wear indicate beyond any reasonable doubt that they were breeding birds. Though I was not able to compare them with the type of *goldmani* directly, I have never the less examined the type (143169 Biol. Surv.), which was taken in the identical locality in January, 1896, and unhesitatingly pronounce the breeding birds and the type to be one and the same subspecies. Griscom's supposition that the type of *goldmani* was perhaps only the winter plumage of *nigrifrons* is, of course, completely negatived by the British Museum series.

The wing and tail measurements of the four males (including the type) are 82 to 84 and 63 to 65 mm., respectively. The two females

measure 79–80 and 60–62. It is of interest to note that the winter and summer plumages of the males of *goldmani* are essentially the same. At both seasons they are virtually black, with golden yellow throat, rump, side patches, and crown spot, and a very limited area of grayish white on the central abdominal region.

Granatellus sallaei

As Griscom has remarked (p. 338), this warbler is exceedingly rare in Guatemala and has been recorded definitely only from Cajabon and Tactic. In American collections there exist, so far as I am aware, only two females in the National Museum at Washington, and a single male in the Museum of Comparative Zoölogy. These are all "Guatemala" trade skins without definite locality, but probably from the general vicinity of Coban. In the Berlin Museum is a single male from "Coban"; in the Paris Museum a male and two females in the Boucard collection from "Guatemala", and in the British Museum two males and three females from Cajabon, "Vera Paz", and "Guatemala." These twelve specimens, five males and seven females, are all the Guatemala skins which I have been able to locate, though doubtless others exist. Typical *sallaei* from southeastern Mexico, and *boucardi* from Yucatan are slightly more common, for I have been able to examine twenty-four of the former and sixteen of the latter in the above enumerated collections.

The unlikelihood that Guatemala birds could be referred to *sallaei* was first indicated at the Paris Museum when I compared two *sallaei* from Vera Cruz, two *boucardi* from Yucatan and the three Guatemala skins in the Boucard collection. Direct comparison between specimens from all three areas was also possible at three other institutions and the characters shown by the Boucard birds has been confirmed in each instance. I take pleasure in naming the Guatemala race

Granatellus sallaei griscomi subsp. nov.

Type. ♂, presumably adult, no. 28916, Museum of Comparative Zoölogy; "Guatemala" [= Coban by designation]; collector and date unknown.

Subspecific characters. Males brighter blue (less slaty) dorsally than either *Granatellus sallaei sallaei* (Bonaparte) or *Granatellus sallaei boucardi* Ridgway; underparts intermediate between the other two races in regard to shade and distribution of red and amount of gray

intermixture on throat. Females intermediate between the other two races in relative darkness of color, but upper parts and wing edgings more purely slaty (less brownish) than either.

Range. Known chiefly through Coban trade skins, though Cajabon (800 ft.) and Tactic (4600 ft.) are specific locality records. Two specimens from "Western District, British Honduras" (British Museum) are so exactly intermediate between *boucardi* and *griscomi* that I do not attempt to place them.

Remarks. Bonaparte's type of *Setophaga sallaei* in the mounted collection at the Musée d'Histoire Naturelle in Paris is an adult male, collected by Sallé at Cordova, Vera Cruz, in April, 1856. It is typical of the Mexican race, with extensively dark red under parts, uniform slate colored throat, and slaty blue upperparts. In the same collection is another bird of this species, a female, which is also marked as a type, but investigation shows that this specimen was purchased from Sallé in 1862, and that it was not even collected until April, 1859, three years after the species was described!

Material examined. G. s. sallaei; 24 from Vera Cruz, Mexico (Cordova; Buena Vista; Orizaba; Potrero) and Oaxaca (Playa Vicente; Tuxtepec), and including the types of *Setophaga sallaei* Bonaparte and *Granatellus sallaei* Sclater. *G. s. boucardi;* 16 from "Yucatan" and "Northern Yucatan", including the type. Chichen Itza is apparently the only specific locality record. *G. s. griscomi;* 12 from Guatemala. *G. s.* subsp. indet.; "Western District, British Honduras", 2.

Zarhynchus wagleri

The subspecific status of *Cacicus wagleri* Gray has heretofore hinged on a colored plate (LXXXVI[=LXXXV]) in volume 2 of the Genera of Birds, a plate which is apparently that of a bird of mixed racial characters. Though the bill and slightly larger size are those of the northern race, Ridgway (Proc. Wash. Acad. Sci., **3**, Apr. 15, 1901,151) assigned the name to the southern bird because of the dark colored underparts, and named the northern one *Zarhynchus wagleri mexicanus.* In the absence of a type or the slightest hint of a type locality such procedure was entirely proper, but recent findings put an entirely different light on the matter. While at the British Museum in September, 1933, I went over the series of Wagler's oropendulas with the object of determining, if possible, which specimen was the individual from which the plate was drawn. This proved less difficult than was anticipated, for at the time the fascicle was issued (October, 1844)

there were just two specimens of this species in the collection at the British Museum. These are a male and a female from "Coban", which means only that they are Coban trade skins from somewhere in the lowlands of eastern Guatemala. The male shows exactly the characters depicted in the plate, in fact the wing and bill measurements and bill shape correspond so accurately that there can be no reasonable doubt (leaving out all other evidence) that this male is the original from which the plate was drawn. The darker underparts of Guatemala, as compared with Mexican, specimens is a character which has already (p. 386) been noted by Griscom.

To summarize briefly: Gray's plate accurately depicts a Guatemala male, and since there is in the British Museum a Coban male which accurately matches the plate, and which was the only male of the species in the collection at the time the plate was drawn, it is reasonable to accept it as the type. This specimen is no. 43.6.13.16 [that is, it was entered in the catalogue on June 13, 1843]. It is a skin in good condition, which evidently at one time was mounted, and gives the following measurements: wing, 214; tail, 130; exposed culmen, 62.6; depth of bill at base, 26.2; width of frontal shield, 19.1; tarsus, 39.0; middle toe minus claw, 28.1 mm.

The southern race, which has heretofore borne the name of *wagleri* and which ranges from Nicaragua southward is here named

Zarhynchus wagleri ridgwayi subsp. nov.

Type. ♂ adult, no. 14966, Dickey collection at the California Institute of Technology; Limón, Limón, Costa Rica, January 2, 1925; collected by Austin Smith.

Subspecific characters. Similar to *Zarhynchus wagleri wagleri* (Gray) of Mexico and Guatemala, but underparts more extensively black; head and rump paler brown; culmen more highly arched, and frontal shield wider.

Range. Eastern side of Central America and South America, from Nicaragua south to Colombia and Venezuela. [Also western Ecuador and Peru?].

Remarks. The race *mexicanus* of Ridgway is, of course, a synonym of *wagleri*.

Ecuadorean and Peruvian birds should be critically examined, since they probably represent another subspecies.

B. NOTES ON SOME TYPES OF MEXICAN AND CENTRAL AMERICAN BIRDS

The notes incorporated in this section cover some miscellaneous types from widely scattered localities in the neotropical region north of Panama.

Eupsichortyx sclateri Bonaparte

This name seems to have been completely overlooked by monographers, but nevertheless is a valid one for the black-throated bob-white of western Nicaragua and southern Honduras, and has three years' priority over the current name of *leylandi* Moore.

In the collection of mounted birds in the 'Gallerie des Oiseaux' at the Paris Museum, I came across a mounted adult male specimen of this bob-white with the following inscription on the bottom of the stand: "de Californie, acquis à M. Delattre en 1853 (Cat. No. 419). Eupsychortyx sclateri Bp. 12575." In the catalogue for 1853 this specimen is listed (simply as "*Ortyx*") as one of a lot of 70 birds acquired from Delattre in that year, and which contained most of Bonaparte's Delattre-taken types. Bonaparte's account of Delattre's Nicaragua-California collection contains no mention of the species as such, but in the section which deals with quail he states (Notes Orn. Coll. Delattre, 93) that no new species were found, though there were present in the collection such well known forms as "* * * * *Eupsichortyx parvieristatus* Gould * * *." Two years later Bonaparte realized that his bird was not *parvieristatus*, for in the list of species in the genus *Eupsichortyx* on page 883 of Comptes Rendus, **42**, No. 19, May 12, 1856, he gives "266 *sclateri*, Bp. (*Eups. gula nigra*)." In the minutes of the meeting for the succeeding week (May 19) he again deals with this bird as follows: "*Eupsichortyx sclateri*, Bp., [translation] needs no description: it is the only species of the genus which has the throat black, and because of this and by its general appearance it resembles both *Lophortyx californica* and a true *Ortyx*." At no place is any type locality given.

The black-throated bob-white of the Pacific slope of Nicaragua and Honduras should be known, therefore, as

Colinus leucopogon sclateri (Bonaparte)

Eupsichortyx sclateri Bonaparte, Comptes Rendus, **42**, No. 19, May 12, 1856, 883 (No type locality given, but type from "Californie," = western Nicaragua.).

In connection with the name *leylandi*, I am hesitant about considering it a synonym of *sclateri*. Moore's type was collected by Leyland at Flores, on the road between Comayagua and Omoa, in northwestern Honduras. This locality is far away from the normal range of *sclateri* and on the Atlantic slope. Therefore it is entirely possible that a distinct race of this species occurs on the Atlantic slope of Honduras, and if so it will bear the name *leylandi*.

Caprimulgus macromystax Wagler

In the Munich Museum (the Zoologische Sammlung des Bayerischen Staats), are many of Wagler's types, among them that of *Caprimulgus macromystax*. This is an unsexed bird, formerly mounted but now made into a skin and in a poor state of preservation. The entire tail and most of the bill is missing. It was collected by Karwinski and has no more definite locality than "Mexico."

Wagler's original description (Isis von Oken, 1831, Heft. 5, 533) was based on a single bird from Mexico which was "unfortunately without [a] tail" and which had the rictal bristles "nearly as long as the head without bill." He describes the bird in considerable detail and since the Munich specimen corresponds in every particular there can be no doubt that it is, just as it is labelled, the actual type. In addition to the tailless bird the collection contains a male, also taken by Karwinski, to which someone has tied a type tag as though it were to be considered as a cotype. Whether this bird was or was not known to Wagler at the time his description was written has nothing to do with the case, since the name was based exclusively on a single tailless specimen of unknown sex.

The name *macromystax* has long been used for the race of *Caprimulgus vociferus* resident in eastern Mexico. It is too bad to have to discard it at this late date, but there is no alternative since the type is nothing more nor less than a specimen of the common whip-poor-will of eastern North America, taken in winter or on migration. The longest rictal bristles are less than 30 millimeters in length, though because of their disarrangement they are more prominent than is usual in *vociferus*. However, many *vociferus* have longer and thicker bristles than has the type of *macromystax*. Though Wagler makes the statement that the bristles are unusually stiff and longer than in any other American goatsuckers, it is very unlikely that he had a specimen of *vociferus* available, for his only comparison is with the common goatsucker of Europe! I am well aware that Hartert has examined the

type of *macromystax*, and that his conclusions differ from my own, but, on the other hand, he was interested chiefly in showing that *macromystax* was not the bird so called by Baird, Brewer and Ridgway, and his comments (Ibis, 1892, 286) make no comparison with *vociferus*. Had he actually compared the type with authentic *vociferus* he would, of course, immediately have seen the true situation.

Since *Caprimulgus macromystax* Wagler is a synonym of *Caprimulgus vociferus vociferus* Wilson, the whip-poor-will of eastern Mexico, is left without a name. I propose

Caprimulgus vociferus setosus subsp. nov.

Type. Female adult, number 31832, Dickey collection at the California Institute of Technology; Galindo, Tamaulipas, Mexico, October 5, 1908; collected by F. B. Armstrong.

Subspecific characters. Similar to *Caprimulgus vociferus arizonae* (Brewster) in size and in length of rictal bristles but coloration darker and less brownish; similar to *Caprimulgus vociferus vociferus* Wilson in coloration, but size slightly larger, and rictal bristles longer and also thicker at base. These bristles average about 30 millimeters long in *vociferus* and about 45 millimeters in *arizonae* and *setosus*. Measurements of the type are: wing, 165; tail, 124; longest rictal bristles, 47 mm.

Range. Eastern Mexico from central Tamaulipas south to southern Vera Cruz and northern Oaxaca.

Remarks. This is, of course, the "*macromystax*" of authors in general, but not of Wagler.

Malacoptila costaricensis Cabanis

Cabanis' type of this species is in the Zoölogical Museum in Berlin. It is a mounted bird in a fair state of preservation, with the plumage slightly, though not excessively, abraded. The label on the stand reads: "*Malacoptila panamensis* Lafr. 1847/ *Malacoptila costaricensis* Cab.* 1863/ Costa Rica 16288 v. Frantzius S." Under the old system an asterisk following a name signified a type. Furthermore we know from Cabanis' statement that he had only a single specimen, collected by von Frantzius.

This name has lately been applied by Peters (Bull. M. C. Z., **71**, 1931, 318) to the race of eastern and northwestern Costa Rica, be-

cause the probabilities were that von Frantzius collected the type in eastern Costa Rica. That such was not the case was obvious from an examination of the type, which is a rather typical example of *Malacoptila panamensis panamensis*. Von Frantzius himself (J. für Orn., 1869, 312) gives four localities for the species in Costa Rica. These are, San Mateo, Guaitíl, Pacuare, and Angostura. The first of these is from Cooper; the third and fourth from Carmiol, so that Guaitíl, a place in which von Frantzius is known to have worked, is undoubtedly the type locality. This is in central western Costa Rica, about midway between San José and the Pacific Ocean. The characters of the type are in accordance with what would be expected from such a place and there is nothing to do but to place *costaricensis* as a strict synonym of *panamensis*. It is to be remarked that Cabanis used a specimen from Esmeraldas, Ecuador, as representative of *panamensis* when he drew up his diagnosis of *costaricensis*. Esmeraldas specimens are, of course, not *panamensis* at all, but are *poliopis* Sclater.

The next available name for the race of *Malacoptila panamensis* which inhabits eastern and northwestern Costa Rica, and southeastern Nicaragua, is *Malacoptila fuliginosa* Richmond, based on an aberrant individual from the Río Escondido, Nicaragua.

Centurus sulfuriventer Reichenbach

A few years ago (Trans. San Diego Soc. Nat. Hist., **6**, 1931) I used this name for the Gila Woodpecker of the Alamos Faunal Area of southern Sonora, on the presumption that it probably was applicable. This turns out to be incorrect. Reichenbach's types, collected in "Mexico" by Spangenburg, are in the Dresden Museum, where I examined them in September, 1933. They are a male and a female in fully adult, slightly abraded plumage. Though once mounted they have been remade recently into skins and are not in the best of condition. The male is numbered 8338 of the old catalogue and has been renumbered as 18182; the female is 7583 of the old catalogue and, probably through error, is likewise numbered 18182 of the new. It was evident at first glance that these birds were never collected anywhere near the Alamos Faunal Area, but were taken somewhere further south. They are typical of the race which occurs in southern Sinaloa and south to Tepic and the name, of course, belongs in that territory.

Typical *uropygialis*, as I have remarked elsewhere, attains its extreme characters of pale coloration, wide white barring, and very white, sparsely barred upper tailcoverts, in the lower Colorado River

Valley. Eastward across Arizona there is a gradual increase in size accompanied by a slight deepening in general coloration and a narrowing of the white bars on the upper parts. At one time I considered naming the Gila Woodpecker of eastern Arizona as a distinct race, but do not now believe such a course to be advisable. It is true that extremes from eastern Arizona and from the lower Colorado River Valley are very different looking birds, and were these two areas the only elements in the situation, it would be not only permissible but necessary to recognize two races. However, the behavior of the species in eastern Sonora puts a different aspect on the matter. The Alamos subspecies extends north in scarcely altered form to within a relatively short distance of the Arizona border and the dark color of eastern Arizona birds is, therefore, most likely due to propinquity to that race. The size difference in itself is scarcely enough to warrant a name.

Southward, in western and central Sonora, *uropygialis* maintains its typical characters in essentially stable form to about the latitude of Tiburón Island coastwise and Hermosillo in the interior.

The Alamos race is characterized by very dark coloration and, on the upper parts, narrow white barring. It is decidedly the darkest of the several races. Its range is the Alamos Faunal Area in southern Sonora, southwestern Chihuahua, northern Sinaloa, and north in the Moctezuma and Bavispe River valleys to about latitude 30°. This race, to which I once wrongly applied the name *sulfurirenter,* is here named *Centurus uropygialis fuscescens* subsp. nov., with the type an adult male, number 30611, Dickey collection; Chinobampo, Sonora, March 9, 1930; collected by J. T. Wright, original number 5255.

South of the Alamos district the Gila Woodpeckers show a condition which, curiously, closely parallels *uropygialis,* a race from which they are completely separated by the very different *fuscescens.* After examination of ample series from southern Sinaloa, Nayarit, and Jalisco, the only distinguishing characters I can find, in comparison with *uropygialis,* are the more heavily barred rump and upper tail-coverts and a slightly darker tone to the underparts. In addition, there are frequently traces of the golden yellow nuchal patch and yellow nasal tufts of *Centurus aurifrons.*

As further indication that, after all, the *uropygialis* group of races is very closely related to *aurifrons* and may be only subspecifically distinct, I may mention two specimens in the British Museum. A female (98.3.14.515) from Calvilla, Aguas Calientes, is an exact intermediate between *sulfurirenter* and *aurifrons,* and a male (88.10.10.521) from Santana, near Guadalajara, Jalisco, shows much the same condition.

Whether such birds are hybrids or intergrades is a question which can be answered only by more material from critical localities.

A synopsis of the ranges of the three mainland subspecies of the Gila Woodpecker is as follows:

Centurus uropygialis uropygialis Baird

Centurus uropygialis Baird, Proc. Acad. Nat. Sci. Phila., **7**, June, 1854, 120 (Bill Williams Fork of the Colorado River, New Mexico, Arizona).

Range. Lower Sonoran Zone from extreme northeastern Lower California, the Imperial Valley of California, and extreme southern Nevada, east across Arizona to extreme southwestern New Mexico and south through western and central Sonora to Tiburón Island and Hermosillo.

Centurus uropygialis fuscescens van Rossem

Range. Arid Lower Tropical Zone of Sonora, from about Guaymas on the coast and latitude 30° in the Moctezuma River Valley, south to northern Sinaloa and east to southwestern Chihuahua.

Centurus uropygialis sulfuriventer Reichenbach

Centurus sulfuriventer Reichenbach, Handb. Scansores, Picinae, Oct., 1854 410, pl. 664, figs. 4411, 4412 [error. = 4401, 4402] (Mexiko = central western Mexico.)

Range. Arid Lower Tropical Zone from northern Sinaloa and western Durango, south to central and western Jalisco, western Zacatecas, and Aguas Calientes.

Zebrapicus kaupii "Bonap." Malherbe

This name, though it dates from Malherbe's monograph of the Picidae, 1862, was really founded on a manuscript name of Bonaparte's for two specimens in the Darmstadt Museum, and though the type locality is usually given as "Bolivia", it is clear from the text that such a designation is incorrect. Malherbe's "Bolivian" specimen is no longer in the museum at Metz, at least I could not find it there in July, 1933.

The two specimens which were the basis of Bonaparte's manuscript name are still in the Darmstadt Museum, where I examined them on

August 22, 1933. They still bear the old labels, on which is written: "*Centurus hypopolius*/ Wagl. / Mexico." However, they are the only Gila Woodpeckers which are now, or, according to the catalogue, ever have been in the collection and hence are almost certainly the birds seen by Bonaparte. In characters they are typical of the southern race, *Centurus uropygialis sulfuriventer* Reichenbach, and the name *Zebrapicus kaupii* is, therefore, a synonym of *sulfuriventer*. While there is no indication of locality the probabilities are that these specimens are of Wollweber origin and came from Zacatecas.

Picus scalaris Wagler

The type in the Berlin Museum is an adult male collected by Deppe at Jalapa, Vera Cruz, and is typical of the race to which the name has so long been applied. It is a skin which recently has been taken down from a mount and is in good condition. The plumage is slightly abraded as though the bird had been taken in early spring. The attached tag reads: "Picus scalaris Wagl * / Typ. ♂ / Xalapa 10472 v. Sack. Deppe." The measurements are as follows: wing, 96.5; tail, 50.0; exposed culmen, 19.1; tarsus, 17.5; outer anterior toe minus claw, 13.1.

Picus castaneus Wagler

Wagler described three individuals, a male adult, a female adult, and a male juvenile as being the types of "*Picus castaneus* Lichtenstein." However, I could find but two of these birds in the Zoölogical Museum in Berlin in August, 1933. These are the male and female adult, which are numbered 10627 and 10628, respectively. Both have recently been taken down from mounts and made into skins. They were both taken by Deppe at Valle Reál, Mexico. No locality was mentioned in the original description (Isis von Oken, 1829, Heft. 5, 515), but because Wagler cited "Pic rouge rayé de Cayenne", it has been supposed that the types were from South America.

Mexican individuals of this species seem always to have darker crests than the average from Central America. However, the dark extremes from Central America are so similar to Mexican birds in this respect that I do not venture to separate them. Sufficient material in seasonably comparable plumage might prove southern birds to be racially distinct.

Synallaxis erythrothorax Sclater

The British Museum contains a specimen of this species to which a type tag has been attached. It is not the specimen which was the basis of the written description, but of the colored plate which was inserted ahead of the description. This plate is validated by a name and has priority over the formal diagnosis which follows. While this would make no difference of moment had the description and plate been taken from the same specimen, it does, in this case, shift the type locality from Guatemala to Honduras, and thereby brings about the possibility that Guatemalan birds will have to be renamed.

Sclater listed three birds in the text of the description of *Synallaxis erythrothorax* (Proc. Zoöl. Soc. Lond., 1855, 75, pl. LXXXVI), one from Coban, Guatemala, in the collection of the Derby Museum, one from Honduras in the British Museum, and one in his own collection, also presumably from Honduras. The individual from which the written description was drawn was the bird in the Derby Museum. For this we have the explicit statement of Salvin and Godman in the 'Biologia', and the inferential statement by Sclater himself in the introductory paragraph and in the text. Sclater mentions that his own bird has white speckling on the throat, a feature missing from the Derby Museum specimen. The bird pictured in the plate has the white throat speckling, which Sclater believed to be peculiar to his specimen, and therefore Sclater's bird must be considered the type of the species. Because of the page priority of the plate the type locality of the species is Honduras. I do not believe a restriction of the type locality is in order until we have a better knowledge of the geographical behavior of the species in that country.

The type of the plate (and of the species) is a skin in poor condition and with part of the tail missing. Attached to it is a Sclater Museum label which reads: 'Synallaxis erythrothorax / 1853 / Honduras. Parzudaki." On the reverse is the Sclater catalogue number, 931a, and the British Museum registry number, 89.5.20.211. This bird is the darkest-colored individual in the entire British Museum series, and is not exceeded in this respect even by the darkest *furtiva* from Vera Cruz. Should further material verify these characters and show the existence of such a race from Honduras the name *erythrothorax,* of course, would belong there and the paler colored birds of eastern Guatemala and British Honduras would require a new name.

It may be appropriate to remark here that the extremely pallid race of western Guatemala, *pacifica* Griscom, is shown by the British

Museum series to extend north to San Benito and Tuxtla, Chiapas. Four of the Tuxtla specimens show intergradation with *furtiva*. One specimen from San Cayetano, Chiapas, is apparently good *furtiva*.

Myiarchus nigricapillus Cabanis

Since there has been some question as to which race of *Myiarchus tuberculifer* should bear the name of *nigricapillus*, it is worth recording that the three cotypes, collected by von Frantzius, are in the Zoölogical Museum in Berlin. These are mounted birds in good condition and in fairly fresh plumage. None is marked as to sex. They are easily referable to the race to which the name is currently applied and give the following wing and tail measurements: wing, 75.5, 77.0, 78.0; tail, 71.5, 74.5, 78.5.

Bonilla, eastern Costa Rica, has been designated as a restricted type locality. However, von Frantzius (J. für Orn., 1869, 308) has mentioned the "highlands of San José", and, since it is the only place he gives for the species, it should stand as the actual type locality.

Empidonax rubicundus Cabanis and Heine

The three specimens upon which Lichtenstein's manuscript name of *Muscicapa rubicunda* was based are in the Zoölogical Museum in Berlin, where they are numbered 2465, 2466, and 2467, respectively. Ferdinand Deppe was the collector of all three, the localities being Jalapa [Vera Cruz], Real Arriba [Puebla], and [the City of] Mexico. Fortunately, Cabanis and Heine give measurements in connection with their description, and since these accord most closely with number 2466 it is fair to assume that this was the individual from which the diagnosis was drawn.

Twenty-four hundred and sixty-six is a mounted bird. It was just completing the fall moult when collected and, though faded, shows the racial characters in a more satisfactory manner than do the other two. The label on the stand reads: "M. rubicundus N [obis] / Mas / Real Arriba 2466 Deppe." The measurements of this specimen, here designated as a restricted type, are: wing, 57.0; tail, 50.0; exposed culmen, 10.3; tarsus, 12.6; middle toe minus claw, 7.0.

Pica morio "Lichtenst" Wagler

The three birds which were the basis of the above name and of *Corrus morio* Lichtenstein are in the mounted collection at the Zoölogical Museum in Berlin.

It is already well known that the *morio* of both Wagler and Lichtenstein was a composite of two species. The name has by current usage been applied to the species with unicolored tail, a restriction which is proper since the first and main part of the description applies to it. It is now necessary to restrict the name still further, for two subspecies are represented by the two specimens which have been currently presumed to be *morio*.

The first, and main, part of Wagler's description is that of a bird with yellow bill and feet and "light sooty" underparts. This is specimen number 1527 and must be considered as the restricted type of *Pica morio*. The second part, the "Foemina (an avis potius junior?)", is another species, (*Psilorhinus mexicanus* Rüppel). The third part, the "Mas. juv.", describes a juvenile of the same species as the first, but of a different race.

The type of *Pica morio*, restricting that name now to the first specimen described by Wagler, is a fully adult bird (not sexed), with the wide, full-length rectrices of maturity, and with yellow bill and feet. It is *not* a young bird as supposed (on what grounds I do not know) by Ridgway. Though the term "light sooty" is a little ambiguous, an examination of the specimen itself definitely fixes its status as a normal example of the dark-colored race of southern and extreme eastern Mexico which, until now, has been known as *fuliginosa* Lesson. It was collected by Deppe, ostensibly at Jalapa, though much more probably at an altitude considerably below the town. Other specimens definitely from Jalapa, which have been examined in the present study, belong to the northern and interior race.

The "Mas. juv." of Wagler belongs to the species *morio*, but represents the pale-colored race of northern and interior Mexico. It, also, is a Deppe-taken specimen (no. 1525), collected at Valle Reál, a locality which does not seem to be on any modern maps. However, other species from the same place indicate a highland locality somewhere between Vera Cruz and Mexico City. The bird is, just as described by Wagler, a juvenile with particolored bill.

Some nomenclatural adjustments necessarily follow. The name of the southern race of brown jay which extends northward in the Tierra Caliente of eastern Mexico to San Luis Potosi must be known as *Psilorhinus morio morio* (Wagler), of which *Pica fuliginosa* Lesson is a synonym. The race with pale gray or grayish white underparts which occurs in northeastern and interior Mexico is without a name and I propose for it: *Psilorhinus morio pallidus* subsp. nov., with the type an adult male, number 31837, Dickey collection at the California

Institute of Technology; Ciudad Victoria, Tamaulipas, Mexico; collected by F. B. Armstrong. The race *palliatus* is, of course, the *Psilorhinus morio morio* of Ridgway, 1904, but not of Wagler.

The ranges of the two subspecies of the brown jay are not possible to outline satisfactorily at this time, chiefly because of the lack of properly labelled specimens. All the evidence now available shows that the southern race, *morio,* extends northward along the narrow strip of tropical lowlands to extreme southeastern San Luis Potosi. Small series even from Tampico and Alta Mira, Tamaulipas, show variability, but average closer to *palliatus.*

Troglodytes latisfasciatus Lichtenstein

One of the cotypes has disappeared but the female listed by Lichtenstein (Preis-Verz., 1830, 2) is still in the collection at the Zoölogical Museum in Berlin. It is number 4690 and was collected by Deppe at [the City of] Mexico. This name must supplant *Salpinctes obsoletus notius* Ridgway for the rock wren of central and southern Mexico, providing that race is considered recognizable. I agree with Griscom (Bird Life in Guatemala, 1932, 297), that the characters of "*notius*" are completely lost in the range of individual and seasonal variation of *Salpinctes obsoletus obsoletus.*

Turdus deflexus Lichtenstein

This name was based on two mounted specimens in the Zoölogical Museum at Berlin, taken at Chico [Hidalgo] (no. 3655) and Temascaltepec [Mexico] (no. 3656). Though some one at the Berlin Museum has tied a type tag to the Temascaltepec bird, the two should be considered as cotypes, unless it becomes necessary to restrict the name to a definite locality. The Temascaltepec specimen is definitely buffy on the posterior underparts and is the more heavily spotted of the two. Lichtenstein's description of "white-gray" underparts certainly accords better with the Chico specimen, and should it become necessary to restrict the name then that specimen should become the restricted type. *Turdus deflexus* is at present considered to be a synonym of *Toxostoma curvirostre curvirostre* (Swainson).

Vireo pallens Salvin

Salvin had at least three cotypes of *pallens,* for in addition to the two in the British Museum there is one at the National Museum in Washington. Number 85.3.10.108 in the British Museum, collected

by Salvin at Realejo, Nicaragua, is the more olive (less greenish) above and paler (less yellowish) below, and is unquestionably the individual which Salvin used when writing the description. Specimen number 85.3.10.107 is the individual figured in the 'Biologia'.

The Realejo bird, the type in a restricted sense, is a male, presumably adult, which measures as follows: wing, 58.0; spurious primary, 21.7; tail, 47.0; exposed culmen, 12.3; tarsus, 20.7; middle toe minus claw, 11.3. The plumage is slightly abraded.

Vireo ochraceus Salvin

The type of *Vireo ochraceus*, a presumably adult female in fresh winter plumage, is numbered 85.3.10.109 of the British Museum collection, taken at San José de Guatemala by Salvin in January, 1863. It bears the original tag with the type designation in Salvin's handwriting. The measurements are: wing, 56.0; spurious primary, 20.0; tail, 44.0; exposed culmen, 11.6; tarsus, 19.1; middle toe minus claw, 11.7.

Vireo semiflavus Salvin

The type is number 85.3.10.111 of the British Museum collection, a presumably adult female in slightly abraded spring plumage, collected by Salvin in April, 1862, at Sakluk, Peten, "Yucatan" [= Guatemala]. It shows well the racial characters of shorter wing, shorter spurious primary, grayer upperparts, and brighter yellow underparts. The measurements are: wing, 53.0; spurious primary, 16.5; tail, 44.0; exposed culmen, 11.7; tarsus, 19.7; middle toe minus claw, 11.5. It may be remarked that in this, as in various other species of *Vireo* there is no difference of moment in the comparative size of the sexes.

In the great series of 56 specimens of *semiflavus* in the British Museum, the two color extremes mentioned by Griscom (Bird Life in Guatemala, 319) are readily apparent, but I am skeptical about age or sex being responsible. *Vireo huttoni*, for instance, shows similar color extremes which are not so correlated, and for this reason, and others, I do not think the grayer individuals of *pallens* and its races are necessarily young of the year.

Besides the great series of *semiflavus* in the British Museum there are eight birds from Holbox Island and two from Progreso, which show that an undescribed race extends along a narrow strip of coastal islands in northern Yucatan, and which is probably confined to the mangrove association. The nearest comparison is with *Vireo pallens pallens* of the Pacific coast of southern Central America. They average

a little more yellowish below, but are distinguished from *pallens* chiefly by the shorter wing and decidedly shorter spurious primary. In this latter respect they are similar to the other Atlantic coast race, *semiflavus,* but they differ from *semiflavus* in color much as does *pallens.* As the type of this new race, here named as *Vireo pallens salvini* subsp. nov., I designate number 86.9.9.539 of the British Museum collection, collected on Holbox Island, Yucatan, in December, 1885, by G. F. Gaumer. It is not marked as to sex. The measurements of the type correspond very closely to the racial average. They are: wing, 53.0; spurious primary, 16.5; tail, 40.0; exposed culmen, 12.0; tarsus, 19.5; middle toe minus claw, 10.0.

The four races of *Vireo pallens* may be characterized briefly as follows:

Larger. Wing averaging about 57 mm.; spurious primary about 21 mm.

Coloration paler; more olive-gray above; creamy below.
Vireo pallens pallens. Eastern El Salvador to western Costa Rica.

Coloration darker; more greenish above; yellow below.
Vireo pallens ochraceus. Western El Salvador to southern Sinaloa, Mexico.

Smaller. Wing averaging 53 mm.; spurious primary 17 mm.

Coloration grayish green above; yellow below.
Vireo pallens semiflavus. Yucatan Peninsula, south to eastern Nicaragua.

Coloration more olive gray above; creamy below.
Vireo pallens salvini. Islands of the northern coast of Yucatan, from Progreso to Holbox Island.

Twelve specimens from Mujeres Island off the coast of Quintana Roo are certainly *semiflavus,* as are 24 from Ruatan Island, Honduras. The remainder of the series of *semiflavus* examined are from mainland points from Yucatan south to Campeche and to Greytown, Nicaragua.

A specimen in the British Museum from San Blas, Nayarit, is doubtfully referable to *ochraceus,* for it is grayer dorsally than any Central American individual of this race examined. There is another west-Mexico (Mazatlan) specimen in the U. S. National Museum, but this latter is too worn to be of any value for purposes of comparison. It is probable that a series in fresh plumage would demonstrate a recognizable race on the coast of northwestern Mexico.

Compsothlypis mexicana Cabanis

The two mounted specimens which are the types of Lichtenstein's *nomen nudum*, *Sylvia mexicana*, and hence the basis of *Compsothlypis mexicana* Cabanis, are in the Zoölogical Museum in Berlin. They are marked male and female and are numbered 4443 and 4444, respectively. These cotypes were both collected at Reál Arriba, Puebla and are typical examples of the pale colored Mexican race. The species was described with "Mexico" as a type locality and it is now possible to name, definitely, the place where they were collected.

Sturnus holosericeus Lichtenstein

In the collection of the Zoölogical Museum at Berlin are the two specimens (7575 and 7576) which are the types of this species. They are mounted birds in a fair state of preservation but in badly abraded plumage, as though they had been taken in midsummer. Both are marked as male, though one (7575) is so small that it must be a female. Both were collected by Deppe at Alvarado [Vera Cruz]. The species was described simply as from "Mexico", but the type locality is now restricted as above.

Tanagra abbas Lichtenstein

The cotypes (male and female) of this common tanager are numbered 5710 and 5711, respectively, in the Zoölogical Museum in Berlin. Both were collected by Deppe at Oaxaca, and the type locality of "Mexico" may now be definitely restricted.

In measurements these are typical Mexican representatives of the species, and therefore slightly larger than Central American birds. The male measures: wing, 99.0; tail 68.0; exposed culmen, 12.9; depth of bill at base, 9.0; tarsus, 20.5; middle toe minus claw, 15.3 mm. This bird (7510) has been ticketed as *the* type, but I see no good reason for not regarding both as cotypes.

Carpodacus rhodocolpus Cabanis

The identity of this type has been the cause of a good deal of speculation, though the name is currently used for the race of house finch

in central western Mexico which is characterized by moderately large size and the great extent of red.

The type of *Carpodacus rhodocolpus* is number 6893 of the Zoölogical Museum in Berlin. It is a male, mounted and in good condition both as to preservation and state of plumage, and was collected by Deppe at Cuernavaca, Morelos. Attached to one leg is a supplementary tag which reads, on one side: "Carpodacus frontalis mas.", and on the other: "á renvoyer au Musée d'Berlin." This, of course is the specimen handled by Bonaparte which, specifically, was named by Cabanis as the type of *rhodocolpus*.

So far as I can see, this type is nothing but a normal *mexicanus*, a fact which I had all along suspected because of the type locality. The color notes made at the time I examined this specimen are as follows: "This bird is just finishing the fall moult and therefore is dull pinkish or purplish red instead of scarlet. It is like *mexicanus* in area of red. The superciliaries extend backward over the auriculars, and the red on the forehead reaches to a line through the center of the eyes. On the under parts the red extends only to the chest as a solid color, though the lower chest is suffused slightly with the same color. The lines of demarcation between the red and the streaked parts of the plumage are obscured by gray tipping. Measurements are: wing, 76.0; tail, 62.5; exposed culmen, 9.7; depth of bill at base, 9.0; tarsus, 17.5; middle toe minus claw, 13.0 mm."

The illustration of this specimen in Bonaparte and Schlegel's 'Monographie des Loxiens' is much too highly colored on the underparts, and it is this circumstance, combined with Cabanis' overemphasis of the same feature, which has led to the wrong application of the name.

The placing of *rhodocolpus* in the synonymy of the typical race, *mexicanus*, leaves the bird of central western Mexico without a name but I do not believe that a new name for it should be coined at this time. For one thing we do not know what Sharpe's *Carpodacus roscipectus* may be. The fact that house finches from as far southeast as Chilpancingo are apparently typical *mexicanus* leads one to suspect that *roscipectus* will eventually join the procession of synonyms of *mexicanus*, but this and other questions of a like nature will have to be answered by a competent reviser. Without having gone into the subject in anywhere near the detail required it is my distinct impression that the name *sonoriensis* could easily be stretched to cover the house finches of central western Mexico, and also that too many divisions of the typical race, *mexicanus*, have been proposed.

Fringilla haemorrhoa Lichtenstein

The series upon which this name was based was, for the most part, collected at [the City of] Mexico by Deppe. There were at least four males, one of which, from Cuernavaca, was later selected by Cabanis as the type of *rhodocolpus*. Since the name *haemorrhoa* was thus a composite it is entirely proper to restrict the name. Dr. Stresemann has selected adult male number 6890 from Mexico [City] as a restricted type and with this selection I agree. This specimen is a typical *mexicanus* in size and color. The moderately abraded plumage places it as an early summer or late spring bird. Measurements are; wing, 77.5; tail, 62.0; exposed culmen, 9.1; depth of bill at base, 8.9; tarsus, 18.5; middle toe minus claw, 14.8 mm.

Spermophila morelleti "Pucheran" Bonaparte

The type of *Spermophila morelleti* is still in the Paris Museum, where it is number 1849—85 of the old catalogue. It is a mounted adult male in good condition, and on the bottom of the stand is the following data: "Spermophila Moreletti [sic] Bp. In Peten (Amer. centrale) par M. Morelet. 1849 Cat. no. 85. Spermophila morelcti [sic] Puch. (type). Type de la description du Pce. Ch. Bonaparte." In the original description a female was named also, but this seems to have disappeared.

Recent designations of "Alta Vera Paz" as a restricted type locality for the original "Guatimala" (Consp. Av., **1**, 497) are not in order, for Salvin and Godman showed the proper place as long ago as 1885, in the 'Biologia', to be Peten.

Spermophila torqueola Bonaparte

The only two males of the cinnamon-rumped seedeater which were in the Berlin Museum at the time Bonaparte described the species (Consp. Gen. Av., **1**, 1850, 495) were two specimens from "Mexico", one of which (6481) was collected by Aschenborn probably at, or near, the City of Mexico, and the other (6483), taken by Deppe, was definitely from that place. These should be considered as cotypes, though the Berlin Museum has type-tagged 6481 as *the* type. In any case the City of Mexico is the restricted type locality for this species.

Eleven years after Bonaparte's description appeared, Cabanis used the same two males, with the addition of a female (6483) from "Mexico" and another female from Cuernavaca, collected by Deppe, (6484)

to set up Lichtenstein's old *nomen nudum* of *Sporophila ochropyga*. The formal part of the description (J. für Orn., **9**, 1861, 5) deals entirely with the males, and therefore *ochropyga* is a synonym of *torqueola* in the strictest sense of the word.

With his usual acute foresight, Cabanis, in the text of his discussion on the relationships of various forms of *Sporophila*, was inclined to consider *ochropyga* [=*torqueola*] as the northern representative of *morelleti*. While no one to date has actually proposed that they should be considered conspecific, Mr. Ludlow Griscom (Amer. Mus. Novit., 438, 1930, 6) has recently hinted at such a course. The present writer has observed tendencies in the direction of *torqueola* in several El Salvador specimens of *Sporophila morelleti mutanda* and believes, with Griscom, that material from critical localities in extreme southwestern Mexico will definitely establish intergradation between *mutanda* and *torqueola*.

SPERMOPHILA ALBITORQUIS Sharpe

Number 85.2.10.121 of the British Museum collection is ticketed as the type of this supposed species. It bears two tags, one a Sclater Museum label which reads: "Mexico Warwick", and on the reverse: "625 b of Cat./ 85.2.10.121." The type tag bears the same data, with the additional information that the specimen was purchased by Sclater from Warwick and from Sclater by the museum in 1885. Though not marked as to sex, the bird is an adult male in fresh plumage.

Sharpe's original description (Cat. Birds Brit. Mus., **12**, 1888, 120) lists two birds, specimen "a" as above, and specimen "b" from Chapulapam, [Oaxaca]. Neither was designated as the type. I could not find specimen "b" in the British Museum collection in September, 1933. My own measurements of the single male cited above accord closely with Sharpe's measurements in inches and hundredths. I measure: wing, 57.0; tail, 48.0; exposed culmen, 9.1; tarsus, 14.8.

The only way in which this individual differs from *Sporophila torqueola* is that the collar around the hind neck is brokenly complete instead of being interrupted on the hind neck by an area of black. In this one respect it shows a variation in the direction of *mutanda*, many individuals of which have a similar nearly-complete collar. Whether *albitorquis* is an intergrade which is much closer to *torqueola* than to *mutanda*, whether it is a race of *torqueola*, or whether it is simply a slightly aberrant specimen of *torqueola* is a matter for further material to decide. The first named hypothesis is probably the correct one, but in any case *albitorquis* has no standing as a distinct species and, for the present, may most easily be disposed of as a synonym of *torqueola*.

Tanagra rutilus Lichtenstein

The actual type locality of this towhee, which was described simply as from "Mexico", has apparently never been published. The type is a mounted bird in abraded plumage but otherwise in good condition, marked as a male, and collected by Deppe at Oaxaca. It is number 6231 of the Zoölogical Museum in Berlin.

Pyrgisoma kieneri Bonaparte

The mounted type of this species is in the "Gallerie des Oiseaux" at the Paris Museum, where I examined it on July 27 and again on August 4, 1933. As various people have suspected, it is simply a specimen of the ground sparrow which at present is known as *Melozone rubricatum xantusi* (Lawrence). In characters the type is larger than the average, but by no means represents the maximum of the race. There *are* white orbital rings, though the plumage of the head is so rumpled and stained that they are not discernable save on close examination. The only abnormal feature is that the ear-coverts are redder than in the average case. However, I have seen individuals which match the type very closely in this respect. Measurements of the type are: wing, 82.5; tail, 73.0; exposed culmen, 15.7; depth of bill at base, 10.0; tarsus, 25.3; middle toe minus claw, 18.7.

The actual type locality may be presumed, for the present, to be San Blas, Nayarit. On the bottom of the stand is the meagre data: "Exped. de la Danaïde, par M. Jaures, Mexique. Pyrgisoma Kienerii Bp. type 1843." There is no other number.

The Danaïde expedition, its personnel, and its itinerary, would be an extremely interesting problem for someone, with the time and facilities, to investigate. There are more than a few specimens in the Paris Museum which were collected on this expedition, all apparently by Jaures. Aside from the type of *Pyrgisoma kieneri* there are other specimens of extreme interest,—the type of the Gilded Flicker for instance,—and it is evident that collecting was done at various points in western Mexico, Lower California and California. My own inquiries have failed to uncover any record of this expedition, which seems to have been on the west coast in 1842.

Since *kieneri* is the earliest specific name, the three races should stand as:

Melozone kieneri kieneri (Bonaparte)
Melozone kieneri rubricatum (Cabanis)
Melozone kieneri grisior van Rossem

C. A SYSTEMATIC REPORT ON THE BREWSTER COLLECTION OF MEXICAN BIRDS

In the late '80s of the last century William Brewster became interested in Mexican ornithology, an interest which was probably stimulated, originally, by the earlier work of Xantus and Belding in Lower California, and also by various new species which were taken by McLeod in the mountains of Chihuahua, which came into Brewster's hands through gift or purchase at about this period. With full realization of the potential richness of the Mexican field he engaged J. C. Cahoon and M. Abbott Frazar, two professional collectors, to make intensive collections in northwestern Mexico. In this program Cahoon, in 1887, worked south from the Arizona border to central eastern Sonora, while Frazar went to the Cape Region of Lower California. Frazar returned from Lower California very early in 1888, and spent practically the whole of that year in working from southern Sonora through and across the Sierra Madre to Chihuahua City. His general itinerary and practically all of his very sketchy notes have been recorded by Mr. Ludlow Griscom in "The Auk" for January, 1933.

The Lower California collections of Frazar have been reported upon by Brewster himself and they formed the chief basis for his "Birds of the Cape Region of Lower California" which was published in 1902. The mainland collections of Frazar, Cahoon, and McLeod have never been studied as a whole, though Brewster, Ridgway, Nelson, Griscom, and others have used them from time to time in connection with descriptions of new species and subspecies. Some of the locality records have been given by Ridgway in his "Birds of North and Middle America," but the greater part of these collections has never been studied in a systematic sense.

The entire mainland collection assembled by Frazar, Cahoon, and McLeod now totals about 4500 skins. 4731 are catalogued, but of these some 200 have been exchanged to other institutions. In addition, an uncertain number were disposed of before the catalogue was made, for I have found a few in the British Museum which had never received a Brewster collection number, and of which there is no record in the Brewster catalogue. It is probable that in round numbers the combined take of the three collectors was a little less than 5000 specimens.

When I first became concerned with the birds of northwestern Mexico some years ago, Mr. Outram Bangs, then Curator of Birds at the

Museum of Comparative Zoölogy, suggested that I come to Cambridge and work up this material, but the opportunity to do so did not materialize until the fall of 1933. In the interval Bangs had died. However, every facility and courtesy was extended by the present staff and I wish to express my appreciation for assistance in many ways to Dr. Thomas Barbour, Mr. J. L. Peters, and Mr. Ludlow Griscom.

The report on this collection is entirely systematic in nature, for none of the collectors is known to have kept field notes. Several new races are here described, but the value of the collection is chiefly that it provides a far better understanding of the distribution of many species and subspecies than previously was possible.

Itinerary of M. Abbott Frazar

Frazar first visited Sonora in January, 1887, on his way to Lower California, but Guaymas seems to have been the only point at which he did any collecting at that time. The period from January 13 to January 21 was spent there and small series of the commoner birds of the locality were prepared. He was obviously simply filling in time while awaiting passage to Lower California (where he arrived on January 24), and had no thought of doing intensive collecting in Sonora at the moment.

His real work on the mainland of Mexico began on January 17, 1888, on which date he arrived from Lower California. He was thus in Lower California almost exactly a year, though Brewster states that Frazar was in the Cape Region "about nine months." At any rate he was at Guaymas until January 27, on which date he left, by steamer, probably by way of Agiabampo, to go to Alamos where he arrived on or about the first of February. He remained at Alamos (at the Rancho Mercedes) for two months and left there on April 4. Collecting dates at Alamos are from February 2 to March 30, inclusive.

His next station was at Mina Abundancia, a place which does not appear even on modern mining maps of the region. According to Frazar it was "21 miles this side [northeast] of Alamos" and "less than 200 yards" inside Chihuahua territory. Since Hacienda de San Rafael, which in Frazar's day was also in Chihuahua, is now four or five miles from the corrected boundary, and in Sonora, it follows that Mina Abundancia is also in Sonora. It is, according to Frazar, about 2000 feet higher than Hacienda de San Rafael and presumably in the same canyon. At Mina Abundancia, Frazar collected three weeks,

from April 7 to 30 inclusive, and then went down to Hacienda de San Rafael for a similar period,—from May 1 to 22.

Following the three weeks at San Rafael, he went prospecting for a new collecting ground in the higher mountains and finally located at Pinos Altos in Chihuahua on June 2. Here he stayed until July 15, thence to Bravo, Chihuahua, for the four weeks of July 18 to August 11, inclusive, and then spent a week in traversing the mountainous country on foot to Jesus Maria, or, as he insisted on calling it in his correspondence with Brewster, "Jesus Mary." This was his last station in the high country, and he spent almost a month there, from August 20 to September 13. From Jesus Maria he went to Chihuahua City, where he arrived on September 26 and began work on the 28th. Frazar left Chihuahua City for home on December 20, 1888.

Itinerary of John C. Cahoon

Brewster sent Cahoon to Arizona at about the same time that Frazar went to Lower California. He worked in the vicinity of Fort Huachuca for some weeks and then went south into eastern Sonora. At this time the region was the center of the Apache country, and whether Cahoon worked alone or whether he accompanied military parties which crossed the line in pursuit of hostile Indians, is not known. At any rate he succeeded, in the face of what would now be considered insuperable difficulties, in collecting fair series of most of the species which occur in this broken, mountainous country and his work provides us with practically all that is known about the ornithology of east central Sonora today. His route has been worked out on the basis of label data and is probably, in the main, correct. Cahoon made two trips into Sonora, the first of but a few days' duration. He was evidently travelling at top speed, for he was at the Miller Ranch, 64 miles south of Fort Huachuca, on January 31, 1887; at the Ranken Ranch, 90 miles south of Fort Huachuca, on February 1; at Cumpas from February 3 to 5, and at Bacuachi (the Bacoachi or Bacoachic of some maps) on February 8 on his way north. He re-crossed the border, again on his way south, early in March and this time went in more leisurely fashion, for he was 25 miles south [east] of San Pedro on March 11; 35 miles south [east] of San Pedro on March 12; at Fronteriza [Fronteras] March 13 and 14; at Nacozari March 18 to 31, and at Oposura [Moctezuma] on April 4. By far the greater part of his collecting was done at Oposura, for he remained in the locality until June 18, with only one side trip, May 5, 6, and 7, to Granados. Un-

fortunately, the Oposura labels cannot be taken too literally, for species so widely diverse, zonally, as the Lucy Warbler and the Mexican Creeper are all included under the single locality. Oposura was simply Cahoon's headquarters, out of which he worked for distances which probably seldom exceeded half a day's walk. Whether he worked the ridges east or west of the valley in which Oposura is situated, will probably never be known.

Itinerary of R. R. McLeod

In contrast with Frazar and Cahoon, McLeod was not a professional collector of birds. His activities were concerned primarily with mining, and the (roughly) two hundred specimens which Brewster secured from him represent what was probably his total take for the three years, 1883, 1884, and 1885, which are represented in the small collection made by him. McLeod was apparently always on the lookout for rarities rather than the acquisition of a general collection, and for this reason his small number of birds is an extraordinarily rich one. The center of his collecting was in the mining district in the mountains of central western Chihuahua, but it is not feasible to attempt a precise account of his movements. The mines or mining towns of Moris, Pinos Altos, Jesus Maria, Carmen, (or El Carmen), La Trompa and Durazno all appear on the scraps of paper which served him for labels, but the dates show that he was constantly moving about from one place to another.

ARDEIDAE

Leucophoyx thula brewsteri (Thayer and Bangs)

Frazar. 1, Guaymas, January 18, 1887.

Butorides virescens anthonyi (Mearns)

Frazar. 1, Alamos, February 7, 1888.
3, Chihuahua, September 29 to October 5, 1888.
Cahoon. 1, Oposura, April 15, 1887.

I agree with Peters (Birds of the World, 1931, 103) that *Butorides virescens eremonomus* Oberholser, described from San Diego, Chihuahua, is best synonymized with *anthonyi*. It is simply an intermediate between *anthonyi* and *virescens*, though nearer the former. The three Chihuahua specimens recorded above are a little darker and smaller than typical *anthonyi* and would be called *eremonomus* by anyone who wishes to recognize that intermediate race.

Heterocnus cabanisi (Heine)

Frazar. 1, Alamos, March 28, 1888.

THRESKIORNITHIDAE

Plegadis guarauna (Linnaeus)

McLeod. 1, Jesus Maria, no date.

ANATIDAE

Nettion crecca carolinense (Gmelin)

Cahoon. 1, Fronteriza, March 13, 1887.

CATHARTIDAE

Coragyps atratus atratus (Meyer)

Cahoon. 1, Oposura, April 12, 1887.

ACCIPITRIDAE

Accipiter striatus velox (Wilson)

Frazar. 2, Alamos, February 6 and 29, 1888.
2, Bravo, July 28 and 30, 1888.

The two specimens from Bravo are juveniles with the wing quills still partly sheathed. They were undoubtedly raised in the locality, and hence establish an extreme southern breeding station.

Accipiter cooperii mexicanus Swainson

Frazar. 3, Alamos, February 2 to March 5, 1888.
2, Bravo, August 1, 1888.
Cahoon. 1, Oposura, April 30, 1887.

The Bravo birds are juveniles which probably were raised in that locality.

Buteo borealis calurus Cassin

Frazar. 3, Alamos, March 1 to 12, 1888.
1, Pinos Altos, June 29, 1888.
1, Jesus Maria, September 5, 1888.
1, Chihuahua, October 29, 1888.

Buteo albonotatus Kaup

Frazar. 1, Alamos, March 23, 1888.
1, Hacienda de San Rafael, May 3, 1888.
Cahoon. 1, Oposura, June 16, 1887.

Buteo plagiatus maximus (van Rossem)

Frazar. 12, Alamos, March 3 to 29, 1888.
2, Hacienda de San Rafael, May 4 and 7, 1888.
Cahoon. 2, Nacozari, March 29 and 30, 1887.

Wing measurements of 24 specimens of *plagiatus* from Tamaulipas, Nuevo Leon, Vera Cruz, Guerrero, Yucatan, and extreme southern Sinaloa compare with 26 *maximus* from Arizona and Sonora as follows:

plagiatus	13 males	235 — 255 (247).
	11 females	255 — 275 (268).
maximus	17 males	255 — 274 (264).
	9 females	283 — 295 (288).

This size difference, while not great, is apparently uniform. The largest male *plagiatus* (255 mm.) is from southern Sinaloa, a region of intergradation. In addition *maximus* is paler when seen in series, and the proximal tail bar is almost invariably incomplete.

Peters (Checklist, 1931, 228) has discarded *Rupornis* as a genus because the species included in it are intimately related to some of the smaller members of the genus *Buteo*. With this I am in complete accord, because if *Rupornis* is to be recognized it certainly would have to be recast to include *Buteo platypterus* and possibly *Buteo lineatus*. At the same time it is impossible to combine *Buteo* and *Rupornis* and yet leave *Asturina* out of the picture. *Asturina* is very close to *Buteo lineatus* and is decidedly more like the typical *Buteos* on the basis of external characters than are *magnirostris* and *platypterus*. Osteologically, there is so little difference between *plagiatus* and *magnirostris* that, were this evidence alone considered, they could (fide Dr. Loye Miller) scarcely be distinguished as species. Therefore, it is evident that (1), we must recognize *Rupornis* and include in that genus the Broad-winged Hawk; (2), recognize *Asturina* as a connecting link between *Rupornis* and *Buteo* or (3), put *Rupornis*, *Asturina*, and *Buteo* together. In the absence of tangible characters by which to separate them the last course seems preferable.

Hypomorphnus urubitinga ridgwayi (Gurney)

Frazar. 2, Alamos, March 8, 1888.

Buteogallus anthracinus anthracinus (Lichtenstein)

Frazar. 2, Alamos, February 23; March 23, 1888.

Circus hudsonius (Linnaeus)

Frazar. 1, Chihuahua, November 5, 1888.

Geranospiza nigra livens Bangs and Penard

Frazar. 2, Alamos, February 9, 1888.

The female (no. 224,793) of this breeding pair is the type of this well-marked race, which is known at present only from the two specimens recorded above.

FALCONIDAE

Polyborus cheriway audubon Cassin

Cahoon. 1, Oposura, April 8, 1887.

Falco sparverius sparverius Linnaeus

Frazar. 1, Guaymas, January 21, 1887.
2, Alamos, February 18 and 29, 1888.
1, Chihuahua, November 26, 1888.
Cahoon. 1, 35 miles south of San Pedro, March 12, 1887.
McLeod. 1, Carmen, January 6, 1884.
1, Durazno, December 2, 1884.

Falco sparverius phalaena (Lesson)

Frazar. 1, Alamos, March 13, 1888.
Cahoon. 1, Cumpas, February 3, 1887.

As in most collections from this part of Mexico, the larger, darker, migratory *sparverius* is the more commonly represented.

The name *phalaena* is of rather unsatisfactory status, since there is no means of knowing whether Lesson had specimens of the resident race or only migratory *sparverius*. I fear that the question will never be settled. The type of *phalaena* is not now, nor, so far as I could determine, ever has been in the Paris Museum. It is not at Lyon, and Dr. Delacour told me that the bird collection at Bordeaux is no longer in existence.

CRACIDAE

Ortalis wagleri griseiceps subsp. nov.

Frazar. 6, Alamos, March 16 to 30, 1888.
1, Hacienda de San Rafael, May 7, 1888.

Type. Male adult, no. 224937, Museum of Comparative Zoölogy; Alamos, Sonora, Mexico, March 16, 1888; collected by M. Abbott Frazar.

Subspecific characters. Similar to *Ortalis wagleri wagleri* (Gray) of southern Sinaloa and Jalisco, but head and neck paler and grayer; feathers of the crown uniform pale slaty gray instead of dark slate on the inner webs and slate gray on the outer; mantle slightly grayer in fresh plumage and decidedly grayer when in worn plumage.

Range. Extreme southern Sonora, south for an undetermined distance into northern Sinaloa.

Remarks. Specimens from extreme southern Sinaloa (Escuinapa) are variously intermediate, though closer to *wagleri.* San Blas and Tepic, Nayarit specimens are typical of *wagleri,* and I suggest that the "Western Mexico" of the original description be restricted to San Blas.

PERDICIDAE

Colinus virginianus ridgwayi Brewster

Cahoon. 6, Cumpas, February 5, 1887.
4, Bacuachi, February 8, 1887.

Lophortyx gambelii gambelii Gambel

Cahoon. 3, Bacuachi, February 8, 1887.
1, 35 miles south [east] of San Pedro, March 12, 1887.
11, Oposura, April 5 to 22, 1887.
1, Granados, May 6, 1887.

Lophortyx douglasii bensoni Ridgway

Frazar. 16, Alamos, February 8 to March 26, 1888.
Cahoon. 9, Oposura, April 6 to 30, 1887.
6, Cumpas, February 5, 1887.
McLeod. 2, La Trompa, January 5 and April 10, 1885.

I now believe it to be impractical to recognize more than one race of the Douglas Quail in Sonora. It is true that series from the Alamos

Faunal Area show differences which could be recognized, subspecifically, were it not for the behavior of the species further south. Briefly, there is a race in Jalisco and Nayarit which is excellently distinguished from central Sonora birds by dark coloration and small spots on the under parts. The whole state of Sinaloa and the Alamos Faunal Area of Sonora is occupied by birds of such variable characters that they might well be called *douglasii* by one person and *bensoni* by another, depending on what series was examined. Even the great series of *douglasii* in the American Museum, collected by Batty in extreme southern Sinaloa, contains a small proportion of individuals which I cannot distinguish from typical *bensoni*. The majority, though, are *douglasii* without question. The reverse of the situation occurs in the southern part of Sonora. Some specimens from there are very close to *douglasii*, in fact were recorded as that race by myself. The majority are closer to *bensoni*, however, and all Sonora and Chihuahua birds of this species should be called *bensoni*.

Regarding Vigors' type of *Ortyx douglasii*, which is in the British Museum; it is doubtful if it ever came from Mazatlan. It is typical, one might say super-typical, of the southern race. The locality as given in the original description was, of course, "Monterey," but was later changed by Gambel to Mazatlan. Of course it *may* have come from Mazatlan, but all things considered I believe San Blas, Nayarit, to be a better selection. The type is a female, a skin in poor condition and with the tail missing. It was purchased at the sale of the Zoological Society's collection in 1855, and is now numbered 55.12.19.378 of the British Museum.

Cyrtonyx montezumae mearnsi Nelson

Frazar. 1, Mina Abundancia, April 25, 1888.
2, Hacienda de San Rafael, May 7, 1888.
5, Bravo, July 23 to August 6, 1888.
7, Chihuahua, October 15 to November 23, 1888.
Cahoon. 1, Cumpas, February 3, 1887.
1, Nacozari, March 26, 1887.
1, Oposura, May 18, 1887.

The Frazar specimens are all more or less intermediate toward *montezumae*. In fact, some of them could easily be assigned to that race. On two such extremes I have previously recorded *montezumae* from Sonora, but now believe this to be in error. Though some southern individuals are intermediate, all Sonora specimens of this quail should be called *mearnsi*.

RALLIDAE

Rallus limicola zetarius Peters

Frazar. 1, Chihuahua, November 26, 1888.

CHARADRIIDAE

Charadrius alexandrinus nivosus (Cassin)

Frazar. 2, Guaymas, January 19, 1887.

Charadrius hiaticula semipalmatus Bonaparte

Frazar. 2, Guaymas, January 13 and 14, 1887.

Charadrius wilsonia beldingi Ridgway

Frazar. 2, Guaymas, January 14, 1887.

Charadrius vociferus vociferus (Linnaeus)

Frazar. 2, Alamos, February 22, 1888.
12, Chihuahua, October 9 to November 5, 1888.
Cahoon. 2, Oposura, April 4 and 23, 1887.

SCOLOPACIDAE

Capella delicata (Ord)

Frazar. 5, Chihuahua, October 9 to November 17, 1888.
Cahoon. 1, Granados, May 6, 1887.

Actitis macularia (Linnaeus)

Frazar. 1, Alamos, February 14, 1888.
9, Chihuahua, September 29 to November 21, 1888.
Cahoon. 2, Oposura, April 4 and 23, 1887.
McLeod. 1, Carmen, Spring of 1885.

Catoptrophorus semipalmatus inornatus (Brewster)

Frazar. 1, Guaymas, January 19, 1887.

Tringa melanoleuca (Gmelin)

Frazar. 1, Chihuahua, November 30, 1888.

EROLIA BAIRDII (Coues)

Frazar. 1, Chihuahua, October 3, 1888.

EROLIA MINUTILLA (Vieillot)

Frazar. 4, Chihuahua, October 3 to November 5, 1888.

RECURVIROSTRIDAE

HIMANTOPUS HIMANTOPUS MEXICANUS (Müller)

Cahoon. 2, Oposura, April 15, 1887.

LARIDAE

LARUS DELAWARENSIS Ord

Frazar. 2, Guaymas, January 18, 1887.

COLUMBIDAE

COLUMBA FASCIATA FASCIATA Say

Frazar. 3, Pinos Altos, June 29 and July 7, 1888.
Cahoon. 2, Oposura, May 23 and June 8, 1887.

COLUMBA FLAVIROSTRIS RESTRICTA van Rossem

Frazar. 2, Alamos, February 2 and March 27, 1888.

ZENAIDURA MACROURA MARGINELLA (Woodhouse)

Frazar. 1, Alamos, February 27, 1888.
Cahoon. 2, Oposura, April 4 and 5, 1887.

MELOPELIA ASIATICA MEARNSI Ridgway

Frazar. 4, Guaymas, January 14 to 19, 1887.
1, Alamos, February 29, 1888.
Cahoon. 3, Oposura, April 4 and 7; May 13, 1887.
McLeod. 1, La Trompa, January 23, 1884.

COLUMBIGALLINA PASSERINA PALLESCENS (Baird)

Frazar. 4, Guaymas, January 17, 1887.
13, Alamos, February 11 to March 27, 1888.
Cahoon. 1, Bacuachi, February 8, 1887.
1, Oposura, April 16, 1887.

Scardafella inca (Lesson)

Frazar. 11, Guaymas, January 17, 1887.
35, Alamos, February 7 to March 27, 1888.
27, Chihuahua, October 1 to December 6, 1888.
Cahoon. 1, Nacozari, March 22, 1887.
1, Oposura, April 9, 1887.
McLeod. 2, Durazno, October 11 and 12, 1884.

Leptotila verreauxi angelica Bangs and Penard

Frazar. 17, Alamos, February 4 to March 30, 1888.
4, Hacienda de San Rafael, May 2 to 17, 1888.
McLeod. 1, Durazno, December 21, 1884.
1, Carmen, undated.

PSITTACIDAE

Ara militaris mexicana Ridgway

Frazar. 1, Alamos, March 15, 1888.
1, Pinos Altos, June 27, 1888.
McLeod. 1, Jesus Maria, undated.

Rhynchopsitta pachyrhyncha (Swainson)

Frazar. 7, Pinos Altos, June 29 to July 7, 1888.
2, Bravo, July 28, 1888.
McLeod. 1, Jesus Maria, undated.

Aratinga holochlora brewsteri Nelson

Frazar. 8, Hacienda de San Rafael, May 5 to 7, 1888.

The type of this subspecies is an adult male (no. 224,770) from this series, collected on May 5, 1888.

Forpus cyanopygia pallida (Brewster)

Frazar. 12, Alamos, March 8, 1888.

The cotypes of this subspecies are from the above series. They are male number 214,389 and female number 214,390.

AMAZONA FINSCHI (Sclater)

Frazar. 14, Alamos, March 16 to 21, 1888.
1, Mina Abundancia, April 18, 1888.
McLeod. 1, La Trompa, April 10, 1885.

AMAZONA ALBIFRONS SALTUENSIS Nelson

Frazar. 20, Alamos, February 2 to March 26, 1888.

CUCULIDAE

PIAYA CAYANA MEXICANA (Swainson)

McLeod. 2, La Trompa, January 20, 1885 and May 18, 1885.

These two specimens are *mexicana*, not *extima* of the Arid Tropical Zone of southern Sonora and northern Sinaloa. Six specimens of the latter race have recently been examined, in the collection of Robert T. Moore, from Guirocoba, San Rafael, and Questa del Tigre, the last named locality being on the Sonora — Sinaloa boundary.

GEOCOCCYX CALIFORNIANUS (Lesson)

Frazar. 1, Alamos, March 16, 1888.
1, Chihuahua, October 16, 1888.
McLeod. 1, Carmen, September 1, 1884.
1, Jesus Maria, February 9, 1884.

TYTONIDAE

TYTO ALBA PRATINCOLA (Bonaparte)

Frazar. 1, Alamos, February 23, 1888.

STRIGIDAE

OTUS ASIO VINACEUS (Brewster)

McLeod. 1, Durazno, December 2, 1884.

The above specimen (no. 214,124) is the type of *Otus vinaceus*. This "species" is simply a race of *asio*. It is closely similar to *gilmani*, but is even paler and more ashy, and more narrowly vermiculated.

The specimen referred to by myself as *vinaceus* (Trans. San Diego Soc. Nat. Hist., **6**, 1931, 250) without, at that time, having examined the type, is not *vinaceus* at all. It is *Otus hastatus hastatus* (Ridgway).

Otus trichopsis trichopsis (Wagler)

McLeod. 2, Carmen, May 6 and August 22, 1884.

These two birds, an adult female number 214,125, and a juvenal female number 214,126, are the cotypes of *Megascops aspersus* Brewster. This name, as I have shown elsewhere (Trans. San Diego Soc. Nat. Hist., **7**, 1932, 184), is synonymous with *trichopsis* in a subspecific sense.

Bubo virginianus pallescens Stone

Frazar. 1, Guaymas, January 13, 1887.
1, Alamos, February 14, 1888.
Cahoon. 1, 35 miles south of San Pedro, March 12, 1887.

The two Frazar birds are dark, and are at about the maximum of the race in this respect. Cahoon's bird is typical *pallescens* as represented by southeastern Arizona specimens. The horned owls of western Mexico need systematic revision, but there is not, to date, sufficient material to attempt this.

Glaucidium minutissimum gnoma Wagler

Frazar. 2, Bravo, July 25 and 30, 1888.
McLeod. 1, Carmen, November 27, 1884.

The Carmen specimen is typical *gnoma*, while the two from Bravo are *gnoma* in color but intermediate toward *californicum* in size. The male of the Bravo pair is in the gray,—the female in the brown phase. In using the name *californicum*, I follow Bishop (Proc. Biol. Soc. Wash., **44**, 1931, 97–98.) who in my belief is correct in listing *pinicola* as a synonym of *californicum*.

Glaucidium brasilianum ridgwayi Sharpe

Frazar. 3, Alamos, February 2 and March 30, 1888.

Speotyto cunicularia hypugaea (Bonaparte)

Frazar. 2, Chihuahua, October 10, 1888.
Cahoon. 2, Bacuachi, February 8, 1887.

Ciccaba virgata amplonota Kelso

Frazar. 1, Alamos, March 16, 1888.
3, Hacienda de San Rafael, May 4, 8, and 18, 1888.
McLeod. 1, Durazno, December 2, 1884.

These birds are all extreme examples of this well-marked race which has recently been described from Mazatlan. It is the white extreme of the species.

STRIX OCCIDENTALIS LUCIDA (Nelson)

Frazar. 1, Pinos Altos, June 20, 1888.
Cahoon. 1, Oposura, June 11, 1887.

CAPRIMULGIDAE

CAPRIMULGUS VOCIFERUS ARIZONAE (Brewster)

Frazar. 1, Alamos, February 27, 1888.
2, Mina Abundancia, April 25, 1888.
2, Pinos Altos, June 8 and 19, 1888.
4, Bravo, July 30 and 31, 1888.
1, Jesus Maria, August 28, 1888.

PHALAENOPTILUS NUTTALLII NUTTALLII (Audubon)

Cahoon. 5, Oposura, May 11 to June 18, 1887.

OTOPHANES MCLEODII Brewster

McLeod. 1, no locality, December 6, 1884.

This specimen, the type of the species and genus, is an adult female and is numbered 214,123. It is most likely that Durazno is the type locality.

CHORDEILES MINOR HENRYI Cassin

Cahoon. 1, Oposura, June 10, 1888.

CHORDEILES ACUTIPENNIS TEXENSIS Lawrence

Frazar. 1, Alamos, March 2, 1888.
Cahoon. 4, Granados, May 6 and 7, 1887.
2, Oposura, June 17 and 18, 1887.

MICROPODIDAE

STREPTOPROCNE SEMICOLLARIS (De Saussure)

McLeod. 1, Jesus Maria, June 5, 188?.

TROCHILIDAE

Archilochus alexandri (Bourcier and Mulsant)

Frazar. 1, Alamos, March 26, 1888.
Cahoon. 4, Nacozari, March 28 and 30, 1887.

Calypte costae (Bourcier)

Cahoon. 10, Nacozari, March 20 to 30, 1887.
5, Oposura, April 4 to May 10, 1887.

Selasphorus platycercus platycercus (Swainson)

Frazar. 1, Jesus Maria, September 6, 1888.
Cahoon. 3, Oposura, May 27; June 8 and 10, 1887.

Selasphorus rufus (Gmelin)

Frazar. 2, Alamos, March 8 and 17, 1888.
1, Jesus Maria, July 18 (!), 1888.
Cahoon. 3, Nacozari, March 25 to 29, 1887.
7, Oposura, April 8 to 13, 1887.

Stellula calliope calliope (Gould)

Cahoon. 1, Oposura, April 8, 1887.

Eugenes fulgens (Swainson)

Frazar. 2, Mina Abundancia, April 13 and 25, 1888.
9, Pinos Altos, June 8 to July 2, 1888.
1, Bravo, August 1, 1888.
1, Jesus Maria, September 5, 1888.
Cahoon. 14, Oposura, May 21 to June 13, 1887.

Lampornis clemenciae bessophilus (Oberholser)

Frazar. 14, Pinos Altos, June 12 to 20, 1888.
13, Bravo, July 18 to August 8, 1888.
3, Jesus Maria, August 23 and September 11, 1888.
Cahoon. 1, Oposura, June 10, 1887.

Anthoscenus constantii surdus subsp. nov.

Type. Male adult, no. 224,110, Museum of Comparative Zoölogy; Alamos, Sonora, Mexico, February, 1888; collected by M. Abbott Frazar.

Subspecific characters. Similar to *Anthoscenus constantii leocadiae* of southwestern Mexico, but upper parts duller and more bluish green instead of greenish bronze; throat patch in both sexes with the minimum of metallic purple to be found in the species.

Range. Southern Sonora and northern Sinaloa.

Remarks. Bourcier and Mulsant described *Trochilus leocadiae* from a locality no more definite than "Mexico." Since Acapulco, Guerrero, is close to the center of the range of that race, and is a place from which the type could easily have come, I suggest that it be taken as a restricted type locality. Gould's type of *Heliomaster pinicola* was taken by Floresi, and therefore was probably from the vicinity of Bolaños, Jalisco. At any rate Gould's figure is that of the southern bird.

In addition to the single Frazar specimen from Alamos, I have seen three from Guirocoba in the collection of Dr. Louis B. Bishop, one from the Sierra de Alamos in the British Museum, and nine from Guirocoba and northern Sinaloa in the collection of Robert T. Moore. Specimens from extreme southern Sinaloa and Nayarit are intermediate between *leocadiae* and *surdus*.

Saucerottia beryllina viola (Miller)

Frazar. 3, Alamos, February 20; March 14 and 30, 1888.
1, Hacienda de San Rafael, May 9, 1888.
10, Bravo, July 20 to August 8, 1888.
1, Jesus Maria, September 11, 1888.

[Cyanomyia salvini Brewster]

Cahoon. 1, Nacozari, March 31, 1887.

I agree with Griscom that *salvini* is a hybrid between *Cynanthus latirostris* and *Amazilia violiceps conjuncta*.

Amazilia violiceps conjuncta Griscom

Frazar. 13, Alamos, February 2 to March 17, 1888.
1, Hacienda de San Rafael, May 10, 1888.

This is the bird formerly recorded from Sonora as *Amazilia verticalis*.

Hylocharis leucotis borealis Griscom

Frazar. 10, Mina Abundancia, April 9 to 25, 1888.
20, Pinos Altos, June 2 to July 10, 1888.
5, Bravo, July 19 to 30, 1888.
3, Jesus Maria, August 21 and September 11, 1888.
Cahoon. 4, Oposura, June 10 and 13, 1887.
McLeod. 1, Carmen, November 16, 1884.
2, Jesus Maria, July 6 and December —, 1885.

The race *borealis* is easily recognizable by its large size and more extensively white under parts when compared with typical *leucotis*.

Cynanthus latirostris Swainson

Frazar. 1, Guaymas, January 17, 1887.
29, Alamos, February 3 to March 26, 1888.
2, Hacienda de San Rafael, May 3 and 10, 1888.
Cahoon. 6, Nacozari, March 21 to 30, 1887.
3, Oposura, April 28; May 13; June 11, 1887.

TROGONIDAE

Leptuas neoxenus (Gould)

Frazar. 2, Pinos Altos, June 8, 1888.
2, Jesus Maria, September 5 and 11, 1888.
McLeod. 1, Durazno, April, 1885.
2, Jesus Maria, June 3 and 6, 1883.

trogon mexicanus clarus Griscom

Frazar. 6, Pinos Altos, June 4 to July 7, 1888.
11, Jesus Maria, August 20 to September 13, 1888.
McLeod. 2, Durazno, April, 1885.

An adult female, number 224,624, from Pinos Altos, June 4, is the type of this subspecies.

Trogon elegans canescens subsp. nov.

Frazar. 24, Alamos, February 13 to March 30, 1888.
3, Hacienda de San Rafael, May 2 to 15, 1888.
9, Bravo, July 21 to August 10, 1888.
Cahoon. 1, Oposura, June 9, 1887.
McLeod. 2, Durazno, November 29, 1884.

Type. Adult female, No. 28145, Dickey collection; San Javier, Sonora, Mexico, April 9, 1929; collected by J. T. Wright, original number 2994.

Subspecific characters. Resembles *Trogon elegans ambiguus* of southern and eastern Mexico, but wing and tail slightly longer; adult males with red of under parts lighter and more scarlet (less spectrum red or geranium red); females paler and grayer (less brownish), and with the red of posterior under parts paler and less extensive, particularly on flanks and longer under tailcoverts.

Range. Southern Arizona, south through Sonora and western Chihuahua to northern Sinaloa.

Remarks. Though Gould's type of *Trogon ambiguus* was supposed to have come from "northern Mexico", the possibility that it came from anywhere within the range of the race here described is so remote as to be unthinkable. Possibly the bird came from northeastern Mexico, but the probabilities are that it was a Floresi taken specimen from Bolaños, Jalisco. At any rate the plates in both editions of Gould's monograph picture the race of southern and eastern Mexico.

Specimens from Nayarit and southern Sinaloa are so variously intermediate that I do not care to be definite as to their subspecific status at this time.

Measurements	Wing	Tail
21 adult male *ambiguus*, mostly from southwestern Mexico	124—132 (128.4)	157—168 (165.2)
17 adult male *canescens* from Arizona, Sonora, etc.	130—137 (133.4)	165—177 (173.0)

The tails of one-year-old birds average about 10 millimeters longer than those of adults.

ALCEDINIDAE

Megaceryle alcyon alcyon (Linnaeus)

Frazar. 7, Chihuahua, October 3 to 12, 1888.

Megaceryle alcyon caurina (Grinnell)

Frazar. 1, Alamos, March 18, 1888.
1, Guaymas, January 18, 1887.
Cahoon. 1, Bacuachi, February 8, 1887.

CHLOROCERYLE AMERICANA SEPTENTRIONALIS (Sharpe)

Frazar. 19, Alamos, February 4 to March 23, 1888.
42, Chihuahua, September 29 to October 26, 1888.
Cahoon. 3, Oposura, April 4 to 15, 1887.

PICIDAE

COLAPTES CAFER COLLARIS Vigors

Frazar. 9, Pinos Altos, June 5 to July 14, 1888.
3, Bravo, July 19 to August 9, 1888.
10, Chihuahua, October 16 to November 3, 1888.
Cahoon. 2, Oposura, May 26 and June 2, 1887.

The Pinos Altos and Bravo specimens are a little smaller than typical *collaris* and are slightly darker throughout, and have the backs a little more prominently barred. These differences are in the direction of *mexicanus*.

COLAPTES CHRYSOIDES TENEBROSUS van Rossem

Frazar. 2, Alamos, February 3 and 25, 1888.
1, Guaymas, January 18, 1887.

The Guaymas specimen is an intermediate, as are most of the gilded flickers from that locality.

CEOPHLOEUS SCAPULARIS OBSOLETUS van Rossem

Frazar. 2, Alamos, March 16 and 21, 1888.

The male of this pair (224,294) is the type of this subspecies.

CENTURUS UROPYGIALIS UROPYGIALIS Baird

Cahoon. 1, Ranken's Ranch, 90 miles south of Fort Huachuca, February 1, 1887.
1, 25 miles south of San Pedro, March 11, 1887.
4, Nacozari, March 18 and 25, 1887.

The Nacozari specimens are intermediate toward *fuscescens*.

CENTURUS UROPYGIALIS FUSCESCENS van Rossem

Frazar. 8, Guaymas, January 13 to 19, 1887.
2, Alamos, March 12, 1888.
McLeod. 2, Durazno, November 30, 1884 and May 30, 1885.

Balanosphyra formicivora formicivora (Swainson)

Frazar. 10, Mina Abundancia, April 13 to 27, 1888.
5, Hacienda de San Rafael, May 7 to 16, 1888.
4, Pinos Altos, June 9 to July 14, 1888.
9, Bravo, August 1 to 9, 1888.
Cahoon. 11, Oposura, May 21 to June 11, 1887.
McLeod. 2, Carmen, November 15 and 17, 1884.

The identification of the above series involved examination of large series of typical *formicivora* from the table land of Mexico and of *mearnsi* from the mountains of southern Arizona. My conclusion is that *mearnsi* is not a valid race, for only about 20 percent of the Arizona birds can be distinguished from *formicivora* on any basis whatever. The characters given for *mearnsi* by Ridgway, the latest monographer of the genus (Birds of No. and Mid. Amer., 6, 1914, 100–112) are: "Similar to *B. f. formicivorus*, but averaging smaller, especially the bill, and with the chest much more extensively uniform black." The average measurements given by him for the two races in question are:

	Wing	Tail	Culmen
41 male *formicivora*	141.1	76.6	26.9
32 male *aculeata*	140.5	76.8	26.1
44 female *formicivora*	136.3	75.6	25.1
33 female *aculeata*	138.9	76.0	24.4

This tabulation speaks for itself. The other supposed character, the more solidly black chest, breaks down completely when enough specimens are examined. On this latter basis it is possible to recognize about 20 percent of the Arizona specimens as distinct, but even then I am inclined to believe it to be the result, in many cases, of the "make" of the skins.

Asyndesmus lewis (Gray)

McLeod. 1, Moris, December 26, 1884.

Sphyrapicus varius nuchalis Baird

Frazar. 1, Alamos, March 23, 1888.
9, Chihuahua, October 3 to November 16, 1888.
Cahoon. 1, Miller Ranch, January 31, 1887.
1, 25 miles south [east] of San Pedro, March 11, 1887.
McLeod. 1, Carmen, November 18, 1884.
1, Jesus Maria, winter of 1884.

DRYOBATES VILLOSUS ICASTUS Oberholser

Frazar. 23, Pinos Altos, June 5 to July 7, 1888.
Cahoon. 2, Oposura, May 31 and June 10, 1887.
McLeod. 1, Carmen, spring of 1885.

DRYOBATES SCALARIS CACTOPHILUS Oberholser

Frazar. 6, Chihuahua, October 16 to November 13, 1888.
Cahoon. 1, Nacozari, March 28, 1887.
4, Oposura, April 12 to May 11, 1887.

The Nacozari and Oposura specimens are intermediates which combine the small size of *agnus* with the color of *cactophilus*.

DRYOBATES SCALARIS AGNUS Oberholser

Frazar. 6, Guaymas, January 14 to 19, 1887.
10, Alamos, February 9 to March 29, 1888.
2, Hacienda de San Rafael, May 3 and 9, 1888.
McLeod. 3, Durazno, December 1 to 20, 1884.
1, Carmen, spring of 1885.

Oberholser based *agnus* on only four specimens. There is ample material now available from Sonora and this should be compared with series of *sinaloensis* Ridgway.

DRYOBATES ARIZONAE ARIZONAE (Hargitt)

Frazar. 16, Mina Abundancia, April 9 to 27, 1888.
5, Pinos Altos, June 5 to July 14, 1888.
6, Bravo, July 27 to August 9, 1888.
Cahoon. 6, Oposura, May 24 to June 8, 1887.
McLeod. 2, Carmen, January 2 and November 15, 1884.

PHLOEOCAESTES GUATEMALENSIS NELSONI (Ridgway)

Frazar. 3, Alamos, March 16 and 21, 1888.

These are close to *nelsoni*, but are not typical. Larger series are necessary.

CAMPEPHILUS IMPERIALIS (Gould)

Frazar. 2, Pinos Altos, July 7, 1888.
McLeod. 1, no locality, May, 1884.

DENDROCOLAPTIDAE

Xiphorhynchus flavigaster tardus Bangs and Peters

Frazar. 2, Hacienda de San Rafael, May 4 and 7, 1888.

One of these specimens (male, number 224,029, May 7) is the type of this gray, northern extreme of the species.

Picolaptes leucogaster (Swainson)

Frazar. 14, Mina Abundancia, April 9 to 25, 1888.
4, Hacienda de San Rafael, May 4 to 14, 1888.
McLeod. 3, Carmen, December 17, 1884; January 2, 1885.

COTINGIDAE

Platypsaris aglaiae richmondi van Rossem

Frazar. 3, Alamos, March 12 to 30, 1888.
7, Hacienda de San Rafael, May 8 to 19, 1888.

The single United States record of this becard,—the immature male taken by Price in the Huachuca Mountains, June 20, 1888,—is now in the Museum of Comparative Zoölogy, and is numbered 241,717. It is a typical *richmondi*.

TYRANNIDAE

Tyrannus crassirostris pompalis Bangs and Penard

Frazar. 3, Alamos, February 14 and March 2, 1888.
5, Hacienda de San Rafael, May 7 to 19, 1888.

One of the San Rafael specimens (male, 223,593) is the type of this race.

Tyrannus verticalis Say

Frazar. 1, Bravo, July 23, 1888.
Cahoon. 1, Oposura, April 7, 1887.

Tyrannus vociferans vociferans Swainson

Frazar. 2, Alamos, February 25 and March 5, 1888.
1, Pinos Altos, June 11, 1888.
3, Chihuahua, September 28 and October 20, 1888.

Cahoon. 4, Nacozari, March 24 to 29, 1887.
3, Oposura, May 18; June 17 and 18, 1887.
McLeod. 2, Durazno, November 30 and December 1, 1884.
2, Carmen, spring of 1885.

The fact that Frazar did not secure specimens of such a common species as *Tyrannus melancholicus occidentalis* is further evidence that it is migratory in the northern part of its range. He was out of the lowlands by April 4, and my own observations indicate that the first *occidentalis* reach southern Sonora about April 22.

Pitangus sulphuratus derbianus (Kaup)

Frazar. 1, Alamos, March 8, 1888.

Myiodynastes luteiventris swarthi van Rossem

Frazar. 11, Hacienda de San Rafael, May 10 to 19, 1888.
13, Bravo, July 18 to August 9, 1888.
McLeod. 2, Carmen, May 15 and 26, 1885.

In the British Museum there is a specimen collected by Frazar on July 28, 1888, tagged with a Brewster label as from San José del Rancho, Lower California. This, of course, was a pure *lapsus* on the part of whoever added the Brewster label to the skin. On the date in question Frazar was at Bravo, Chihuahua, a locality in which the species is common, and where Frazar collected series. The original Frazar field tag, with date, but, as usual, without locality, is still attached to the specimen.

Myiarchus tyrannulus magister Ridgway

Frazar. 7, Hacienda de San Rafael, May 10 to 15, 1888.

Myiarchus cinerascens cinerascens (Lawrence)

Frazar. 6, Guaymas, January 13 and 14, 1887.
Cahoon. 2, Nacozari, March 25, 1887.
7, Oposura, April 13 to June 17, 1887.

Myiarchus cinerascens inquietus Salvin and Godman

Frazar. 5, Hacienda de San Rafael, May 10 to 18, 1888.
10, Alamos, February 3 to March 26, 1888.
McLeod. 2, Durazno, October 12 and December 3, 1884.
2, Carmen, November 11 and 27, 1884.

MYIARCHUS TUBERCULIFER OLIVASCENS Ridgway

Frazar. 15, Alamos, March 13 to 29, 1888.
3, Mina Abundancia, April 9 and 17, 1888.
2, Hacienda de San Rafael, May 3 and 15, 1888.
2, Bravo, July 19, 1888.
Cahoon. 3, Oposura, May 18 and 21; June 17, 1887.
McLeod. 2, Carmen, May 14 and 16, 1884.

SAYORNIS PHOEBE (Latham)

Frazar. 3, Chihuahua, October 20 and 31; December 4, 1888.

SAYORNIS NIGRICANS SEMIATRA (Vigors)

Frazar. 1, Guaymas, January 18, 1887.
2, Alamos, February 9 and March 7, 1888.
7, Chihuahua, October 12 to November 20, 1888.
Cahoon. 3, Nacozari, March 19 to 22, 1887.
3, Oposura, April 7 and 15, 1887.
McLeod. 1, Jesus Maria, March 19, 1883.
2, Carmen, January 8 and November 8, 1884.
1, Durazno, December 20, 1884.

The seven Chihuahua specimens might, on geographic grounds, be presupposed to be *nigricans*. They are *semiatra* without any question, but perhaps do not represent the subspecies breeding in that locality.

SAYORNIS SAYA SAYA (Bonaparte)

Frazar. 2, Guaymas, January 13 and 14, 1887.
2, Alamos, February 17 and March 12, 1888.
11, Chihuahua, October 1 to December 12, 1888.
Cahoon. 2, Cumpas, February 4, 1887.

EMPIDONAX MINIMUS (Baird and Baird)

Frazar. 1, Alamos, March 7, 1888.

This appears to be the first far-western record of the Least Flycatcher.

EMPIDONAX HAMMONDII Xantus

Frazar. 7, Mina Abundancia, April 11 to 27, 1888.
10, Jesus Maria, August 29 to September 12, 1888.
Cahoon. 2, Nacozari, March 21 and 25, 1887.
1, Oposura, May 21, 1887.
McLeod. 1, Carmen, November 27, 1884.
1, Jesus Maria, April 16, 1884.

Empidonax wrightii Baird

Frazar. 4, Alamos, February 27 to March 17, 1888.
4, Chihuahua, November 9 to December 6, 1888.

Empidonax affinis pulverius Brewster

Frazar. 11, Pinos Altos, June 6 to July 13, 1888.
3, Jesus Maria, August 24; September 6 and 7, 1888.
McLeod. 1, Durazno, December 24, 1884.

The cotypes of this race are male 214,387 and female 214,388, respectively, of the Pinos Altos series.

Empidonax griseus Brewster

Frazar. 12, Alamos, February 9 to March 29, 1888.
1, Chihuahua, November 21, 1888.
Cahoon. 1, Cumpas, February 4, 1887.
1, Oposura, April 16, 1887.

Empidonax difficilis difficilis Baird

Frazar. 11, Alamos, February 2 to March 30, 1888.
3, Hacienda de San Rafael, May 7 to 10, 1888.
1, Mina Abundancia, April 27, 1888.
Cahoon. 17, Oposura, April 7 to June 14, 1887.

The Oposura series, most of which are presumably breeding birds, are typical *difficilis*, with no perceptible tendencies in the direction of *salvini*. Those from Alamos, Hacienda de San Rafael, and Mina Abundancia are more or less intermediate and probably represent either the breeding birds of those localities or else are migrants on their way northward to points in the mountains between Oposura and the *salvini* localities listed below.

Empidonax difficilis salvini Ridgway

Frazar. 6, Pinos Altos, June 4 to July 14, 1888.
9, Bravo, July 24 to August 8, 1888.
1, Jesus Maria, August 23, 1888.
McLeod. 1, Jesus Maria, April 24, 1884.

I cannot distinguish these breeding birds from *salvini* of Tamaulipas and the Mexican highlands generally. Compared with *difficilis* they are darker and more richly colored, are larger (wings of the males average 71.5), and the bills are notably wider. The transition from *salvini* to *difficilis* would seem to be abrupt in this region.

EMPIDONAX FULVIFRONS PYGMAEUS Coues

Frazar. 3, Alamos, February 9 and 13; March 12, 1888.
14, Pinos Altos, June 5 to July 14, 1888.
Cahoon. 2, Nacozari, March 24, 1887.
McLeod. 1, Durazno, December 2, 1884.

The Pinos Altos (breeding) series is in worn plumage and not in the best of shape for comparison. However, they show no tendencies toward *rubicundus*.

MITREPHANES PHAEOCERCUS TENUIROSTRIS Brewster

Frazar. 15, Alamos, February 2 to March 8, 1888.
7, Mina Abundancia, April 7 to 21, 1888.
3, Pinos Altos, June 6 to 20, 1888.
2, Bravo, August 1, 1888.
1, Jesus Maria, August 20, 1888.
Cahoon. 1, Oposura, June 7, 1887.

The Oposura specimen (female no. 214,150) is the type of the race.

MYIOCHANES VIRENS RICHARDSONII (Swainson)

Frazar. 1, Hacienda de San Rafael, May 7, 1888.
Cahoon. 8, Oposura, May 18 to June 16, 1887.

All of these specimens are of the smaller, paler race which breeds in Sonora and Chihuahua, and north, in the Sonoran Zones, into southern Arizona. The breeding birds recorded by Thayer and Bangs from La Chumata (Proc. Biol. Soc. Wash., 1906, 19) are also of this race. In characters the breeding race of northwestern Mexico is closer to *virens* than to *richardsonii;*—at any rate it forms a good connecting link between the two. It will probably bear the name of *veliei* Coues, but I have not yet seen the type of *veliei* and hesitate to use the name at this time.

MYIOCHANES PERTINAX PALLIDIVENTRIS (Chapman)

Frazar. 13, Alamos, February 14 to March 28, 1888.
8, Mina Abundancia, April 9 to 27, 1888.
5, Pinos Altos, June 9 to 30, 1888.
1, Bravo, July 18, 1888.
Cahoon. 2, Oposura, May 23 and 31, 1887.
McLeod. 1, Jesus Maria, May 15, 1884.
1, Durazno, January 18, 1885.

No intergradation with *pertinax* is apparent in any of these specimens.

NUTTALLORNIS BOREALIS BOREALIS (Swainson)

McLeod. 1, Jesus Maria, May 30, 1884.

PYROCEPHALUS RUBINUS FLAMMEUS van Rossem

Frazar. 2, Guaymas, January 13 and 19, 1887.
18, Alamos, February 2 to March 28, 1888.
Cahoon. 2, Fronteriza, March 14, 1887.
22, Nacozari, March 18 to 28, 1887,
McLeod. 1, Carmen, May 16, 1885.

CAMPTOSTOMA IMBERBE RIDGWAYI Brewster

Frazar. 10, Alamos, February 6 to March 28, 1888.
1, Hacienda de San Rafael, May 15, 1888.

I can only reiterate that *ridgwayi* is a recognizable race, and the specimens examined since 1930 have only served to confirm the characters then given, namely larger size and particularly the larger bill. Texas and Tamaulipas specimens are almost as large as *ridgwayi* but possess the smaller bill of *imberbe*, and also have the dark color phase common to *imberbe* from all parts of its range and which *ridgwayi* lacks. Mr. Ludlow Griscom (Ornithology of Guerrero) has recently admitted the existence of two races of this species, but believes that it is the southern race which should be named as distinct from typical *imberbe*. Sclater's type came from San Andreas Tuxtla in *southern* Vera Cruz. Therefore, there is no necessity for coining a new name, even if northern Vera Cruz specimens were, for the sake of argument, referable to the Sonora-Arizona race.

ALAUDIDAE

OTOCORIS ALPESTRIS ADUSTA Dwight

OTOCORIS ALPESTRIS LEUCOLAEMA (Coues)

OTOCORIS ALPESTRIS OCCIDENTALIS McCall

Frazar. 75, Chihuahua, September 28 to December 3, 1888.

This fall and winter series contains typical examples of all three of the above races, but many are intergrades which I do not attempt to classify arbitrarily. However, the resident *adusta* is the most numerous, for about half of the series is of that race. The other two appear to be about equally divided.

HIRUNDINIDAE

Tachycineta thalassina lepida Mearns

Frazar. 2, Pinos Altos, June 8 and July 14, 1888.
1, Jesus Maria, September 4, 1888.
Cahoon. 5, Oposura, April 11 and 15; May 26, 1887.
1, Nacozari, March 22, 1887.

A series from the mountains of southern Sonora and southern Chihuahua should prove interesting. One of the Pinos Altos birds and the single specimen from Jesus Maria are adult. These appear to be *lepida*, as are, certainly, three of those from Oposura. Two females from Oposura (April 11 and 15) are small, and if they represent the breeding birds of the valley are probably intergrades toward *brachyptera*, which is the breeding form at Guaymas.

Stelgidopteryx ruficollis serripennis (Audubon)

Frazar. 4, Hacienda de San Rafael, May 5 to 10, 1888.
1, Alamos, February 23, 1888.
Cahoon. 3, Oposura, April 11 to 15, 1887.

Number 221,956, an adult male from Oposura, April 15, is the type of *Stelgidopteryx ruficollis psammochrous* Griscom. It is doubtful if any of these specimens, other than those from San Rafael, are breeding birds, for the species does not begin to nest about Guaymas until about May 1. At any rate, while appreciating the characters shown by the above listed series, I cannot distinguish freshly taken material from central and southern Sonora from western United States series. Oberholser (Sci. Pub. Cleveland Mus. Nat. Hist., 4, No. 1, Sept. 19, 1932), has recently advocated using the name *psammochrous* for the rough-winged swallows of southern Arizona. Our own (adequate) material from southern Arizona does not appear to differ in the least from typical *serripennis*.

Hirundo rustica erythrogaster Boddaert

Frazar. 1, Pinos Altos, June 22, 1888.

Petrochelidon albifrons melanogaster (Swainson)

Cahoon. 2, Granados, May 6, 1887.

Whether these are breeding birds or migrants I do not know.

CORVIDAE

Cyanocitta stelleri diademata (Bonaparte)

Frazar. 4, Alamos, March 6 to 14, 1888.
16, Mina Abundancia, April 18 to 27, 1888.
16, Pinos Altos, June 5 to July 6, 1888.
2, Jesus Maria, August 21 and 27, 1888.

This series averages about 20 millimeters shorter in wing length than do New Mexico and Colorado birds, and in addition are darker throughout, with the dark color of the pectoral region extending well down onto the chest. Ridgway long ago noted the differences between United States and Mexican specimens of this jay, but he had very limited material and therefore preferred to lump everything under one name.

Cyanocitta stelleri macrolopha Baird

Cahoon. 1, Nacozari, March 19, 1887.
15, Oposura, May 20 to June 14, 1887.

These specimens are not distinguishable from southern Rocky Mountain specimens in color. Like southern Arizona birds they are intermediate in size between *diademata* and *macrolopha*. In this latter respect a long series of males from the Santa Rita, Huachuca and Chiricahua ranges averages only 145.5 in wing length, as compared with an average of 153 for Colorado and New Mexico males and 142.5 for the southern Sonora — Chihuahua males of *diademata*. In this, as in the cases of several other mountain species, the low ground along east-west course of the Yaqui River at about latitude 29 degrees is the barrier which separates two subspecies.

Aphelocoma sieberii wollweberi Kaup

Frazar. 13, Mina Abundancia, April 9 to 25, 1888.
10, Bravo, July 18 to August 7, 1888.
McLeod. 1, Carmen, November 17, 1884.
1, Jesus Maria, May 2, 1884.

The race *wollweberi* is well represented by this series. These birds are smaller than *arizonae;* are slightly bluer above, and have the pectoral area darker and in more contrast with the pale throat and median under parts.

APHELOCOMA SIEBERII ARIZONAE Ridgway

Cahoon. 2, Nacozari, March 28, 1887.
2, Oposura, May 8 and June 8, 1887.

These specimens appear to be indistinguishable from Arizona series.

CISSILOPHA BEECHEII (Vigors)

Frazar. 18, Alamos, February 2 to March 29, 1888.

CALLOCITTA COLLIEI (Vigors)

Frazar. 20, Alamos, February 2 to March 30, 1888.
McLeod. 1, Carmen, August 8, 1884.

CORVUS IMPARATUS Peters

Frazar. 6, Alamos, February 16 to March 14, 1888.

CORVUS CRYPTOLEUCUS Couch

Frazar. 1, Chihuahua, October 12, 1888.

CORVUS CORAX SINUATUS Wagler

Frazar. 4, Guaymas, January 15 and 19, 1887.
Cahoon. 1, Oposura, June 3, 1887.

PARIDAE

PENTHESTES SCLATERI SCLATERI (Kleinschmidt)

Frazar. 17, Pinos Altos, June 6 to July 14, 1888.
9, Jesus Maria, August 27 to September 13, 1888.

While occasional specimens approach the northern race, *oidos* Peters, the series as a whole is referable only to *sclateri*.

BAEOLOPHUS WOLLWEBERI ANNEXUS (Cassin)

Frazar. 7, Mina Abundancia, April 7 to 18, 1888.
1, Hacienda de San Rafael, May 17, 1888.
14, Bravo, July 18 to 30, 1888.
Cahoon. 5, Oposura, June 6 to 14, 1887.
McLeod. 1, Carmen, November 18, 1884.

The analogy of many other species would lead one to suspect that the Frazar series would be *wollweberi*, but such seems not to be the

case. However, most of the specimens are badly worn and moreover may have bleached somewhat. Freshly taken series might tell a different story.

Auriparus flaviceps ornatus (Lawrence)

Frazar. 4, Chihuahua, September 29 to December 15, 1888.

Auriparus flaviceps fraterculus van Rossem

Frazar. 3, Guaymas, January 14 to 19, 1887.
3, Alamos, February 14 and 18; March 26, 1888.
Cahoon. 3, Oposura, April 5 and 28, 1887.
2, Nacozari, March 22 and 31, 1887.
1, Granados, May 5, 1887.

The two Nacozari specimens are intermediate toward *ornatus*. Those from Oposura and Granados are just as small and as brightly colored as *fraterculus* from southern points and the range of *fraterculus* thus extends north in the Moctezuma and Bavispe River valleys at least to these points. However, this distribution is in accord with the geographic behavior of several other Alamos subspecies.

Psaltriparus minimus plumbeus (Baird)

Cahoon. 10, Oposura, April 28 to June 4, 1887.

Possibly this series has become browner through post-mortem color change. Fresh material is necessary in order to determine the status of the bush tits of northeastern and east central Sonora. Under present circumstances the Oposura series cannot possibly be called *cecaumenorum*, the pale gray race of the mountains of the central part of the state. The bush tits of the *plumbeus* group of subspecies are much in need of revision. For instance, I cannot distinguish southern Nevada specimens from the type series of *cecaumenorum*, but material from intervening desert ranges would have to be studied before assigning southern Nevada birds to that race.

Psaltriparus melanotis lloydi Sennett

Frazar. 15, Pinos Altos, June 5 to 30, 1888.
6, Bravo, August 2 to 8, 1888.
22, Jesus Maria, August 20 to September 13, 1888.

I cannot distinguish this series from seasonably comparable Texas specimens.

SITTIDAE

Sitta carolinensis mexicana Nelson and Palmer

Frazar. 6, Mina Abundancia, April 7 to 25, 1888.
9, Pinos Altos, June 6 to 30, 1888.
8, Bravo, August 1 to 9, 1888.
McLeod. 1, Carmen, November 18, 1884.

These specimens are intermediate, but certainly closer to *mexicana* than to *nelsoni*.

Sitta carolinensis nelsoni Mearns

Cahoon. 4, Oposura, May 28 to June 7, 1887.

Sitta pygmaea chihuahuae van Rossem

Frazar. 12, Pinos Altos, June 5 to July 13, 1888.
3, Bravo, July 26 to 31, 1888.
2, Jesus Maria, September 1, 1888.

CERTHIIDAE

Certhia familiaris albescens Berlepsch

Frazar. 12, Mina Abundancia, April 9 to 25, 1888.
9, Pinos Altos, June 4 to July 6, 1888.
7, Bravo, July 19 to August 2, 1888.
2, Jesus Maria, August 25 and September 8, 1888.
Cahoon. 4, Oposura, May 20 to June 14, 1887.

CINCLIDAE

Cinclus mexicanus mexicanus Swainson

Frazar. 2, Pinos Altos, July 2 and 6, 1888.
11, Jesus Maria, August 20 to September 12, 1888.
McLeod. 1, Jesus Maria, April 16, 1884.

TROGLODYTIDAE

Troglodytes domesticus parkmanii Audubon

Frazar. 2, Alamos, February 4 and March 10, 1888.
3, Mina Abundancia, April 7 to 20, 1888.
Cahoon. 1, Nacozari, March 28, 1887.
2, Oposura, April 4 and 14, 1887.
McLeod. 1, Carmen, November 20, 1884.

TROGLODYTES BRUNNEICOLLIS CAHOONI Brewster

Frazar. 38, Pinos Altos, June 4 to July 14, 1888.
8, Bravo, July 19 to August 10, 1888.
3, Jesus Maria, August 29 and 31, 1888.
Cahoon. 6, Oposura, April 4 to June 13, 1887.

Two of the Oposura specimens (214,132–3) are the cotypes of this pallid, northern extreme of the species.

THRYOMANES BEWICKII EREMOPHILUS Oberholser

Frazar. 16, Chihuahua, October 8 to December 12, 1888.
Cahoon. 3, Oposura, May 24; June 4 and 8, 1887.

PHEUGOPEDIUS SINALOA CINEREUS (Brewster)

Frazar. 3, Alamos, February 20; March 6 and 30, 1888.
19, Hacienda de San Rafael, May 2 to 19, 1888.
McLeod. 1, Durazno, July 8, 1886.

Two of the Alamos specimens (214,385 and 214,386) are the cotypes of this subspecies.

HELEODYTES BRUNNEICAPILLUS BRUNNEICAPILLUS (Lafresnaye)

Frazar. 9, Guaymas, January 14 to 19, 1887.
11, Alamos, February 18 to March 22, 1888.
Cahoon. 3, Nacozari, March 21 to 28, 1887.
6, Oposura, April 6 to June 17, 1887.

The Oposura specimens are apparently typical *brunneicapillus*. While material is still lacking to plot the ranges of this and the next race in their entirety, it is evident that in this case, as in many others, the Alamos Faunal Area subspecies extends up the tributaries of the Yaqui River to points far north of its northern limits coastwise and in the central interior.

HELEODYTES BRUNNEICAPILLUS COUESI (Sharpe)

Frazar. 21, Chihuahua, October 1 to December 15, 1888.

HELEODYTES CAPISTRATUS GULARIS (Sclater)

Frazar. 15, Mina Abundancia, April 7 to 27, 1888.
1, Bravo, July 27, 1888.
McLeod. 1, Carmen, June 12, 1885.

While there would seem to be every reason for the presence of a distinct northern race, I cannot see that Sonora, Chihuahua, and Sinaloa

specimens differ in any way from *gularis* of southwestern Mexico. Therefore I follow Ridgway in considering *Heleodytes stridulus* Nelson to be a synonym of *gularis*. Sclater's type of *Campylorhynchus gularis* was obtained by Floresi, and therefore Bolaños, Jalisco, is the most probable type locality. I have examined the type as well as many specimens from northwestern, middlewestern and southwestern Mexico in the British Museum, and am, as above stated, unable to perceive any variation north of Jalisco which is not individual in character.

I agree with Griscom that far too many species of cactus wrens are currently recognized and that the great majority are really races of a comparatively few distinct species. There is no doubt that *humilis*, *jocosus*, *narinosus*, and *rufinucha* are simply races of *capistratus*. Griscom has already shown the manner in which *rufinucha* and *capistratus* intergrade through the connecting race *xerophilus*, and the great series in the British Museum shows the transition from *gularis* to *jocosus* in the Sierra Nayarit in northwestern Jalisco. Bolaños, in northeastern Jalisco is at or very near the extreme southern limit of the range of *gularis*.

TELMATODYTES PALUSTRIS PLESIUS Oberholser

Frazar. 7, Chihuahua, October 8 to November 13, 1888.
Cahoon. 1, Nacozari, March 23, 1887.

CATHERPES MEXICANUS ALBIFRONS (Giraud)

Frazar. 1, Chihuahua, November 2, 1888.

CATHERPES MEXICANUS CONSPERSUS Ridgway

Cahoon. 2, Oposura, May 23, 1887.

CATHERPES MEXICANUS MEXICANUS (Swainson)

Frazar. 13, Alamos, February 4 to March 28, 1888.
1, Mina Abundancia, April 25, 1888.
10, Hacienda de San Rafael, May 1 to 14, 1888.
2, Pinos Altos, July 13, 1888.
11, Bravo, July 20, 1888.
5, Jesus Maria, August 20 to 25, 1888.
McLeod. 1, Jesus Maria, no date.

I have nothing to add to the diagnosis of the canyon wren situation as outlined by Ridgway in Part 3 of Birds of North and Middle America. For those who wish to recognize the variable intergrades

between *albifrons, conspersus,* and *mexicanus* by name there is the inclusive title of *Catherpes mexicanus polioptilus* Oberholser, but personally I can see nothing to be gained by so doing. The series listed above is similar to *mexicanus* but averages a little smaller,—in other words it is intermediate toward *conspersus* in this respect. Oberholser has recently (1930) described these birds under the name of *Catherpes mexicanus meliphonus,* and has used one of the Frazar specimens from Alamos (now in the U. S. National Museum) as the type.

Salpinctes obsoletus obsoletus (Say)

Frazar. 2, Guaymas, January 14 and 17, 1887.
3, Alamos, February 9 and March 26, 1888.
6, Pinos Altos, June 4 to 23, 1888.
1, Bravo, July 31, 1888.
6, Chihuahua, October 4 to December 15, 1888.
Cahoon. 1, Miller's Ranch, January 31, 1887.
2, Nacozari, March 20 and 23, 1887.
McLeod. 1, Carmen, March 17, 1885.
1, Jesus Maria, March 18, 1885.

None of these specimens are distinguishable from United States specimens of *obsoletus* in comparable plumage. Ridgway has recorded "*notius*" [=*latisfasciatus*] from southern Sonora, but on what basis I do not know. Griscom (1932) has recently expressed doubts that the Mexican plateau birds are separable from *obsoletus,*—an opinion with which I thoroughly agree.

MIMIDAE

Mimus polyglottos leucopterus (Vigors)

Frazar. 1, Guaymas, January 14, 1887.
4, Alamos, February 10 to March 22, 1888.
2, Chihuahua, November 27 and December 8, 1888.
Cahoon. 2, Nacozari, March 24 and 28, 1888.

Melanotis caerulescens effuticius Bangs and Penard

Frazar. 4, Alamos, February 16 to March 14, 1888.
10, Hacienda de San Rafael, May 3 to 19, 1888.
1, Jesus Maria, September 12, 1888.
McLeod. 2, Jesus Maria, April 24 and May 13, 1884.
1, La Trompa, January 23, 1885.

Number 220,386, from San Rafael, is the type of this subspecies.

TOXOSTOMA BENDIREI (Coues)

Frazar 3, Guaymas, January 14 to 19, 1887.
1, Alamos, February 6, 1888.

TOXOSTOMA CURVIROSTRE CURVIROSTRE (Swainson)

Frazar. 31, Chihuahua, October 1 to December 15, 1888.
Cahoon. 4, Nacozari, March 21 to 26, 1887.
McLeod. 4, Durazno, October 12 to December 24, 1884.
1, Carmen, October 16, 1884.

TOXOSTOMA CURVIROSTRE MACULATUM Nelson

Frazar. 47, Alamos, February 3 to March 28, 1888.
1, Mina Abundancia, April 13, 1888.
Cahoon. 3, Oposura, April 28 and 29, 1887.

TOXOSTOMA CURVIROSTRE PALMERI (Coues)

Frazar. 5, Guaymas, January 13 to 19, 1887.
Cahoon. 1, Bacuachi, February 8, 1887.

The difficulties of identifying small series of this species from points in central and central eastern Sonora are many, for it is in this region that three races meet. I confess to having identified some of the specimens arbitrarily and that fresh material may make re-identification necessary.

OREOSCOPTES MONTANUS (Townsend)

Frazar. 3, Chihuahua, October 5 and 10, 1888.

TURDIDAE

TURDUS MIGRATORIUS PROPINQUUS Ridgway

Frazar. 1, Alamos, March 8, 1888.
5, Mina Abundancia, April 9 to 21, 1888.
1, Hacienda de San Rafael, May 2, 1888.
7, Pinos Altos, June 6 to July 7, 1888.
1, Jesus Maria, August 24, 1888.
Cahoon. 1, Oposura, May 31, 1887.

These robins, most of which are breeding birds, are paler and more orange red ventrally and are slightly paler and grayer dorsally than the average of *propinquus*. However, I am able to match them very

closely with breeding birds from various points in the western United States, and until more material is examined I should not venture to separate them.

Turdus assimilis renominatus Miller and Griscom

Frazar. 2, Hacienda de San Rafael, May 1, 1888.

These two specimens are almost certainly an undescribed subspecies. They are very much paler and grayer than typical *renominatus*, but this may be either the effect of Frazar's preservative or of post-mortem color change. They will have to be checked against freshly collected material.

Turdus rufopalliatus grisior subsp. nov.

Frazar. 4, Alamos, February 6 to March 14, 1888.
1, Hacienda de San Rafael, May 1, 1888.

Type. Male adult, No. 31019, Dickey collection: Guirocoba, Sonora, Mexico, May 25, 1930; collected by J. T. Wright, original number 5773.

Subspecific characters. Differs from *Turdus rufopalliatus rufopalliatus* of southwestern Mexico in paler red chest and flanks, and in having a gray wash over the pectoral region; white of under parts more extensive; sex differences much less pronounced.

Range. Southern Sonora, south to southern Sinaloa.

Remarks. Lafresnaye's type of *Turdus rufopalliatus* is in the collection of the Museum of Comparative Zoölogy. It was originally labelled as from "baye de Monterey, Californie", but this error was corrected by Bangs and Penard, who designated Acapulco, Guerrero, as the type locality. The bird is an adult male by plumage (though not so marked), and is typical of the darker, more richly-colored, southern race.

In typical *rufopalliatus* the sex differences are pronounced, the males being much darker and more richly colored than the females. In *grisior* the sexes are nearly alike, though females average grayer than males. Female *rufopalliatus* is much like the male of *grisior*, though even in this comparison the northern race is slightly paler and is grayer on the chest.

Specimens of *rufopalliatus* have been examined from Tehuantepec; Plains of Colima; Acapulco and Egidio Nuevo, Guerrero; Manzanillo, Jalisco; and Piaxtla, Puebla. In typical form, *grisior* has been seen only from southern Sonora. Mazatlan specimens (3) are intermediate,

though closer to *grisior:* Escuinapa, Sinaloa and Nayarit specimens (series) are also intermediate, some birds resembling one race and some the other. In fact there is apparently a very wide zone of intergradation in northern Jalisco, Nayarit, and southern Sinaloa, a circumstance which once led me to infer that Sonora birds were *rufopalliatus.*

In addition to the Frazar specimens which, it may be noted, seem to have undergone little if any post-mortem color change, I have seen 4 from Chinobampo and Guirocoba in the Dickey collection, and 4 from Alamos in the British Museum.

HYLOCICHLA GUTTATA GUTTATA (Pallas)

Frazar. 3, Alamos, February 7 and 11; March 8, 1888.
Cahoon. 2, Nacozari, March 28 and 29, 1887.

HYLOCICHLA GUTTATA SLEVINI Grinnell

Frazar. 3, Alamos, February 3 and 23; March 1, 1888.

HYLOCICHLA GUTTATA SEQUOIENSIS (Belding)

Frazar. 4, Alamos, February 4 to March 13, 1888.

HYLOCICHLA GUTTATA POLIONOTA Grinnell

Frazar. 1, Mina Abundancia, April 11, 1888.
McLeod. 1, Jesus Maria, April 19, 1884.

HYLOCICHLA GUTTATA AUDUBONI (Baird)

Frazar. 4, Mina Abundancia, April 11 to 20, 1888.

HYLOCICHLA USTULATA USTULATA (Nuttall)

Frazar. 8, Hacienda de San Rafael, May 3 to 19, 1888.
1, Mina Abundancia, April 20, 1888.
Cahoon. 2, Oposura, May 18 and 24, 1887.

CATHARUS MELPOMENE CLARUS Jouy

Frazar. 4, Bravo, July 21 to August 10, 1888.
1, Jesus Maria, August 25, 1888.

Three of the four Bravo birds are juveniles. The two adults from Bravo and Jesus Maria, respectively, are paler and grayer than typical *clarus.* They probably represent an undescribed subspecies, but further material is necessary for final decision.

Catharus occidentalis olivascens Nelson

Frazar. 6, Pinos Altos, June 4 to July 10, 1888.
26, Jesus Maria, August 20 to September 8, 1888.

A splendid series of this well marked race, containing many juveniles in various stages of growth.

Sialia sialis fulva Brewster

Frazar. 17, Mina Abundancia, April 16 to 30, 1888.
1, Bravo, July 27, 1888.
McLeod. 1, Jesus Maria, April, 1884.
3, Durazno, December 20 and 21, 1884.

Sialia mexicana bairdi Ridgway

Frazar. 11, Alamos, February 8 to March 27, 1888.
20, Pinos Altos, June 5 to July 20, 1888.
2, Bravo, July 27, 1888.
3, Chihuahua, December 4, 1888.

Sialia currucoides (Bechstein)

Frazar. 3, Alamos, February 8, 1888.
Cahoon. 1, Bacuachi, February 8, 1887.

Myadestes obscurus cinereus Nelson

Frazar. 8, Alamos, February 20 to March 21, 1888.
1, Mina Abundancia, April 16, 1888.
2, Hacienda de San Rafael, May 2 and 15, 1888.
5, Bravo, July 23 to August 4, 1888.
7, Jesus Maria, August 20 to September 13, 1888.
McLeod. 2, Carmen, November 29, 1884.
1, Durazno, December 1, 1884.

Myadestes townsendi (Audubon)

Frazar. 6, Pinos Altos, June 6 to July 13, 1888.

SYLVIIDAE

Polioptila caerulea amoenissima Grinnell

Frazar. 4, Guaymas, January 13 to 18, 1887.
1, Alamos, March 12, 1888.
1, Mina Abundancia, April 9, 1888.
Cahoon. 1, Nacozari, March 23, 1887.
4, Oposura, April 5 to May 28, 1887.
McLeod. 1, Carmen, November 14, 1884.

Polioptila nigriceps restricta Brewster

Frazar. 9, Alamos, February 3 to March 20, 1888.

One of this series (214,384) is the type of *restricta*.

Polioptila melanura melanura Lawrence

Frazar. 6, Chihuahua, October 26 to December 8, 1888.

Polioptila melanura lucida van Rossem

Frazar. 4, Guaymas, January 13 and 14, 1887.
Cahoon. 4, Oposura, April 7 to 28, 1887.

Corthylio calendula calendula (Linnaeus)

Frazar. 1, Chihuahua, November 16, 1888.
Cahoon. 2, Nacozari, March 21, 1887.
McLeod. 1, Carmen, November 24, 1884.

Corthylio calendula cineraceus (Grinnell)

Frazar. 4, Alamos, February 2 to March 27, 1888.
1, Mina Abundancia, April 13, 1888.
7, Chihuahua, October 26 to December 15, 1888.

MOTACILLIDAE

Anthus spinoletta rubescens (Tunstall)

Frazar. 1, Alamos, March 23, 1888.
9, Chihuahua, October 9 to November 5, 1888.
Cahoon. 4, Oposura, April 15, 1887.
1, Granados, May 6, 1887.

BOMBYCILLIDAE

Bombycilla cedrorum Vieillot

Frazar. 1, Hacienda de San Rafael, May 18, 1888.
Cahoon. 1, Oposura, April 28, 1887.

PTILOGONATIDAE

Phainopepla nitens lepida Van Tyne

Cahoon. 1, Ranken's Ranch, February 1, 1887.
2, Cumpas, February 3 and 4, 1887.
5, Nacozari, March 24 to 29, 1887.
2, Oposura, April 12 and 30, 1887.

LANIIDAE

Lanius ludovicianus excubitorides Swainson

Frazar. 22, Chihuahua, October 28 to December 15, 1888.

Lanius ludovicianus migrans Palmer

Frazar. 1, Chihuahua, November 12, 1888.

Lanius ludovicianus sonoriensis Miller

Frazar. 1, Guaymas, January 13, 1887.
1, Alamos, February 8, 1888.
Cahoon. 1, Bacuachi, February 8, 1887.

Lanius ludovicianus gambeli Ridgway

Frazar. 2, Alamos, February 10, 1888.
Cahoon. 1, Oposura, April 9, 1887.
McLeod. 1, Durazno, December 18, 1884.
1, Moris, January 12, 1885.

VIREONIDAE

Vireo huttoni stephensi Brewster

Frazar. 2, Mina Abundancia, April 17 and 18, 1888.
3, Pinos Altos, June 11; July 13 and 16, 1888.
10, Bravo, July 18 to August 4, 1888.
7, Jesus Maria, August 25 to September 12, 1888.
Cahoon. 2, Oposura, June 14, 1887.
McLeod. 1, Carmen, November 15, 1884.

Vireo hypochryseus nitidus subsp. nov.

Type. Male adult, No. 221,901, Museum of Comparative Zoölogy; Hacienda de San Rafael, "Chihuahua" [=Sonora], May 2, 1888; collected by M. Abbott Frazar.

Subspecific characters. Similar to *Vireo hypochryseus hypochryseus* of southwestern Mexico, but brighter and more purely yellow below, and with the greenish wash on the sides much reduced or lacking altogether.

Range. Known only from southern Sonora. (7, Hacienda de San Rafael, May 2 to 10, 1888).

Remarks. Sclater's type of *Vireo hypochryseus* came, via Parzudaki of Paris, from an unknown locality in Mexico. It is now in the British

Museum, where I examined it in September, 1933. It is a decidedly unusual specimen and almost certainly does not represent the race of southern Sinaloa south to Guerrero, and which is currently called *hypochryseus*. The measurements (wing 62; tail 53) are small, and at about the minimum for the species, but the color is as dark above as the dark extreme of *Vireo hypochryseus sordidus* Nelson of the Tres Marias Islands. Below it is brighter than *sordidus*, but is heavily washed with green laterally. Until the range of the typical race can be defined it seems better to call the southwestern birds *hypochryseus*, for there is always the possibility that the type is an aberrant individual.

Specimens which are tentatively called *hypochryseus* have been examined from as far north as Plomosas, southern Sinaloa (4), and from Jalisco (3), Morelos (4), Guerrero (10), and Michoacan (2).

Vireo bellii arizonae Ridgway

Frazar. 1, Alamos, February 20, 1888.
Cahoon. 3, Oposura, April 21 and May 12, 1887.

Vireo vicinior Coues

Frazar. 2, Guaymas, January 19, 1887.

Vireo solitarius cassinii Xantus

Frazar. 6, Alamos, February 13 to March 29, 1888.
4, Mina Abundancia, April 11 to 18, 1888.
1, Bravo, August 2, 1888.
7, Jesus Maria, August 27 to September 4, 1888.
Cahoon. 2, Nacozari, March 25 and 29, 1887.
6, Oposura, April 18 to May 28, 1887.
McLeod. 1, Jesus Maria, April 16, 1884.
1, Durazno, September 7, 1884.
1, Carmen, November 18, 1884.

In addition to the above, there is a Cahoon specimen taken at Oposura on May 30, 1887, in the British Museum, which bears no Brewster number and which was probably exchanged before the collection was catalogued.

I cannot understand the occurrence of *cassinii* at Oposura at dates so late as May 28 and 30. These specimens have every appearance of being breeding birds, but that there is an isolated colony of *cassinii* in that vicinity is well nigh unbelievable. At the same time there is

the analogy of one race of the black-headed grosbeak breeding in the foothill zones of Sonora while another occupies the higher mountains. It *may* be, therefore, that *cassinii* breeds in the foothills.

Vireo solitarius plumbeus Coues

Frazar. 4, Alamos, February 16 to March 16, 1888.
Cahoon. 1, Nacozari, March 24, 1887.

These birds are, of course, winter visitants and migrants.

Vireo solitarius pinicolus subsp. nov.

Frazar. 3, Mina Abundancia, April 13 and 23, 1888.
7, Pinos Altos, June 8 to July 13, 1888.
4, Bravo, July 27 to August 10, 1888.
1, Jesus Maria, September 1, 1888.

Type. Male adult, No. 115724, M.C.Z. collection; altitude 8000 feet, Mound Valley, Chihuahua, September 2, 1905; collected by W. W. Brown, Jr.

Subspecific characters. Largest of the known races of *Vireo solitarius.* Intermediate in coloration between *cassinii* of western United States and *plumbeus* of the southern Rocky Mountains.

Range. Mountains of southern Sonora and southwestern Chihuahua.

Remarks. Good series of solitary vireos from the Huachuca, Chiricahua, and Santa Rita ranges are slightly intermediate in size or color or both, between *plumbeus* and *pinicolus* but certainly average closer to *plumbeus.* Two specimens from Pacheco in northwestern Chihuahua are apparently just halfway in characters between the two races.

Measurements of males and females do not differ to any appreciable extent. However, the following averages are all taken from males.

	Wing	Tail
12 *plumbeus* from east central Arizona	77.3	57.1
27 *plumbeus* from southern Arizona	79.4	58.0
13 *pinicolus* from Sonora and Chihuahua	83.1	59.0

Vireo olivaceus flavoviridis (Cassin)

Cahoon. 1, Oposura, June 6, 1887.

Vireo gilvus swainsonii Baird

Frazar. 6, Alamos, February 9 to March 20, 1888.
Cahoon. 1, Nacozari, March 23, 1887.
15, Oposura, April 15 to June 11, 1887.

Some, at least, of the Oposura specimens are breeding birds. Whether these came from the high mountains or from lower levels is unknown. At any rate they show no tendencies toward *brewsteri* of the mountains to the southward.

Vireo gilvus brewsteri Ridgway

Frazar. 4, Mina Abundancia, April 9 to 27, 1888.
11, Bravo, July 18 to August 10, 1888.

Number 221,811 from Bravo is the type of this race. I have nothing to add to the diagnosis of Ridgway (1904), save that the Bravo series is in very worn plumage, and that less abraded specimens would undoubtedly give an average considerably larger than the figures provided by the type series.

COMPSOTHLYPIDAE

Mniotilta varia (Linnaeus)

Frazar. 1, Chihuahua, September 29, 1888.
McLeod. 1, Carmen, November 4, 1884.

Vermivora celata celata (Say)

Frazar. 2, Alamos, March 10 and 16, 1888.
2, Chihuahua, October 26 and December 8, 1888.
Cahoon. 5, Oposura, April 7 to 22, 1887.

Vermivora celata orestera Oberholser

Frazar. 1, Jesus Maria, September 8, 1888.
1, Chihuahua, October 20, 1888.
Cahoon. 5, Oposura, April 8 to 29, 1887.
1, Nacozari, March 29, 1887.
1, Granados, May 6, 1887.

Vermivora celata lutescens (Ridgway)

Frazar. 2, Guaymas, January 18, 1887.
3, Alamos, February 29 and March 29, 1888.
1, Jesus Maria, August 28, 1888.
Cahoon. 3, Oposura, April 12 and 16, 1887.
1, Nacozari, March 30, 1887.

Vermivora ruficapilla ridgwayi van Rossem

Frazar. 8, Alamos, March 10 to 29, 1888.
Cahoon. 2, Nacozari, March 21 and 24, 1887.
9, Oposura, April 9 to May 13, 1887.

Vermivora virginiae (Baird)

Cahoon. 4, Oposura, April 12; May 9 and 10, 1887.

Vermivora luciae (Cooper)

Frazar. 11, Alamos, March 10 to 29, 1888.
Cahoon. 1, Nacozari, March 26, 1887.
2, Oposura, May 9 and June 18, 1887.

Vermivora superciliosa mexicana (Cabanis)

Frazar. 1, Mina Abundancia, April 9, 1888.
22, Pinos Altos, June 4 to July 13, 1888.
10, Bravo, July 19 to August 10, 1888.
13, Jesus Maria, August 20 to September 12, 1888.
McLeod. 1, Jesus Maria, June 21, 1884.

Mexican birds constitute a well marked race which differs from typical *superciliosa* of Guatemala in being paler throughout; the yellow of the under parts more restricted and more lemon (less golden) in hue; flanks and sides pale gray instead of brownish gray.

The two specimens upon which Lichtenstein founded his *nomen nudum* of *Sylvia mexicana*, which, in turn, was the sole basis of Cabanis' *Compsothlypis mexicana*, are in the Berlin Museum. They are mounted birds, marked as male (4443) and female (4444), respectively, and were both taken at Reál Arriba (Puebla) by Ferdinand Deppe.

Comparison of good series of *mexicana* from central and eastern Mexico with the Brewster series listed above, discloses certain differences which might entitle the latter to a name. The Sonora-Chihuahua series averages grayer and paler and has a slightly larger bill. Unfortunately very few of the specimens in the two series are in seasonally comparable plumage, and the color differences noted may be chiefly seasonal in nature. The bill difference alone is hardly sufficient to justify a name.

COMPSOTHLYPIS PITIAYUMI PULCHRA Brewster

Frazar. 1, Mina Abundancia, April 20, 1888.
29, Hacienda de San Rafael, May 1 to 19, 1888.

Male number 214,379 and female number 214,380, are the cotypes of this subspecies.

PEUCEDRAMUS OLIVACEUS ARIZONAE Miller and Griscom

Frazar. 3, Mina Abundancia, April 18 and 23, 1888.
16, Pinos Altos, June 6 to July 18, 1888.
1, Bravo, August 10, 1888.

This series averages slightly more deeply colored than Arizona specimens which, presumably, indicates a tendency toward *jaliscensis*. The several races of the olive warbler are easily distinguishable by the characters given by Miller and Griscom in their review of the species in the American Museum Novitates, No. 183, 1925.

DENDROICA AESTIVA RUBIGINOSA (Pallas)

Frazar. 1, Mina Abundancia, April 16, 1888.

DENDROICA AESTIVA MORCOMI Coale

Frazar. 1, Jesus Maria, August 28, 1888.
Cahoon. 2, Oposura, April 30 and May 12, 1887.

DENDROICA AESTIVA SONORANA Brewster

Frazar. 1, Alamos, March 28, 1888.
Cahoon. 6, Nacozari, March 21 to 31, 1887.
5, Oposura, April 4 to 28, 1887.

The cotypes of this race, a male, 214,151, and a female, 214,152, are from the Oposura series.

DENDROICA MAGNOLIA (Wilson)

Frazar. 1, Alamos, February 27, 1888.

The occurrence of eastern species in southern Sonora, such as the redstart, least flycatcher, magnolia warbler and Louisiana water thrush, can doubtfully be called casual. It appears more probable that the region is a wintering ground or migration route of these and perhaps other eastern species.

Dendroica auduboni auduboni (Townsend)

Frazar. 3, Alamos, February 3 and 18; March 26, 1888.
1, Mina Abundancia, April 18, 1888.
2, Chihuahua, October 3 and 16, 1888.
Cahoon. 2, Nacozari, March 24 and 28, 1887.
4, Oposura, April 7 and May 23, 1887.

Dendroica auduboni memorabilis Oberholser

Frazar. 1, Guaymas, January 13, 1887.
2, Alamos, February 9 and March 2, 1888.
2, Chihuahua, November 3 and 16, 1888.
Cahoon. 3, Oposura, April 29; May 21 and 23, 1887.

Dendroica auduboni nigrifrons Brewster

Frazar. 5, Pinos Altos, June 5 to July 13, 1888.

The eotypes are an adult male, an adult female, and a juvenal male, taken respectively June 5, June 5, and July 13, and numbered 214,381, 214,382, and 214,383.

Dendroica nigrescens (Townsend)

Frazar. 5, Alamos, February 14 to March 27, 1888.
6, Mina Abundancia, April 13 to 27, 1888.
2, Bravo, August 7 and 10, 1888.
2, Jesus Maria, August 24 and September 7, 1888.
Cahoon. 1, Nacozari, March 23, 1887.
4, Oposura, April 16 to May 13, 1887.
McLeod. 4, Carmen, November 15 to 23, 1884.

With abundant material from the entire breeding range of the species before me, I am unable to see the slightest reason for recognizing two races of the black-throated gray warbler.

Dendroica townsendi (Townsend)

Frazar. 8, Mina Abundancia, April 11 to 27, 1888.
46, Jesus Maria, August 31 to September 12, 1888.
1, Chihuahua, November 3, 1888.
Cahoon. 1, Oposura, May 31, 1887.
McLeod. 1, Jesus Maria, April 24, 1884.
1, Durazno, November 7, 1884.

DENDROICA OCCIDENTALIS (Townsend)

Frazar. 11, Mina Abundancia, April 9 to 27, 1888.
49, Jesus Maria, August 23 to September 8, 1888.
McLeod. 1, La Trompa, April 21, 1885.

DENDROICA GRACIAE GRACIAE Baird

Frazar. 16, Mina Abundancia, April 11 to 27, 1888.
7, Pinos Altos, June 4 to July 4, 1888.
14, Bravo, July 26 to August 10, 1888.
Cahoon. 2, Oposura, June 14, 1887.

SEIURUS MOTACILLA Vieillot

Frazar. 3, Alamos, February 7; March 8 and 28, 1888.

Four individuals of this species are now known from southern Sonora. The region is probably the regular wintering ground for a certain number of this water-thrush.

OPORORNIS TOLMIEI (Townsend)

Frazar. 5, Alamos, February 7 to March 14, 1888.
1, Mina Abundancia, April 1, 1888.
1, Chihuahua, October 9, 1888.
Cahoon. 1, Nacozari, March 30, 1887.
4, Oposura, April 11 to 28, 1887.
McLeod. 1, Jesus Maria, May 13, 1884.

GEOTHLYPIS TRICHAS OCCIDENTALIS Brewster

Frazar. 1, Guaymas, January 18, 1887.
1, Alamos, February 22, 1888.
1, Hacienda de San Rafael, May 8, 1888.
Cahoon. 3, Nacozari, March 22 to 28, 1887.
3, Oposura, April 6 and 11; May 10, 1887.
1, Granados, May 7, 1887.

These yellowthroats are all winter visitants or migrants and not one can be referred to either of the breeding races, *chrysecola* of the interior, or *modesta* of the southern coastal region.

ICTERIA VIRENS AURICOLLIS (Lichtenstein)

Frazar. 1, Hacienda de San Rafael, May 17, 1888.

CARDELLINA RUBRIFRONS RUBRIFRONS (Giraud)

Frazar. 25, Pinos Altos, June 4 to July 12, 1888.
1, Bravo, July 28, 1888.
29, Jesus Maria, August 20 to September 13, 1888.
McLeod. 1, Jesus Maria, April 22, 1884.

WILSONIA PUSILLA PUSILLA (Wilson)

Cahoon. 5, Oposura, April 28; May 12 to 27, 1887.

These five specimens are typical *pusilla* in every respect. Several borderline cases from the same locality are listed under *pileolata*.

WILSONIA PUSILLA PILEOLATA (Pallas)

Frazar. 1, Alamos, March 28, 1888.
1, Mina Abundancia, April 27, 1888.
7, Jesus Maria, August 22 to September 8, 1888.
1, Chihuahua, October 8, 1888.
Cahoon. 1, Nacozari, March 23, 1887.
9, Oposura, April 22 to June 1, 1887.
McLeod. 1, Jesus Maria, June 5, 1885.

WILSONIA PUSILLA CHRYSEOLA Ridgway

Frazar. 1, Alamos, February 4, 1888.
1, Mina Abundancia, April 20, 1888.
1, Jesus Maria, August 20, 1888.
Cahoon. 1, Nacozari, March 22, 1887.
1, Oposura, April 28, 1887.

SETOPHAGA PICTA PICTA Swainson

Frazar. 2, Alamos, February 27 and March 21, 1888.
18, Mina Abundancia, April 9 to 27, 1888.
2, Pinos Altos, June 6 and July 14, 1888.
20, Bravo, July 18 to August 10, 1888.
2, Jesus Maria, August 20 and September 3, 1888.
Cahoon. 1, Nacozari, March 25, 1887.
18, Oposura, May 20 to June 11, 1887.
McLeod. 3, Durazno, November 8 and December 2, 1884.
1, Carmen, November 10, 1884.

MYIOBORUS MINIATUS MINIATUS (Swainson)

Frazar. 23, Pinos Altos, June 4 to July 20, 1888.
2, Bravo, July 23 and 31, 1888.
20, Jesus Maria, August 20 to September 13, 1888.
McLeod. 2, Jesus Maria, April 22 and 23, 1884.
1, Carmen, November 29, 1884.

EUTHLYPIS LACHRYMOSA Cabanis

Frazar. 29, Hacienda de San Rafael, May 1 to 19, 1888.
1, Bravo, August 1, 1888.

One of the Hacienda de San Rafael specimens (May 10) is the type of *Euthlypis lachrymosa tephra* Ridgway. It is now number 151,906 of the U. S. National Museum.

I am now prepared to acknowledge that I cannot make out enough constant variation to recognize either of the races proposed,—*tephra* Ridgway of northwestern Mexico, or *schistacea* Dickey and van Rossem of western Guatemala and El Salvador. There certainly are strong tendencies toward pallor in specimens from the range of *tephra*, and of slatyness combined with heavier bill in the territory assigned to *schistacea*, and were type series the only specimens to enter the picture there would be ample grounds for the definition of three races. However, individual and sex variation is such that is possible to find good *schistacea* anywhere within the range of the species, and olive-backed birds of the southeastern Mexico type in Guatemala, Nicaragua and El Salvador. Frazar's series has certainly faded and has also become more olive, and bears little resemblance to freshly taken specimens from the same general territory. Again it is emphasized that even freshly taken specimens from the range ascribed to *tephra* average paler and more olive, but with these paler specimens occur individuals which are inseparable from Vera Cruz or Guatemala birds. Females average definitely more olive than males, and a few incorrectly sexed specimens can give a wholly wrong impression of the true state of affairs.

Another complication is that Cabanis' type, a Deppe collected specimen, number 4385 in the Berlin Museum, came from a region of nondescript birds,—from Lagunas, [Oaxaca], on the Pacific side of the Isthmus of Tehuantepec. This region is at the northern edge of the range of "*schistacea*" or the southern edge of the range of "*tephra*." If anyone wishes to recognize by name the three group tendencies, the name *lachrymosa* will apply to one of the Pacific coast races, and the bird of southeastern Mexico must be renamed.

Basileuterus rufifrons caudatus Nelson

Frazar. 2, Alamos, February 27, 1888.
12, Mina Abundancia, April 7 to 25, 1888.
8, Hacienda de San Rafael, May 3 to 18, 1888.
8, Bravo, July 23 to August 10, 1888.
4, Jesus Maria, August 22 to 30, 1888.
Cahoon. 4, Oposura, May 9 to June 18, 1887.
McLeod. 4, Carmen, November 17 and 25, 1884; June 3, 1885.

ICTERIDAE

Sturnella neglecta Audubon

Frazar. 5, Alamos, February 6 to 10, 1888.
19, Chihuahua, October 10 to December 12, 1888.
Cahoon. 1, Cumpas, February 3, 1887.
1, Oposura, April 4, 1887.

Xanthocephalus xanthocephalus (Bonaparte)

Cahoon. 4, Fronteriza, March 13, 1887.
McLeod. 2, Jesus Maria, September 14, 1883.

Agelaius phoeniceus nevadensis Grinnell

Frazar. 1, Alamos, February 4, 1888.
5, Chihuahua, November 6 to December 4, 1888.

Agelaius phoeniceus sonoriensis Ridgway

Cahoon. 5, Oposura, April 4 and 5, 1887.

Icterus wagleri castaneopectus Brewster

Frazar. 16, Alamos, February 2 to March 22, 1888.
1, Mina Abundancia, April 17, 1888.
3, Hacienda de San Rafael, May 7 to 19, 1888.
2, Bravo, July 24, 1888.
Cahoon. 2, Oposura, April 13 and 14, 1887.
McLeod. 2, Carmen, October 11, 1884; May 15, 1885.
4, Durazno, November 6; December 20 and 21, 1884; April, 1885.

The type of this race is a male (214,131) from Oposura.

Icterus cucullatus californicus (Lesson)

Frazar. 4, Alamos, February 2 to March 12, 1888.
Cahoon. 3, Nacozari, March 26 and 31, 1887.
21, Oposura, April 5 to June 17, 1887.

ICTERUS PUSTULATUS MICROSTICTUS Griscom

Frazar. 23, Alamos, February 2 to March 28, 1888.
Cahoon. 2, Oposura, April 6 and 29, 1887.
McLeod. 1, Durazno, December 20, 1884.

ICTERUS PARISORUM Bonaparte

Frazar. 2, Mina Abundancia, April 7 and 23, 1888.
1, Bravo, August 4, 1888.
Cahoon. 1, Nacozari, March 24, 1887.
7, Oposura, May 9 to 28, 1887.
McLeod. 1, Durazno, December 25, 1884.

ICTERUS BULLOCKII BULLOCKII (Swainson)

Cahoon. 8, Nacozari, March 22 to 31, 1887.

EUPHAGUS CYANOCEPHALUS CYANOCEPHALUS (Wagler)

Frazar. 7, Chihuahua, October 15 to December 8, 1888.

CASSIDIX MEXICANUS NELSONI (Ridgway)

Frazar. 6, Alamos, February 23 to March 28, 1888.

CASSIDIX MEXICANUS subsp ?

Frazar. 4, Chihuahua, October 15 to December 8, 1888.

I do not attempt to place, subspecifically, these four anomalous males. They are nearly as large as *mexicanus* but have very small bills, nearly as small as *nelsoni*. Perhaps they are intergrades (though this is not likely), or perhaps they represent an undescribed race. In the absence of females they must, for the time being, remain unnamed.

MOLOTHRUS ATER ATER (Boddaert)

Frazar. 10, Chihuahua, October 12 to December 8, 1888.

MOLOTHRUS ATER OBSCURUS (Gmelin)

Frazar. 3, Hacienda de San Rafael, May 7 and 15, 1888.
Cahoon. 2, Oposura, April 16 and 30, 1887.
1, Granados, May 7, 1887.

TANGAVIUS AENEUS MILLERI van Rossem

Frazar. 2, Hacienda de San Rafael, May 18, 1888.
McLeod. 1, Durazno, May 30, 1885.

THRAUPIDAE

Tanagra elegantissima elegantissima (Bonaparte)

McLeod. 2, La Trompa, May 10, 1885; 1 undated.

Tanagra godmani (Brewster)

Frazar. 2, Alamos, March 16 and 21, 1888.

Piranga ludoviciana (Wilson)

Frazar. 1, Alamos, March 30, 1888.
8, Hacienda de San Rafael, May 3 to 18, 1888.
1, Bravo, August 10, 1888.
1, Chihuahua, September 29, 1888.
Cahoon. 4, Oposura, April 29 to May 9, 1887.
McLeod. 6, Jesus Maria, April 26 to May 15, 1885.

Piranga flava oreophasma Oberholser

Frazar. 11, Alamos, February 20 to March 30, 1888.
9, Mina Abundancia, April 9 to 25, 1888.
4, Pinos Altos, June 13 to July 13, 1888.
9, Bravo, July 18 to August 10, 1888.
1, Jesus Maria, August 31, 1888.
Cahoon. 1, Nacozari, March 25, 1887.
9, Oposura, May 21 to June 8, 1887.
McLeod. 2, Jesus Maria, May 5 and 20, 1884.
2, Carmen, November 21, 1884.
1, Durazno, December 25, 1884.

Piranga bidentata bidentata Swainson

Frazar. 1, Alamos, March 30, 1888.

Piranga rubra cooperi Ridgway

Cahoon. 8, Oposura, April 30 to June 18, 1887.
1, Granados, May 5, 1887.

Piranga erythrocephala candida Griscom

Frazar. 4, Hacienda de San Rafael, May 8 to 15, 1888.
McLeod. 2, La Trompa, January 23, 1885.

Number 222,049, an adult male from Hacienda de San Rafael, May 15, is the type of this subspecies.

FRINGILLIDAE

Richmondena cardinalis affinis (Nelson)

Frazar. 1, Guaymas, January 19, 1887.
6, Alamos, February 9 to March 5, 1888.
Cahoon. 6, Oposura, April 6 to 21, 1887.
4, Nacozari, March 20 to 29, 1887.
2, Cumpas, February 3, 4, or 5, 1887.
McLeod. 1, La Trompa, January 22, 1885.

Pyrrhuloxia sinuata sinuata (Bonaparte)

Frazar. 26, Chihuahua, October 26 to December 15, 1888.

Pyrrhuloxia sinuata fulvescens van Rossem

Frazar. 1, Guaymas, January 17, 1887.
2, Alamos, February 25 and March 7, 1888.
Cahoon. 2, Oposura, April 13, 1887.

Hedymeles melanocephalus melanocephalus (Swainson)

Frazar. 4, Alamos, February 13 to March 27, 1888.
1, Mina Abundancia, April 21, 1888.
6, Pinos Altos, June 5 to 27, 1888.
3, Jesus Maria, August 21, 1888.
Cahoon. 1, Oposura, May 13, 1887.
McLeod. 2, Jesus Maria, May 10 and June 21, 1884.
3, Durazno, December 20 to 27, 1884.

The Oposura specimen may be a migrant through the locality or else is a breeding bird from the mountains near Oposura. Certainly the breeding series from that place is *maculatus*.

Hedymeles melanocephalus maculatus (Audubon)

Frazar. 2, Alamos, March 13 and 20, 1888.
Cahoon. 19, Oposura, April 12 to June 11, 1887.
McLeod. 1, La Trompa, January 25, 1885.

The distribution of the large and small races of the black-headed grosbeak in Sonora presents a problem which is answerable only in part at the present time. Certainly *melanocephalus* is the race which breeds in the higher mountains of eastern Sonora and western Chihuahua, and also at La Chumata, in the Sierra Antonez, in central Sonora. Breeding birds from Saric, (3500 feet) north-central Sonora, are

intermediate though closer to *maculatus*, and the majority of the Oposura specimens recorded above are typical *maculatus*. Series of breeding birds from many localities are necessary before the matter is finally disposed of. In this regard it is desirable again to call attention to the late migration of this species. Specimens taken before May 15 are almost certain to be migrants. In spite of this, the Alamos and Mina Abundancia specimens are still referred to as representing the breeding birds of those localities, and collectively they are called "intermediates." Both races have been taken in the Alamos district as migrants or winter visitants, but just what the breeding birds will prove to be is pure supposition.

Pheucticus chrysopeplus dilutus subsp. nov.

Frazar. 5, Hacienda de San Rafael, May 16 to 19, 1888.
1, Alamos, May 5, 1888 (British Museum).
McLeod. 1, La Trompa, May 10, 1885.

Type. Male adult, No. 223067, M.C.Z. collection; Chihuahua, La Trompa, Mexico, May 10, 1885; collected by R. R. McLeod.

Subspecific characters. Adult males resemble *Pheucticus chrysopeplus chrysopeplus* of southern Sinaloa and southward, but have the concealed sub-basal portions of the rump feathers black as in *Pheucticus chrysopeplus aurantiacus* of Guatemala: back black, flammulated with yellow,—not yellow, flammulated with black as in *chrysopeplus*. Females very much grayer and duller dorsally than the females of *chrysopeplus*, and much more heavily streaked everywhere on the upper parts; flanks with distinct shaft streaks of dusky; yellow of under parts paler and duller.

Range. Southern Sonora, southwestern Chihuahua, and probably northern Sinaloa.

Remarks. Vigors' male type of *Coccothraustes chrysopeplus* is in the British Museum. It is a skin in poor condition and probably at one time was mounted. The plumage is excessively abraded as though the bird had been taken in mid-summer. Of the two tags attached to the skin, the oldest reads, "Type. 55.12.19.19 / Pheucticus chrysopeplus, Vig./ Mexico. Ex Coll Zoöl. Soc." The second tag is a red type tag of the British Museum, on the face of which is written, "Coccothraustes chrysopeplus Vigors / P. Z. S. 1832 p. 4. collected by Hugh / Cummings [sic] in Mexico. Purchased" and continued on the reverse of the label is "at the sale of the Zoölogical Society's / Collection in 1855."

Vigors' original description included a female or young male. This bird seems to have disappeared, but the term "olivaceous yellow" as applied to the back definitely excludes a bird of the *dilutus* type. The male is typical of the southern race, with a yellow back spotted with black. Nothing is known of the actual type locality, but from the fact that Cummings also collected a Douglas Quail at (presumably) the same place, it is probable that either San Blas or Mazatlan was the place where it was taken. I therefore designate San Blas, Nayarit, as a restricted type locality.

In addition to the above specimens, I have seen three from Guirocoba in the Dickey collection, and four from Ysleta in the British Museum.

GUIRACA CAERULEA INTERFUSA Dwight and Griscom

Frazar. 2, Alamos, March 15 and 22, 1888.
1, Hacienda de San Rafael, May 19, 1888.
Cahoon. 2, Oposura, June 16, 1887.

GUIRACA CAERULEA SALICARIUS Grinnell

Frazar. 6, Alamos, February 6 to March 22, 1888.

PASSERINA AMOENA (Say)

Frazar. 6, Alamos, February 2 to March 20, 1888.
1, Mina Abundancia, April 21, 1888.
Cahoon. 1, Nacozari, March 31, 1887.
6, Oposura, April 8 to May 12, 1887.
2, Granados, May 6, 1887.

PASSERINA VERSICOLOR DICKEYAE van Rossem

Frazar. 6, Alamos, February 6 to March 22, 1888.
4, Hacienda de San Rafael, May 4 to 11, 1888.
1, Bravo, July 30, 1888.
Cahoon. 11, Oposura, May 8 to June 16, 1887.
McLeod. 1, Carmen, January 8, 1885.
1, La Trompa, January 22, 1885.

ATLAPETES PILEATUS DILUTUS Ridgway

Frazar. 13, Bravo, July 23 to August 10, 1888.
14, Jesus Maria, August 20 to September 13, 1888.
McLeod. 2, Jesus Maria, April 24 and 25, 1884.

The McLeod specimen taken April 25 is the type of the subspecies. It is now number 99962 of the U. S. National Museum collection.

Hesperiphona abeillii pallida Nelson

McLeod. 1, Jesus Maria, June, 1883.

This specimen, the type and only known example of the subspecies *pallida*, is number 222,053.

Hesperiphona vespertina montana Ridgway

Frazar. 1, Jesus Maria, September 1, 1888.

Carpodacus mexicanus frontalis (Say)

Frazar. 1, Guaymas, January 19, 1887.
17, Chihuahua, October 16 to December 8, 1888.
Cahoon. 1, Ranken's Ranch, February 1, 1887.
6, Nacozari, March 19 to 28, 1887.
8, Oposura, April 8 to 13, 1887.
McLeod. 1, Carmen, May 14, 1883.

The Nacozari and Oposura specimens are presumably breeding birds. They are intermediate toward *sonoriensis* in color, but are definitely *frontalis* in size. Though *frontalis* is known definitely to invade the range of *sonoriensis* in winter, I am at a loss to account for its presence (in typical form) at Carmen at so late a date as May 14, unless it be that *frontalis* ranges much further south in the mountains than it does in the foothills and lowlands of eastern Sonora.

Carpodacus mexicanus sonoriensis Ridgway

Frazar. 5, Guaymas, January 17 to 19, 1887.
7, Alamos, February 18 to March 27, 1888.
McLeod. 1, Durazno. October 11, 1884.

Spinus pinus pinus (Wilson)

Frazar. 3, Chihuahua, November 6 to 10, 1888.
Cahoon. 1, Nacozari, March 25, 1887.
3, Oposura, May 9 and June 2, 1887.

Since the larger, paler *macropterus* occurs as far north as Saric in late spring (May 15), it is surprising to find typical *pinus* at Oposura in early June. Siskins are notorious wanderers, and whether *pinus* or *macropterus* is the breeding form in the mountains of northwestern Mexico is not known at this time.

SPINUS NOTATUS FORRERI (Salvin and Godman)

Frazar. 7, Mina Abundancia, April 13 to 27, 1888.
25, Bravo, July 18 to August 8, 1888.
1, Chihuahua, October 1, 1888.
McLeod. 1, Carmen, May 12, 1885.

SPINUS PSALTRIA PSALTRIA (Say)

Frazar. 20, Chihuahua, October 5 to December 4, 1888.
McLeod. 2, Carmen, November 15, 1884.

SPINUS PSALTRIA HESPEROPHILUS (Oberholser)

Frazar. 2, Hacienda de San Rafael, May 8 and 17, 1888.
Cahoon. 7, Nacozari, March 18 to 28, 1887.
7, Oposura, May 9 to June 11, 1887.

OBERHOLSERIA CHLORURA (Audubon)

Frazar. 3, Alamos, February 14 to March 3, 1888.
1, Jesus Maria, September 2, 1888.
2, Chihuahua, November 7 and December 12, 1888.
Cahoon. 1, Cumpas, February 4, 1887.
2, Nacozari, March 24 and 26, 1887.
4, Oposura, April 6 to May 12, 1887.
McLeod. 1, Carmen, March 25, 1885.

PIPILO MACULATUS ARCTICUS (Swainson)

Frazar. 2, Chihuahua, November 17 and 29, 1888.

PIPILO MACULATUS MONTANUS Swarth

Frazar. 1, Chihuahua, December 6, 1888.
Cahoon. 1, Nacozari, March 24, 1887.

PIPILO MACULATUS GRISEIPYGIUS subsp. nov.

Frazar. 5, Pinos Altos, June 8 to July 12, 1888.
4, Jesus Maria, August 21 to 24, 1888.
McLeod. 1, Jesus Maria, undated.

Type. Male adult, No. 222,899, Museum of Comparative Zoölogy; Jesus Maria, Chihuahua, undated but probably the fall of 1884; collected by R. R. McLeod.

Subspecific characters. Similar in size and proportions to *Pipilo maculatus montanus*, but backs of males with more of olive and less of

black; rump more extensively gray; upper tail coverts gray, concolor with the rump, instead of black. Females parallel males in comparative differences.

Range. Mountains of southwestern Chihuahua south, probably, to Durango.

Remarks. Of this race, which obviously connects *montanus* with *maculatus*, I have seen only the 10 specimens listed above. Miller (Bull. Amer. Mus. Nat. Hist., **23**, 1906, 172), records a single male from northwestern Durango which appears, from his comments, to belong to the new race. I could not find this specimen, however, in the American Museum collection in November, 1933.

How far south *montanus* extends into Chihuahua and Sonora cannot be stated with certainty. The analogies of several other species would make the low country along the east—west course of the Yaqui River at about latitude 29 degrees the dividing line between the two races.

Pipilo fuscus mesoleucus Baird

Cahoon. 2, Nacozari, March 19 and 26, 1887.

Both of these birds are intermediate toward the next race.

Pipilo fuscus intermedius Nelson

Frazar. 6, Alamos, February 2 to March 20, 1888.
6, Pinos Altos, June 5 to July 14, 1888.
5, Bravo, July 20 to 31, 1888.
Cahoon. 2, Oposura, April 4 and 28, 1887.
McLeod. 1, Carmen, May 14, 1883.
1, Durazno, December 24, 1884.

Pipilo fuscus perpallidus subsp. nov.

Frazar. 16, Chihuahua, October 15 to December 4, 1888.

Type. Male adult, No. 222952, M.C.Z. collection; Chihuahua, Chihuahua, Mexico, November 30, 1888; collected by M. Abbott Frazar.

Subspecific characters. Palest and most ashy of the known races of *Pipilo fuscus*, save only *jamesi* of Tiburón Island. Nearest perhaps to *Pipilo fuscus mesoleucus* of Arizona, northern Sonora, and northern Chihuahua, but paler and grayer and size slightly smaller, with proportionally, and actually, shorter tail.

Range. Arid deserts of central Chihuahua.

Remarks. The amount of post-mortem color change in this species is not excessive, but old skins are slightly paler and definitely redder than recently collected ones. In this connection I have examined a fair series of *intermedius* and a very large one of *albigula* taken by Frazar in 1887 and 1888, and find that in neither case has enough change taken place to obscure the subspecific characters.

The race *mesoleucus* comes south to Pacheco in seemingly typical form, and the comparatively dark, richly colored *potosinus* of the central plateau occurs in extreme southeastern Chihuahua. *Perpallidus* is evidently confined to the desert pocket between the central highlands and the eastern Sierra.

Measurements of males	Wing	Tail
30 *mesoleucus* from Arizona and Sonora	90—98 (94.5)	97—107 (103.5)
10 *perpallidus* from Chihuahua	90—94 (92.0)	93—100 (95.5)

Melozone kieneri grisior van Rossem

Frazar. 28, Hacienda de San Rafael, May 3 to 19, 1888.

Number 222,655, taken May 11, is the type of this subspecies.

Plagiospiza superciliosa (Swainson)

McLeod. 1, "Chihuahua", no date.

Calamospiza melanocorys Stejneger

Frazar. 3, Guaymas, January 13 to 18, 1887.
12, Chihuahua, September 28 to December 6, 1888.
Cahoon. 2, Bacuachi, February 8, 1887.

Passerculus sandwichensis rostratus (Cassin)

Frazar. 3, Guaymas, January 18, 1887.

These are winter visitors and bear no resemblance to *atratus*, the breeding race of this locality.

Ammodramus savannarum perpallidus (Coues)

Frazar. 10, Alamos, February 3 to March 27, 1888.
1, Chihuahua, October 31, 1888.

Ammodramus bairdi (Audubon)

Frazar. 2, Chihuahua, October 2, 1888.

POOECETES GRAMINEUS CONFINIS Baird

Frazar. 7, Alamos, February 6 to March 12, 1888.
28, Chihuahua, September 28 to December 12, 1888.

CHONDESTES GRAMMACUS STRIGATUS Swainson

Frazar. 1, Guaymas, January 17, 1887.
2, Alamos, February 6 and 17, 1888.
2, Chihuahua, October 1 and 8, 1888.
Cahoon. 1, Bacuachi, February 8, 1887.
2, Oposura, April 8 and May 10, 1887.
1, Granados, May 7, 1887.
McLeod. 1, Moris, March 6, 1885.

There are two types of western lark sparrows present in Sonora, a darker one which breeds there and a paler one which occurs, together with the first, in winter. The name *strigata* as currently used almost certainly includes more than one race. Swainson's type of *Chondestes strigatus*, which I examined at Cambridge University in September, 1933, belongs to the darker-colored breeding race. Its measurements are: wing 87.0; tail 71.0; exposed culmen, 12.4; depth of bill at base, 8.8; tarsus, 21.0; middle toe minus claw, 14.8. The specimen is not marked as to sex and the measurements, therefore, are of doubtful value.

AIMOPHILA CARPALIS CARPALIS Coues

Frazar. 1, Guaymas, January 17, 1887.
Cahoon. 7, Oposura, April 8 to 21, 1887.

AIMOPHILA CARPALIS BANGSI Moore

Frazar. 44, Alamos, February 2 to March 29, 1888.

AIMOPHILA QUINQUESTRIATA SEPTENTRIONALIS subsp. nov.

Frazar. 37, Hacienda de San Rafael, May 2 to 18, 1888.
Cahoon. 9, Oposura, May 8 to June 16, 1887.

Type. Male adult, No. 222625, M.C.Z. collection; Hacienda de San Rafael, "Chihuahua"=Sonora, Mexico, May 18, 1888; collected by M. Abbott Frazar.

Subspecific characters. Similar to *Aimophila quinquestriata quinquestriata* of southwestern Mexico, but size larger, coloration paler throughout, and breast spot smaller. 20 males of *septentrionalis* measure: wing, 67–73 (70.5); tail, 67–72 (70.4); while 9 males of *quinquestriata* give wing, 63–68 (64.2); tail, 61–65 (63.3).

Range. Southern and eastern Sonora, southwestern Chihuahua, and probably northern Sinaloa.

Remarks. Sclater's type of *Zonotrichia quinquestriata* (examined at the British Museum in September, 1933) is a very dark colored bird, not marked as to sex but almost certainly a male. It has the longest wing of any individual of the race so far measured by me (68 mm.), but otherwise is typical of the southern race. Though the type locality is not known with certainty, it is most probably Bolaños, Jalisco, for the type was received by Gould from Floresi.

Besides the type I have seen 13 specimens of *quinquestriata*, all from the state of Jalisco. Except for one Durango record (Ridgway, Bds. No. and Mid. Amer., Pt. 1, 1901) there are apparently no specimens of record between Jalisco and Sonora. In addition to the Brewster series of *septentrionalis* listed above, I have seen three from Guirocoba in the Dickey collection and one from Nuri, Sonora, in the British Museum.

The sexes have been described as alike. It is true that they are very similar, but females are definitely a little paler above and browner, less purely gray, below. They are also smaller, and female *septentrionalis* is about the size of male *quinquestriata*.

Aimophila rufescens mcleodii Brewster

Frazar. 24, Mina Abundancia, April 9 to 27, 1888.
6, Hacienda de San Rafael, May 1 to 19, 1888.
2, Jesus Maria, August 22 and 30, 1888.
Cahoon. 13, Oposura, May 21 to June 10, 1887.
McLeod. 2, Carmen, November 10, 1884 and June 3, 1885.

The two Carmen Specimens are the cotypes of the subspecies *mcleodii*, and are numbered 214,128 and 214,127 respectively. From the Oposura series Brewster named *Aimophila cahooni* (cotypes number 214,129 and 214,130), which is generally called synonymous with *mcleodii*. The case needs further study.

Aimophila ruficeps scottii (Sennett)

Cahoon. 5, Oposura, May 9 to June 8, 1887.

Aimophila ruficeps simulans subsp. nov.

Frazar. 11, Mina Abundancia, April 7 to 25, 1888.
15, Bravo, July 26 to August 4, 1888.
7, Jesus Maria, August 22 to 30, 1888.
McLeod. 2, Jesus Maria, March 20, 1883 and April 17, 1884.

Type. Male adult, No, 222,783, Museum of Comparative Zoölogy; Mina Abundancia, "Chihuahua"=Sonora, April 20, 1888; collected by M. Abbott Frazar.

Subspecific characters. Almost exactly similar in coloration and size to *Aimophila ruficeps sororia* of Lower California, but bill small as in *Aimophila ruficeps scottii* of Arizona, northern Sonora and northern Chihuahua. Differs from *scottii* in redder dorsal coloration, whiter under parts, much smaller size, and proportionally, as well as actually, shorter tail.

Range. Mountains of southern Sonora, southern Chihuahua, and south to northwest Durango and Nayarit.

Remarks. The two Nayarit specimens are a little darker than northern birds but I place them here rather than with *fusca* Nelson, of Jalisco and southward. Like so many Nayarit birds of other species they are intermediate. In the following measurements worn July and August specimens are not included.

Measurements of males	Wing	Tail
22 *scottii* from Arizona and northern Sonora	65—71 (67.3)	67—75 (71.2)
12 *simulans* from Sonora, Chihuahua and Durango	60—64 (62.5)	62—67 (64.5)

Amphispiza bilineata deserticola Ridgway

Frazar. 1, Guaymas, January 14, 1887.
Cahoon. 1, Cumpas, February 3, 1887.
1, Bacuachi, February 8, 1887.

Amphispiza bilineata confinis subsp. nov.

Frazar. 16, Chihuahua, November 6 to December 16, 1888.

Type. Male adult, No. 222576, M.C.Z. collection; Chihuahua, Chihuahua, Mexico, November 12, 1888; collected by M. Abbott Frazar.

Subspecific characters. Equal in size to *Amphispiza bilineata grisea* Nelson, of the central Mexican plateau, but coloration throughout very much paler; similar to *Amphispiza bilineata deserticola* Ridgway, of Arizona, New Mexico, etc., but even paler and lacking the pale brown tones which are characteristic of *deserticola*. The nearest color comparison is with *Amphispiza bilineata cana* van Rossem, of San Esteban Island off the coast of Sonora, but *confinis* is even grayer and is definitely larger.

Range. Apparently confined to the deserts of central Chihuahua.

Remarks. The series of *grisea* in the Bureau of Biological Survey shows that the central plateau race comes north at least to Parral in extreme southern Chihuahua, but even at that point there is no discernable tendency toward *confinis*.

Average measurements of males	Wing	Tail
20 *deserticola* from the range	66.3	62.1
10 *confinis* from the type locality	67.2	64.3
9 *grisea* from Hidalgo, San Luis Potosi etc.	67.0	64.7

JUNCO HYEMALIS HYEMALIS (Linnaeus)

Frazar. 1, Chihuahua, November 15, 1888.

JUNCO OREGANUS SHUFELDTI Coale

Frazar. 39, Chihuahua, October 31 to December 15, 1888.

JUNCO MEARNSI Ridgway

Frazar. 33, Chihuahua, October 26 to December 15, 1888.

JUNCO CANICEPS CANICEPS (Woodhouse)

Frazar. 5, Chihuahua, November 16 to December 8, 1888.

JUNCO PHAEONOTUS PALLIATUS Ridgway

Frazar. 32, Pinos Altos, June 4 to July 14, 1888.
4, Jesus Maria, August 20 to 29, 1888.
McLeod. 2, Jesus Maria, April 1 and 18, 1884.
1, Carmen, March 9, 1885.

SPIZELLA PASSERINA ARIZONAE Coues

Frazar. 3, Mina Abundancia, April 9 to 27, 1888.
17, Chihuahua, October 31 to December 4, 1888.
Cahoon. 2, Nacozari, March 26 and 28, 1887.
McLeod. 1, Durazno, December 20, 1884.

SPIZELLA PASSERINA MEXICANA Nelson

Frazar. 8, Pinos Altos, June 5 to July 14, 1888.

These specimens are not typical of any race. They are intermediate in coloration between *arizonae* and *mexicana*, and combine the small bill of *arizonae* with the larger general size of *mexicana*.

Spizella pallida (Swainson)

Frazar. 8, Alamos, February 6 to March 29, 1888.
1, Chihuahua, October 5, 1888.

Spizella breweri breweri Cassin

Frazar. 1, Guaymas, January 17, 1887.
11, Chihuahua, September 28 to October 29, 1888.
Cahoon. 5, Oposura, April 5 to 16, 1887.
5, Granados, May 6, 1887.

Spizella atrogularis atrogularis (Cabanis)

Cahoon. 1, Oposura, May 10, 1887.

Zonotrichia leucophrys oriantha Oberholser

Frazar. 1, Alamos, March 3, 1888.
Cahoon. 1, Cumpas, February 3, 1887.
3, Nacozari, March 22 to 28, 1887.
4, Oposura, April 4 to 14, 1887.
McLeod. 1, Moris, January 12, 1885.

Zonotrichia leucophrys leucophrys (Forster)

Frazar. 1, Chihuahua, October 5, 1888.

Zonotrichia gambelii gambelii (Nuttall)

Frazar. 3, Guaymas, January 17 and 19, 1887.
11, Chihuahua, October 3 to December 15, 1888.
Cahoon. 1, Cumpas, February 3, 1887.
3, Nacozari, March 22 and 25, 1887.
1, Oposura, April 5, 1887.

Melospiza lincolnii lincolnii (Audubon)

Frazar. 4, Alamos, February 10 to March 15, 1888.
2, Mina Abundancia, April 7, 1888.
5, Chihuahua, October 8 to November 17, 1888.
Cahoon. 1, Oposura, April 23, 1887.
3, Nacozari, March 21 and 25, 1887.
McLeod. 1, Carmen, spring of 1885.

Melospiza lincolnii gracilis (Kittlitz)

Cahoon. 2, Oposura, April 28 and May 30, 1887.
1, Nacozari, March 22, 1887.

MELOSPIZA MELODIA FALLAX (Baird)

Frazar. 30, Chihuahua, October 8 to December 12, 1888.
Cahoon. 1, 25 miles south of San Pedro, March 11, 1887.

MELOSPIZA MELODIA SALTONIS Grinnell

Cahoon. 1, Oposura, April 7, 1887.
2, Granados, May 7, 1887.

These three specimens are darker and grayer than typical *saltonis*, and are assigned to that race arbitrarily. There is a similar specimen from Moctezuma in the British Museum. I have previously commented on birds of this nature from Saric and Magdalena.

RHYNCHOPHANES MCCOWNII (Lawrence)

Frazar. 13, Chihuahua, October 13 to November 14, 1888.

CALCARIUS ORNATUS (Townsend)

Frazar. 43, Chihuahua, October 2 to November 7, 1888.

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No. 8 — NOTES ON THE NORTH AMERICAN HARVESTING ANTS OF THE GENUS POGONOMYRMEX MAYR

BY O. WILFRED OLSEN

WITH FIFTEEN PLATES

CAMBRIDGE, MASS., U.S.A.:
PRINTED FOR THE MUSEUM
DECEMBER, 1934

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No. 8.—*Notes on the North American Harvesting Ants of the Genus Pogonomyrmex Mayr*[1]

By O. Wilfred Olsen

During the past thirty years since the appearance of Professor W. M. Wheeler's[2] key to the genus *Pogonomyrmex*, many new forms of these interesting ants have been discovered. It is the purpose of this paper to give a key suitable for determining the workers of the North American species and also to give their geographic distribution. There are now known 36 North American forms represented by 2 subgenera, 21 species, 5 subspecies, and 10 varieties. Of this number *P. badius* Lat. is the only species occurring in the eastern United States, the others are desert and mountain forms found in the southwestern and western United States, Mexico and Canada, except one species from Guatemala and two species and a variety from Haiti. All of the recorded forms, except *P. desertorum var. tenuispina* Forel, are in Professor Wheeler's collection.

In reviewing the worker forms of this genus I have had the facilities of Professor Wheeler's collection and library. In addition he has freely given suggestions and advice for all of which I wish to acknowledge sincere appreciation.

Pogonomyrmex belongs to the subfamily *Myrmicinae* Lepeletier, 1836, which may be distinguished from the other subfamilies of the Formicidae by the following characters.

The cloacal orifice is ventral and slit shaped. The exsertile sting is long and well developed. The abdominal pedicel consists of two distinct segments, the petiole and postpetiole, the latter being much narrower than the first segment of the gaster. The clypeus is almost always prolonged between the frontal carinae, which covers the antennal insertions. The eyes are rarely vestigial or absent. Larvae are provided, at least in the younger stages, with hairs which are hooked, branched or of other forms for anchorage. The nymphs are nude, not spinning a cocoon.

The members of the genus *Pogonomyrmex* may be distinguished from those of the other genera of the *Myrmicinae* by the following combination of characters.

Workers are present and monomorphic, except in *Pog. badius* Lat. where they are polymorphic. The clypeus always extends between the frontal carinae which are separated. There are four segments in the maxillary and

[1] Biological Laboratories, Harvard University.

[2] New Agricultural Ants from Texas, Am. Nat., **36**, pp. 97–99, 8 figs., 1902. Psyche, **9**, pp. 387–393 (1902).

three in the labial palps. The antennal fossae are not prolonged as grooves along the sides of the head. The postpetiole is articulated to the anterior end of the gaster which is of the usual shape. Antennae consist of 12 segments and with a more or less distinct club of four articles. The thoracic dorsum is smooth and without any trace of a mesoëpinotal or promesonotal sutures or impressions.

The North American *Pogonomyrmex* may be divided into two subgenera: the Subgenus *Pogonomyrmex* Mayr 1868[1], *s. str,* consisting of forms of variable size and with a more or less well developed beard of long recurved hairs on the gular region and lower surface of the mandibles, and the subgenus *Ephebomyrmex* Wheeler 1902[2] which comprises those small forms not exceeding 5.5 mm. in length and without a beard.

The following key is adapted for identification of the workers of the North American species, subspecies, and varieties.

Key to the Workers of the North American Species of Pogonomyrmex Mayr

1. Epinotum without distinct spines (*Pog. californicus var. hindleyi* has very short epinotal spines; anomalous paired or single spines occur in *Pog. badius*).....25
   Epinotum with one or two pairs of distinct spines, the posterior pair formed by the upturned projections of the metasternum (spines often reduced in some forms of *Pog. subdentatus*).....2
2. Epinotum with one pair of spines; beard of long recurved hairs present on gula and ventral side of mandibles; femora not incrassate, except in *Pog. guatemaltecus.* (A. Subgenus *Pogonomyrmex*).....8
   Epinotum with two pairs of spines; beard of long recurved hairs absent; femora incrassate. (B. Subgenus *Ephebomyrmex*).....3
3. Black or blackish brown; first pair of epinotal spines obviously much longer than broad at their bases and cylindrical in form; no distinct transverse ridge connecting them.....4
   Red in color; first pair of epinotal spines short and compressed, at most only slightly longer than the width of the base; bases connected by a distinct transverse ridge.....6
4. Dark brown, almost black; mandibles, except dentate border, sides of clypeus, cheeks, antennae, legs, thoracic spines, pe-

[1] Annuar. Soc. Nat. Modena, **3**, p. 169 (1868).
[2] Psyche, **9**, No. 317, p. 390 (1902).

duncle of petiole, anterior border and sides of petiole, and anterior margin of first gastric segment red: tip of gaster and margins of posterior segments yellow. Thorax longitudinally rugose; posterior surface of node of petiole convex, coarsely and longitudinally rugose, rugae converging anteriorly at tip.

Pog. (*E.*) *saucius* Wheeler and Mann

Color black; sculpture of thorax and shape of node of petiole different 5

5. Black; mandibles, tip of gaster and tarsi beyond the first joint deep red; thorax longitudinally reticulate-rugose; anterior surface of node of petiole rises to form a right angle with peduncle, half as long as posterior sloping flat surface; the two surfaces meet at a sharp ridge forming a broadly rounding anterior margin; posterior surface of node roughly reticulate-rugose and opaque; postpetiole and basal third or half of first gastric segment densely punctate and opaque, remaining segments shining.

Pog. (*E.*) *schmitti* Forel typical

Similar to *schmitti* typical except posterior surface of node of petiole not roughly reticulate rugose, but with broad, widely separated rugae, their interspaces coarsely punctate and opaque; postpetiole and base of gaster smooth and shining or with traces of fine punctures.

Pog. (*E.*) *schmitti var. sublaevigatus* Wheeler and Mann

6. Clypeus without a tooth-like projection before each antennal fovea; node of petiole conical in profile.

Pog. (*E.*) *pima* Wheeler

Clypeus with a tooth-like projection before each antennal fovea; node of petiole not conical in profile. 7

7. Postpetiole sparsely punctate; subopaque; entire gaster smooth and shining.

Pog. (*E.*) *imberbiculus* Wheeler

Postpetiole and basal half of first gastric segment densely and finely punctate and very opaque; the latter with sparse piligerous foveolae; remainder of gaster more shining.

Pog. (*E.*) *townsendi* Wheeler

8. Posterior angles of head smooth and shining. Sculpture of head and thorax very fine. 9

Posterior angles of head not smooth and shining. Sculpture fine or coarse. 12

9. Clypeus with a prominent and broad tooth-like projection anterior to each antennal fovea; frontal area without a median carinula.

Pog. dentatus sp. nov.

Clypeal tooth-like projection absent; frontal area with median carinula, often with two carinulae (*Pog. desertorum* Wheeler). 10

10. Dark uniform ferruginous color; gaster smooth but not shining.

Pog. desertorum var. ferrugineus var. nov.

Not dark ferruginous color; gaster shining.....11

11. Color uniformly yellowish red; diameter of epinotal spines greatest at base and tapering cone-like to a point; node of petiole longer than its peduncle.

Pog. desertorum Wheeler, typical

Color similar; epinotal spines as slender at base as at tip; node of petiole small and shorter than its peduncle.

Pog. desertorum var. tenuispina Forel

12. Sculpturing of head, mandibles and thorax fine; rugae of front very dense and without apparent interrugal sculpturing, those of sides of head and prothorax more widely separated and with distinct large, shallow foveolae; remainder of thorax without distinct interrugal sculpturing; frontal area with median carinula and delicate rugae, not shining; head barely concave posteriorly; ventral tooth of peduncle pronounced; abdomen elongate, wasp-like; large, 9.5-11.5 mm.; dark yellowish red; entirely sub-opaque.

Pog. wheeleri sp. nov.

Sculpturing of entire ant never so fine; rugae of front never so dense; head distinctly concave posteriorly.....13

13. Head distinctly concave posteriorly; densely rugose, rugae but little divergent posteriorly, with or without delicate interrugal sculpturing; large forms (*Pog. barbatus* F. Smith).....14

Head not distinctly concave posteriorly; not densely rugose; rugae of head distinctly divergent posteriorly; interrugal spaces distinctly sculptured (except *Pog. similis*); small to medium sized forms.....18

14. Head, thorax and legs deep blackish red; petiole, postpetiole, and especially the gaster, lighter.....15

Color not as above.....16

15. Head, thorax and legs dark red, nearly black; petiole, postpetiole and gaster red; interrugal spaces of head and thorax without sculpturing. Beard scanty.

Pog. barbatus F. Smith typical

Head, thorax and legs dark red, nearly black; petiole and post-petiole brown, gaster yellowish red, often with a dark band

transversing the distal margin of basal segment; interrugal spaces of head and thorax finely punctate. Beard full.

Pog. barbatus var. marfcnsis Wheeler

16. Ant bright ferruginous red throughout; rugae of head especially, and thorax finer and denser than *barbatus* typical.

Pog. barbatus var. molefaciens Buckley

Color and sculpture different 17

17. Head and thorax brownish red, gaster in part or entirely brown; cephalic rugae coarser than *molefaciens;* interrugal spaces with delicate punctures; thoracic rugae coarser. Beard full.

Pog. barbatus var. fuscatus Emery

Color dark red, nearly black; tibiae, tarsi and funiculi red; cephalic rugae as in *barbatus* typical, interrugal spaces finely punctate; thoracic sculpture coarse. Beard scanty.

Pog. barbatus var. nigrescens Wheeler

Color ranges from ferruginous to black; head and thorax very coarsely rugose; interrugal spaces of head bear traces of 2-3 fine rugules; node of petiole rather coarsely and irregularly rugose. Beard full.

Pog. barbatus subsp. rugosus Emery

18. Anterior border of clypeus broadly but definitely excised 19

Anterior border of clypeus straight 23

19. Mandibles 6-dentate; head coarsely rugose, with interrugal spaces densely punctate; thorax reticulately rugose.

Pog. huachucanus Wheeler

Mandibles 7-dentate; thorax not reticulately rugose 20

20. Sculpturing of head and thorax moderately fine; interrugal spaces without visible structure, giving to head, thorax, petiole and postpetiole a very opaque appearance; gaster smooth and subopaque.

Pog. similis sp. nov.

Sculpturing of head and thorax coarse; interrugal spaces densely punctate; head, thorax, petiole and postpetiole opaque; gaster smooth and shining 21

21. Peduncle of petiole with prominent, downward projecting tooth; epinotal spines short, their length at most barely exceeding the distance separating their bases (epinotal spines of *Pog. occidentalis* var. *utahensis* short, but peduncle lacks prominent downward projecting tooth).

Pog. subdentatus Mayr

Peduncle without prominent downward projecting tooth, at most a rounded swelling; epinotal spines long or short 22

22. Epinotal spines 1½ times longer than the interbasal distance; infraspinal facet of epinotum rugose, scarcely shining; node of petiole as broad as long, or nearly so.

Pog. occidentalis Cresson typical

Epinotal spines short; node of petiole distinctly longer than broad.

Pog. occidentalis var. utahensis var. nov.

23. Interrugal spaces of head and thorax very coarsely and densely punctate giving a bead-like appearance at ordinary magnification; node of petiole and postpetiole without rugae, but densely punctate; basal half of first gastric segment finely punctate and subopaque, remaining segments with fine reticulation and shining; head, thorax, petiole and postpetiole very opaque; dark ferruginous, except gaster, which is brown.

Pog. salinus sp. nov.

Interrugal punctures not extraordinarily coarse and bead-like in appearance.....24

24. Node of petiole distinctly narrower than broad; interrugal spaces of head and thorax coarsely and densely punctate; thoracic dorsum strongly arched in profile (as in *Pog. californicus* typical); epinotal spines generally short; opaque, except gaster, which is smooth and somewhat shining.

Pog. comanche Wheeler

Node of petiole almost as broad as long; rugae of head and thorax prominent, their interspaces finely punctate and shining; thoracic dorsum not arched in profile; epinotal spines long; head and thorax shining, gaster smooth and very shining.

Pog. subnitidus Emery

25. Posterior angles of head smooth and shining.....26

Posterior angles of head not smooth and shining.....27

26. Clypeus deeply excised; frontal area without median carinula and strongly convex; epinotum with pair of slight swellings; node of petiole in profile very blunt and low, longer than high. Ferruginous.

Pog. sancti-hyacinthi Wheeler

Clypeus moderately excised; frontal area with or without median carinula and not convex; epinotum without swellings; node of petiole blunt in profile, but not low, as high as long; yellowish red.

Pog. apache Wheeler

27. Clypeus distinctly and broadly excised.....28

Clypeus not excised, but straight (*Pog. californicus* Buckley) ..29

28. Mandibles 5-dentate; node of petiole high and distinctly rounded in profile; rugosity of head and thorax coarse and reticulate. Workers monomorphic.

Pog. guatemaltecus Wheeler

Mandibles 7-dentate; node of petiole high and distinctly pointed in profile; rugosity of head and thorax coarse and parallel. Workers polymorphic.

Pog. badius Latreille

29. Node of petiole distinctly longer than its peduncle; postpetiole longer than high; mandibles except dentate border, clypeus and anterior portion of genæ light yellowish red, remainder of head and thorax darker; distal segments of gaster brown.

Pog. californicus subsp. longinodis Emery

Node of petiole not longer than its peduncle; color darker.....30

30. Apical third or more of gaster black; petiole and postpetiole often brown; the former slender, its node less erect than in *Pog. californicus* typical, apex rounder or but slightly pointed.

Pog. californicus var. estebanius Pergande

Gaster not black.....31

31. Epinotum with two extremely short and small distinct spines; interrugal spaces more densely and coarsely punctate than in *Pog. californicus* typical; head and thorax yellowish red.

Pog. californicus var. hindleyi Forel

Epinotum perfectly round and smooth.....32

32. Rugae of head and thorax sharp and pronounced; interrugal spaces of head with shallow and more or less confluent depressions, those of thorax without sculpturing; head and thorax shining; gaster smooth and shining; light ferruginous red.

Pog. californicus Buckley typical

Rugae of head and thorax not sharp and pronounced; interrugal spaces densely and distinctly punctate; head and thorax not shining; light yellowish red or reddish.....33

33. Interrugal spaces of head and thorax densely and very coarsely punctate; postpetiole higher than long and with a prominent transverse ventral protuberance; opaque, except gaster, which is smooth and shining; color dark reddish.

Pog. californicus var. barnesi M. R. Smith

Interrugal spaces densely but not coarsely punctate; postpetiole not higher than long and without a prominent ventral protuberance.....34

34. Length of postpetiole distinctly greater than either its height or width; interrugal spaces of head and thorax densely and finely punctate; node of petiole and postpetiole shagreened; subopaque; gaster smooth and shining; dark yellowish red in color, except gaster, which is brown.

Pog. californicus subsp. maricopa Wheeler

Length of postpetiole equal to its height or width; interrugal spaces of head and thorax filled with shallow foveae; node of petiole and postpetiole shagreened; subopaque; gaster smooth and very shining; color reddish.

Pog. californicus subsp. sinaloanus subsp. nov.

A. SUBGENUS POGONOMYRMEX

1. Pogonomyrmex apache Wheeler

Plates 2 and 9

Wheeler, Psyche, **9**, p. 392, ☿ . 1902.

Geographical distribution:

Arizona: North Miller Canyon, Huachuca Mts. (W. M. Wheeler).

Texas: Fort Davis (W. M. Wheeler).

2. Pogonomyrmex badius (Latreille)

Plates 1 and 9

Formica badius Latreille, Fourmis, p. 238, pl. 11, fig. 71, A-D, ☿ ♀, 1802;

Myrmica crudelis (F. Smith), Mayr, Zoöl.-bot. Ges., Wien, Vol. **12**, p, 740, ♀ ♂, 1862; Wheeler, Am. Nat., **36**, p. 92, fig. 8, ☿ , 1902.

Geographical distribution:

Florida: Lake North, Sanford Flats (Schmitt); Inverness (C. M. Weed); Jacksonville (W. M. Wheeler); St. Augustine (C. T. Brues); Grant, Enterprise, Lakeland.

Georgia: Bowman's Station, Decateur Co. (J. C. Bradley); Thomasville, St. Simon's Isle.

Mississippi: Lucedale (R. W. Harned).

North Carolina: Duke Forest (A. S. Pearse).

3. Pogonomyrmex barbatus (F. Smith)

Plates 2 and 9

Myrmica barbata F. Smith, Cat. Hym. Brit. Mus., **6**, p. 130, ♀, 1858; Mayr, Verh. Zoöl.-bot. Ges., Wien, **37**, pp. 610, 611, ☿ ♂, 1887; Wheeler, Am. Nat., **36**, p. 91, fig. 4, ☿ , 1902.

Geographical distribution:
Mexico: Cerro del Chile, Chihuahua; Zapotlan, Colima (C. H. T. Townsend); Pachuca, Hidalgo (W. M. Mann); Guadalajara, Tuxpam (J. F. McClendon); Mexico (City?) (A. Herrera); Aguas Calientes (W. M. Wheeler.)
Texas: New Braunfels, Austin (W. M. Wheeler); Chisos Mts. (O. W. Williams); San Angelo, Langtry.

4. Pogonomyrmex barbatus var. fuscatus Emery

Plate 10

Emery, Zoöl. Jahrb. Abth. Syst., **8**, p. 309, ☿ , 1895.
Geographical distribution:
Arizona: Oracle, 4000 ft., Post Canyon, Pinaleño Mts., 5000-6000 ft., Tempe, Bowie (W. M. Wheeler).
Colorado: Pueblo (Schmitt).
Mexico: San Jose de Guaymas (L. O. Howard).
New Mexico: Clayton (W. M. Wheeler); Alamogordo (G. v. Krockow).
Texas: Limpio Canyon, Fort Davis Mts.; Fort Davis, Langtry (W. M. Wheeler); Laredo (J. F. McClendon); Chisos Mts. (O. W. Williams).

5. Pogonomyrmex barbatus var. marfensis Wheeler

Plate 10

Wheeler, Am. Nat., **36**, p. 98, ☿ , 1902.
Geographical distribution:
New Mexico: Deming, White Sands, White Water, Roswell (T. D. A. Cockerell); Alamogordo, Rincon (G. v. Krockow); Engle (Nora Newberry); Santa Fé.
Texas: Chisos Mts. (W. B. Phillips); Marfa and San Esteban, Presidio Co.; Alpine, Pisano Pass, Brewster Co. (W. M. Wheeler).

6. Pogonomyrmex barbatus var. molefaciens Buckley

Plate 9

Buckley, Proc. Acad. Nat. Sci. Phil. p. 45, ☿ , 1860; Proc. Ent. Soc. Phil., p. 348, ☿ ♀ , 1867; Emery, Zoöl. Jahrb. Abth. Syst., **8**, p. 308, ☿ ♀ ♂, 1895.
Geographical distribution:
Arizona: Phoenix, Mouth Miller Canyon, Huachuca Mts., 4500 ft.; Post Canyon, Pinaleño Mts.; Jerome, Bensen, Tempe, Apache Camp, South Catalina Mts.; Oracle, 4500 ft., Texas Pass, Dragon Mts.; Hereford, Sabino Canyon, South Catalina Mts.; Palmerlee, Huachuca Mts.; Garden Canyon, Huachuca Mts., 5000 ft.; Palmacoles, Huachuca Mts., 5000 ft.; Hunter's Canyon, Huachuca Mts., 5800 ft. (W. M. Wheeler); Tempe, Prescott (T. D. A. Cockerell); Kit's Peak, Baboquivari (Clark

and A. N. S. P.); Huachuca Mts., 3500-4500 ft. (C. R. Biederman); Ramsey Canyon, Huachuca Mts., 5800 ft. (W. M. Mann); Lowell's Ranger Stn., Pima Co.

Kansas: Newton.

Oklahoma: Bliss, Ponca City (A. C. Burrill); Tulsa (J. C. Bradley).

Mexico: Aguas Calientes (C. C. Deam); Tampico (D. L. Crawford); Queretaro, San Juan del Rio, Tamarindo, Teotihuacan, Patzingo, Oaxaca.

New Mexico: Mescalera (T. D. A. Cockerell); Engle (Nora Newberry); Clayton (W. M. Wheeler).

Texas: Austin, Del Rio (W. M. Wheeler); Amarillo, Bovina (T. D. A. Cockerell); Langtry (W. L. Braun); Brownsville (R. A. Vickery); Barksdale, Edwards Co., Richmond.

Utah: St. George (V. M. Tanner).

7. Pogonomyrmex barbatus var. nigrescens Wheeler

Plate 10

Wheeler, Psyche, **9**, pp. 389, 391, ☿, 1902.

Geographical distribution:

Arizona: Gila Bend Mts., Casa Granda, Bowie, Fenner Canyon, South Catalinas Mts., 3000 ft. (W. M. Wheeler).

New Mexico: Aden, Alamogordo, 4300 ft. (W. M. Wheeler); Albuquerque (W. H. Long); Mesa Negra (E. L. Hewitt and Ruth Reynolds).

Texas: Del Rio (W. M. Wheeler); Eagle Pass (May Backus); Laredo (F. C. Pratt); Barstow (J. C. Crawford); El Paso (J. C. Bradley); Musquiz Canyon, Fort Davis (Cornell U. Exped.).

8. Pogonomyrmex barbatus subsp. rugosus Emery

Plate 9

Emery, Zoöl. Jahrb. Abth. Syst., **8**, pp. 309, 310, ☿, ♂, 1895.

Geographical distribution:

Arizona: Tucson, Indian Gardens in Grand Canyon, Tempe, Florence, Jerome (W. M. Wheeler); Cactus Plain (F. H. Snow).

California: San Jacinto (Theo. Pergande); Riverside (H. L. Quayle); Elsinore (C. F. Baker); Lakeside, Palm Springs, Jacumba (W. M. Wheeler); Needles (F. M. Carpenter); Victorville (E. C. Jaeger); San Diego (J. D. S.); Point Loma (Percy Lenard); Perris (J. C. Bradley).

9. Pogonomyrmex californicus Buckley

Plates 2 and 11

Myrmica californica Buckley, Proc. Acad. Nat. Sci. Phil., p. 336, ☿, 1867; Wheeler; Am. Nat., **36**, p. 98, fig. 7, ☿, 1902; Psyche, **21**, pp. 153-154, ☿, ♀, ♂, 1914.

Geographical distribution:
Arizona: Yuma, Grand Canyon, Phoenix, Yucca, Welton, Tempe, Norton's (W. M. Wheeler), Wilcox (A. K. Fisher).
California: Lakeside, Claremont, Arroyo Seco, Pasadena, Needles, Coyote Wells, Saugus, Laguna Beach, Jacumba (W. M. Wheeler); San Jacinto (C. Emery); Point Loma, San Diego (Percy Lenard); Upland, Lompoc, Mission, San Diego (J. C. Bradley); San Pedro (T. D. A. Cockerell); Altamont (McLane); Sier Valley.
Mexico: Ojos del Diablo, Chihuahua (C. H. T. Townsend); Lower California (Albatross Exped.).
Nevada: Las Vegas (J. C. Bradley); Moapa (C. W. Creel).
New Mexico: Las Cruces, Rincon (T. D. A. Cockerell); Alamogordo, Mesilla Park (W. M. Wheeler).
Texas: El Paso (J. C. Bradley).
Utah: St. George (V. M. Tanner).

10. Pogonomyrmex californicus var. estebanius Pergande

Plate 11

Pergande, Proc. Cal. Acad. Sci. (2), **4**, p. 33, 1893.
Geographical distribution:
Arizona: Tucson, Tucson Mts., Tempe, Florence, Gila Bend Mts., Yucca, Yuma, Phoenix (W. M. Wheeler); Thatcher (R. V. Chamberlin).
California: Mojave, Palm Springs, Hidden Spring Canyon, Little San Bernadino Mts. (W. M. Wheeler); Victorville, 12 miles east (E. C. Jaeger); Otis, Mojave Desert, Perris, Indio (J. C. Bradley); El Centro (Cornell Exped.).

11. Pogonomyrmex californicus var. hindleyi Forel

Plate 11

Forel, Bull. Soc. Vaud. Sci. Nat., **50**, p. 27, ♀, 1914.
Geographical distribution:
Arizona: Thatcher (R. V. Chamberlin).
California: Escondido (E. Hindley).
New Mexico: Albuquerque (W. H. Long).

12. Pogonomyrmex californicus subsp. barnsei M. R. Smith

Plate 11

Smith, Ann. Am. Ent. Soc., **22**, pp. 246-247, ♀, 1914.
Geographical distribution:
Arizona: Maricopa Co. (O. L. Barnes).

13. Pogonomyrmex californicus subsp. longinodis Emery

Plate 11

Emery, Zoöl. Jahrb. Abth. Syst., **8**, p. 311, ♀, 1895.
Geographical distribution:
New Mexico: Alamogordo (W. M. Wheeler).
Texas: Marfa (W. M. Wheeler); Chisos Mts. (W. B. Phillips).

14. Pogonomyrmex californicus subsp. maricopa Wheeler

Plate 12

Wheeler, Psyche, **21**, p. 155, ♀ ♂, 1914.
Geographical distribution:
Arizona: Post Canyon, Pinalino Mts. 4000-6000 ft.; Phoenix, Sabino Canyon, South Catalina Mts.; Benson 3600 ft., Tucson, Yuma, Norton's, Welton, Texas Pass, Dragoon Mts. (W. M. Wheeler); Sanford, Graham Mts., Ash Creek (E. G. Holt); Ramsey Canyon, Huachuca Mts. (W. M. Mann); Coyote Mts. 3500 ft. (Clark and A. N. S. P.).
California: Needles (W. M. Wheeler); Brawley (J. C. Bradley); El Centro (Cornell U. Exped.).
Mexico: Ojo de S. Dijuela and Ojos del Diablo, Chihuahua (C. H. T. Townsend).
New Mexico: Alamogordo, Albuquerque (W. M. Wheeler); Roswell, Deming (T. D. A. Cockerell); Las Truces (Lillie Gerhardt); Engle (Nora Newberry); Mesilla Park (D. E. Merrill).

15. Pogonomyrmex californicus subsp. sinaloanus subsp. nov.

Plate 12

Worker.—Length 8–9 mm.

This handsome subspecies differs from the typical form of *californicus* and all its known forms by its deep ferruginous color, except *barnsei* which it resembles closely in this respect, but may be readily distinguished from it by the delicate interrugal punctures and shining appearance. Peduncle of petiole with distinct small ventral tooth; its node obviously narrower than long; length and height of postpetiole equal to its width, its ventral protuberance undeveloped. Node and postpetiole finely shagreened dorsally.

Described from 21 workers taken by Case at Sinaloa, Mexico.

16. Pogonomyrmex comanche Wheeler

Plate 3 and 12

Wheeler, Psyche, **9**, p. 392, ♀, 1902; **21**, pp. 156-157, ♂, 1914.
Geographical distribution:
Arizona: Graham Mts., Ash Creek, 3200 ft. (E. G. Holt).
New Mexico: Albuquerque (W. H. Long).
Texas: Metropolis, Travis Co. (W. M. Wheeler); Milano.

17. Pogonomyrmex dentatus sp. nov.

Plate 12

Worker.—Length 8.5 mm.

Head rectangular, exclusive of the 7-toothed mandibles slightly broader than long; posterior margin slightly concave. Anterior border of the clypeus broadly but faintly excised; its sides with a large blunt tooth-like projection anterior to each antennal fovea. Frontal area triangular, broader by a third than long, without a median carinula. Eyes in the middle of the lateral surfaces of the head. Antennal scape not reaching to midway between the eye and posterior angle of the head. Thorax of the usual contour, with two long slender epinotal spines, their length being at least a third greater than the interbasal distance, directed obliquely upward, outward, and backward. Petiole compressed at its base, its peduncle shorter than its node, which is pointed in front so that the ascending dorsal surface forms an obtuse angle in profile; posterior descending surface gently convex; antero-ventral spine of petiole absent. Postpetiole campanulate; broader than long, its ventral protuberance prominent. Gaster and legs of the usual type.

Mandibles with coarse parallel striae. Frontal area smooth and shining. Clypeus, sides, and upper surface of head traversed by very delicate, parallel rugae, which are very close together and scarcely divergent posteriorly. Interrugal punctures indistinct and in a single row between each pair of rugae. Posterior angles of the head smooth and shining as in *desertorum*. Pleura of the pronotum densely punctate and without rugae, its dorsum covered with fine transverse rugae and the interrugal spaces densely and finely punctate; meso- and metathoracic and coxal rugae mostly transverse and very fine. Infraspinal facet smooth and shining. Petiole, postpetiole, and legs covered only with a delicate microscopic reticulum.

Head, body, and legs covered with bristly, pale yellow hairs, which are erect on the dorsal surface of the head and thorax and suberect on the other parts. Lower surface of the head and mandibles with a well developed beard. Pubescence absent.

Head and thorax yellowish red, gaster golden brown, mandibles, except the black dentate margin, and posterior margin of the petiole ferruginous. Eyes black.

This species is described from one specimen from the Pergande Collection of the United States National Museum taken at Mirafiera of the Cape Region of Lower California, Mexico.

Pog. dentatus is very similar to *desertorum* in appearance, but differing in its larger size, absence of median frontal carinula, short interbasal distance of epinotal spines, prominent ventral protuberance of postpetiole, presence of blunt tooth-like projections of clypeus before the antennal fossae (which suggested the name), the absence of rugae on the pleura of the pronotum, and darker mandibles and gaster.

18. Pogonomyrmex desertorum Wheeler

Plates 3 and 14

Wheeler, Psyche, **9**, pp. 387-388, ♀, 1902.

Geographical distribution:

Arizona: Tucson and desert east, Benson, Tempe (W. M. Wheeler); Thatcher (R. V. Chamberlin); Bowie (Cornell U. Exped.).

New Mexico: Mesilla Park, Aden (W. M. Wheeler); Mesilla Park "Pluchea zone" (T. D. A. Cockerell); White Sands, Tularosa Desert (G. v. Krockow).

Texas: Fresno Canyon, Presidio, Langtry (W. M. Wheeler).

19. Pogonomyrmex desertorum var. ferrugineus var. nov.

Plate 14

Worker.—Length 5.5–6 mm.

The worker of this variety differs from that of the typical form in the following characters: *1*, The coloration: in the typical form the whole ant is yellowish red, while in the variety the entire ant is uniformly dark ferruginous red, except the eyes and the dentate mandibular margins which are black in both forms. *2*, The epinotal spines of *desertorum* s. st. are separated at their bases by a distance equal to that of their length, while in the variety the interbasal distance of the spines is less than their length. *3*, The rugae of the head and thorax of the typical form are very delicate and the interrugal punctures are in-

distinct and in a single row, but in the variety *ferrugineus* the rugae of the head and thorax are distinctly coarser and the interrugal spaces densely, but finely punctate. *4*, The typical form is shining, but the variety is decidedly opaque.

This variety is described from 10 workers taken at Tucson, Arizona, one from the Pergande Collection and 9 collected by Mr. P. Klingenbery at College Peak on March 22, 1933.

20. Pogonomyrmex desertorum var. tenuispina Forel

Forel, Bull. Soc. Vaud. Sci. Nat., **50**, p. 269-270, ☿ , 1914.

I am unable to find specimens of this variety in the collection. Forel gives the locality as the United States, collected by Pergande.

21. Pogonomyrmex guatemaltecus Wheeler

Plates 3 and 14

Wheeler, Psyche, **21**, p. 149-151, ☿ ♀, 1914.
Geographical distribution:
Guatemala: Zacapa (W. M. Wheeler).

22. Pogonomyrmex huachucanus Wheeler

Plates 4 and 14

Wheeler, Psyche, **21**, pp. 151-152, ☿ , 1914.
Geographical distribution:
Arizona: Mouth Miller Canyon, Huachuca Mts.; Sabino Canyon, South Catalina Mts.; Texas Pass, Dragoon Mts.; Oracle (W. M. Wheeler).

23. Pogonomyrmex occidentalis (Cresson)

Plates 4 and 13

Myrmica occidentalis Cresson, Proc. Ent. Soc. Phil., **4**, pp. 426-427, ☿ ♀, 1865; Mayr, Verh. Zoöl.-bot. Ges., Wien, **20**, p. 971, ☿ , 1870; Wheeler, Am. Nat., **36**, pp. 92, 98, fig. 5, ☿ , 1902; Gaige, Proc. Biol. Soc. Wash., **27**, pp. 93–96, ☿ ♀ ♂, 1914.

After a careful comparison of a series of 25 cotypes of workers and of one female of *occidentalis* var. *ruthveni* Gaige with a series of the typical forms of *occidentalis* Cresson I am compelled to consider the former as a synonym of the typical form.

Geographical distribution:

Arizona: Grand Canyon, just below "plateau," Garden Canyon, Huachuca Mts.; Ash Fork; Post Canyon Pinaleño Mts. 5000-6000 ft., Prescott, Coconino Forest, Grand Canyon (W. M. Wheeler); Yampai (T. D. A. Cockerell); Williams, Cameron, Lee's Ferry (A. C. Cole Jr.)[1].

British Columbia: Fairview (W. R. Buckell); Keremeos, Oliver, Okanagan Falls, Osoyoos (E. R. Buckell).[1]

Colorado: Colorado Springs, Buena Vista, Salida (W. M. Wheeler); Boulder (T. D. A. Cockerell); Littleton (A. C. Burrill); Grand Junction (E. H. Siegler); Silverton 12000 ft; Hayden Park, Co. 10000 ft. (E. J. Osler); Trinidad (W. M. Wheeler).[1]

Idaho: Lewiston (J. M. Aldrich); Pocatello (N. A. Weber); Craters of the Moon National Monument; Twin Falls, Rogerson, Nampa, Boise, Blackfoot, Arco, Idaho Falls, Weiser, Mountain Home, Shoshone, Ketchum, Hailey, Redfish Lake, Hagerman, Hammett, American Falls, Dubois, Hollister, Shoshone Falls, Rock Creek Canyon, Malta, Bliss (A. C. Cole, Jr.)[1]; Parma, Virginia (G. W. Haug)[1].

Kansas: Stockton (R. C. Smith)[1].

Montana: Sanders (C. C. Adams); Custer Co. (E. R. Hutchins)[1].

Nebraska: Cambridge (A. P. M.).

Nevada: Maggie Basin, Eureka and Elko Co. (F. M. Gaige).

New Mexico: Albuquerque, Clayton, Pecos 6000 ft. (W. M. Wheeler); Las Vegas, Rowe, Las Valles, Embudo, Pinos Altos (T. D. A. Cockerell)[1], Kasolosky Road House, Pecos Valley, San Miguel Co. (E. D. Hewitt and Ruth Reynolds).

North Dakota: Medora (C. T. Brues).

Oklahoma: Bliss, Ponca City (A. C. Burrill); Woods Co. (R. D. Bird)[1].

Oregon: Echo, Pendleton, Ontario, Baker and LeGrande (A. C. Cole, Jr.).

South Dakota: Ardmore (E. J. Holt); Rapid City, Mitchell, Sioux Falls (A. C. Cole, Jr.)[1]; Capa, Mobridge, Newell (H. C. Severin)[1].

Utah: Salt Lake Co. (R. V. Chamberlin); Lehi (W. A. Hooker); Sandy, Kaysville (E. H. Kalmbach); Brigham City (Grace Olsen); Tooele Valley, Delle, Granssville, Snowville, Ogden, Zion National Park, Kanab (A. C. Cole, Jr.)[1]; Grants (R. C. Shannon)[1].

Washington: Camp Umatilla, Spokane (S. Henshaw); Almota.

Wyoming: Green River (J. M. Aldrich); Upper Geyser Basin, Yellowstone National Park (J. C. Bradley); Cheyenne, Laramie, Rawlins, Rock Springs, Kemmer, Cody, Ten Sleep (A. C. Cole, Jr.).

[1] Cole, A. C. Jr., The Relation of the Ant., Pog. occidentalis Cresson to Its Environment, Jour. Ohio Sci., (2) **32**, pp. 133–134.

24. Pogonomyrmex occidentalis var. utahensis var. nov.

Plate 13

Worker.—Length 7.5–8.5 mm.

This variety differs from the typical form in the following respects: *1*, The node of the petiole in profile terminates in a more or less well defined point directed caudad as in *subdentatus*, node not so wide as in *subdentatus;* viewed from above narrow and pointed as in *californicus*. *2*, The epinotal spines are shorter than the distance between their bases, whereas in the typical form the length exceeds the interbasal distance by one half. *3*, Cephalic rugae widely divergent posteriorly. *4*, Interrugal punctures of head and thorax less pronounced than in *occidentalis*, s. st.; variety *utahensis* is subopaque, typical form opaque.

Male.—Head, thorax and node of petiole black, remainder dark brown, gaster with irregular darker bands; in the typical *occidentalis* head, thorax, antennae, coxae, and femora dark brown, remainder light yellowish red.

Female.—Cephalic rugae strongly divergent posteriorly; darker coloration than the typical form.

This variety is described from 13 workers, two males, and two females taken at Zion National Park, Utah, July 18, 1932 by W. S. Creighton.

25. Pogonomyrmex subnitidus Emery

Plates 4 and 13

Emery, Zoöl. Jahrb. Abth. Syst., **8**, p. 310, ♀, 1895; Wheeler, Psyche, **21**, p. 156, 1914.

Geographical distribution:

California: Mt. Lowe, Arroyo Sacco near Altadena, Tejon Pass, Del Mar, Warren's, San Diego Co. (W. M. Wheeler); Los Gatos Cañon, Diablo Range (J. C. Bradley); La Jolla (C. T. Brues).

26. Pogonomyrmex sancti-hyacinthi Wheeler

Plates 5 and 13

Wheeler, Psyche, **9**, pp. 388–389, ♀, 1902.

Geographical distribution:

New Mexico: Alamogordo.

Texas: Fort Davis, San Antonio (W. M. Wheeler).

27. Pogonomyrmex subdentatus Mayr

Plates 5 and 14

Mayr, Verh. Zoöl.-bot. Ges., Wien, **20**, p. 971, ♀, 1870; Wheeler, Am. Nat., **36**, pp. 94, 95, 98, fig. 6, ♀, 1902.

Geographical distribution:

California: San Jacinto (H. Heath); Pacific Grove (J. C. Bradley); Palo Alto (W. M. Mann); Davis (T. W. Cook); Laguna Beach (W. M. Wheeler).

28. Pogonomyrmex salinus sp. nov.

Plates 5 and 14

Worker.—Length 7 mm.

Head rectangular, exclusive of the 7-toothed mandibles as broad as long; posterior margin straight. Anterior border of the clypeus straight. Frontal area triangular, as broad as long, convex and strongly carinulate. Eyes in the middle of the lateral surfaces of the head. The antennae were broken off in this specimen. Thorax only barely longer than the head exclusive of the mandibles, from above it is broadest through the pronotum, transverse diameters of meso- and epinotum equal; in profile the dorsal outline is strongly convex in the pronotal region and gently sloping to the border of the mesonotum where a slight transverse depression occurs, epinotum weakly convex and armed posteriorly with a pair of short, pointed spines whose length is about 1⅓ greater than the distance separating their bases and about ½ less than that separating their outward pointing tips. Petiole short, the node longer than the peduncle, in profile the node is higher and the apex more pointed than in *occidentalis;* its anterior ascending surface straight, the posterior descending surface moderately convex; seen from above the anterior border broadly acute as in *desertorum,* transversely convex, slightly longer than broad. Ventral surface of the peduncle without a spine. Postpetiole campanulate, as long as broad posteriorly, evenly convex above, its ventral protuberance well developed and transverse. Gaster and legs of the usual form.

Mandibles subopaque, coarsely and deeply striated. Frontal area smooth and shining. Clypeus, front, and sides of head traversed with coarse longitudinal parallel rugae; interrugal spaces of clypeus smooth and shining, those of the front and sides of the head densely punctate as in *occidentalis.* Rugae distinctly divergent posteriorly. Thoracic sculpture coarse as on the head; rugae of the neck transverse and with-

out distinct interrugal sculpture, arcuately transverse on pronotum, longitudinal on mesonotum and meso- and metapleurae, and transverse on epinotum; interrugal spaces coarsely and densely punctate. Infraspinal facet rugose and scarcely glabrous. Stem of petiole and anterior surface of node shining, remainder of node and postpetiole densely covered with coarse punctures; basal half of first gastric segment densely and finely punctate, remainder of gaster finely reticulate and shining. Coxae faintly rugose, and like the legs covered with a fine reticulation.

Head, body, and legs sparsely beset with pale hairs. Beard of long recurved hairs on ventral side of mandibles and head well developed. No pubescence.

Whole ant of a very deep ferruginous color and opaque, except the gaster which is shining and brown, and the dentate apical margin of the mandibles and eyes which are black.

This species is described from a single specimen taken near Soda Springs, Bridgeport, California, by Mr. E. C. Jaeger on August 1, 1932.

29. Pogonomyrmex wheeleri sp. nov.

Plates 6 and 14

Worker.—Length 9.5–11.5 mm.

Head rectangular, exclusive of the 7-toothed mandibles slightly broader than long; posterior margin at the most only very slightly concave. Anterior border of the clypeus broadly and moderately excised. Frontal area triangular, its base 1½ times as broad as its height, with a distinct median carinula. Eyes in middle of the lateral surfaces of the head. Antennal scape short, reaching only about ⅓ of the distance from the posterior margin of the eye to the posterior corner of the head. Thorax strongly arched in profile and usually with a blunt projection at the apex of the pronotum; with two epinotal spines of rather variable length and shape, being rather short in some specimens, in others long and slender, and in still others somewhat spatulate. In all except the shortest spines the length slightly exceeds the interbasal distance; they are only slightly directed outward. Petiole compressed toward the base, its peduncle only slightly longer than the node, whose ascending anterior surface rises gently to a blunt apex and forms in profile an obtuse angle; posterior descending surface mildly convex; lower surface of petiole with a well developed, downwardly projecting tooth. Postpetiole campanulate, broader than

long; its ventral protuberance prominent. Gaster long and very wasp-like in appearance. Legs of the usual type.

Mandibles with moderately fine, parallel striae. Frontal area exceedingly finely striate under a high magnification and subopaque. Clypeus, and upper surface of head traversed by very delicate, parallel rugae which are very dense and not divergent except on the posterior border of the head and there only slightly. Interrugal punctures very indistinct on the front, more distinct on the sides of the head, and in a single row between each pair of rugae. Posterior angles of the head not smooth and shining. Thoracic and coxal rugae mostly transverse, those of the propleurae indistinct and with large, distinct interrugal foveolae arranged in single rows. Infraspinal facet smooth and shining. Petiole and postpetiole punctate and subopaque. Legs and gaster covered with a fine reticulation.

Body and legs beset with bristly pale yellow hairs, which are erect on the dorsal surface of the head and thorax and suberect elsewhere. Beard of long recurved hairs on the lower surface of head and mandibles. No pubescence.

Entire ant uniformly dark yellowish red except eyes and dentate margins of mandibles, which are black.

This species is described from twelve specimens taken at Escuinapa, Sinaloa, Mexico by J. H. Batty. It resembles *dentatus* and *desertorum* in the very delicate sculpturing, but differs from *dentatus* in its greater size, its dark coloration, presence of frontal carinula and antero-ventral spine on the petiole, coarser sculpturing, absence of tooth-like projections of the clypeus anterior to the antennal fossae, and the elongate gaster; from *desertorum*, by the rough posterior angles of the head.

30. Pogonomyrmex similis sp. nov.

Plates 6 and 14

Worker.—Length 7 mm.

Head rectangular, exclusive of the 7-toothed mandibles; posterior margin slightly concave. Anterior margin of clypeus broadly, but at most very faintly excised. Frontal area triangular, broader than long, with a distinct, but not strong median carinula. Eyes in the middle of the lateral surfaces of the head. Antennal scapes reaching not quite half way between the eyes and posterior angles of the head. Thorax of the usual shape and with two epinotal spines whose length is about twice the distance between their bases; the basal portion of each spine

broad and somewhat flattened latero-medially. Petiole compressed at the base, a third shorter than its node, which is pointed anteriorly so that the ascending surface forms an obtuse angle in profile; posterior dorsal descending surface gently convex and longer than broad; ventral surface of the petiole with a low, broad, downward projecting tooth. Postpetiole campanulate and slightly broader than long, its transverse ventral protuberance rather small, but distinct. Gaster and legs of the usual configuration.

Mandibles with rather coarse, parallel striae. Frontal area smooth and shining. Clypeus, sides and surface of the head traversed by parallel rugae which are intermediate in coarseness between the delicate rugae of *desertorum* and the heavy ones of *occidentalis;* they are scarcely divergent posteriorly. Interrugal spaces densely, finely, and indistinctly foveolate, Posterior angles of the head rugose. Thoracic and coxal rugae mostly transverse, except those of the mesonotum which are usually longitudinal. Thoracic sculpture coarser than that of the head. Infraspinal facet of the epinotum smooth and shining. Descending posterior surface of node of petiole traversed by coarse striae; postpetiole finely shagreened. Legs and gaster covered with a microscopic reticulation.

Ant rather densely beset with pale yellow, bristly hairs which are erect on the thorax and dorsal surface of the head, suberect elsewhere. Underside of head and mandibles with a well developed beard of long, recurved hairs.

Dark ferruginous throughout, except the eyes and dentate margin of the mandibles which are black.

This species is described from fourteen specimens taken at Oracle, Arizona on March 13, 1919 by Prof. W. M. Wheeler on the north slope of Mt. Lemon at an altitude of 4500 feet.

It resembles *desertorum* in shape and size but differs in the slightly coarser sculpturing, darker coloration, flattened epinotal spines, and in having the posterior angles of the head rough. It differs from *occidentalis, subnitidus,* and *subdentatus* in having a less coarse sculpture, flattened epinotal spines, and differently shaped petiole and node.

B. SUBGENUS EPHEBOMYRMEX

31. Pogonomyrmex (E.) imberbiculus Wheeler

Plates 6 and 15

Wheeler, Am. Nat., **36**, pp. 86, 87-89, figs. 1, 2, ♀, 1902; Psyche, **9**, p. 390, 1902.

Geographical distribution:
New Mexico: Aden (W. M. Wheeler); Alamogordo (G. v. Krockow).
Texas: Mt. Bonnel, Austin; Del Rio, Langtry, Fort Davis (W. M. Wheeler); Juno (Cornell Exped.).

32. Pogonomyrmex (E.) pima Wheeler

Plates 7 and 15

Wheeler, Jour. N. Y. Ent. Soc., **17**, pp. 79-80, ☿ , 1909.
Geographical distribution:
Arizona: Tucson and desert east, Mt. Lemmon, South Catalina Mts. 8000-9150 ft.; Bowie, Casa Grande, Tempe, Florence (W. M. Wheeler).

33. Pogonomyrmex (E.) saucius Wheeler and Mann

Plates 7 and 15

Wheeler and Mann, Bull. Am. Mus. Nat. Hist., **33**, pp. 29-31, figs. 10-11, ☿ , 1914.
Geographical distribution:
Haiti: Diquini, Furcy, Port au Prince, Cape Haitien (W. M. Mann).

34. Pogonomyrmex (E.) schmitti Forel

Plates 8 and 15

Forel, Ann. Soc. Ent. Belg., **45**, pp. 339-340, ☿ , 1901; Wheeler and Mann, Bull. Am. Mus. Nat. Hist., **33**, pp. 27-29, fig. 9, ☿ ♀, 1914.
Geographical distribution:
Haiti: Haiti (M. J. Schmitt); Furcy, Petionville, Diquini, Port au Prince, Mountains north of Jacmel (W. M. Mann).

35. Pogonomyrmex (E.) schmitti var. sublaevigatus Wheeler and Mann

Plate 15

Wheeler and Mann, Bull. Am. Mus. Nat. Hist., **33**, p. 29, ☿ ♀, 1914
Geographical distribution:
Haiti: Ennery, Mannesville, Diquini, Port au Prince (W. M. Mann).

36. Pogonomyrmex (E.) townsendi Wheeler

Plates 8 and 15

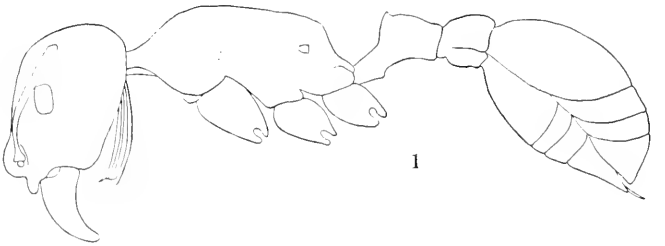
Wheeler, Jour. N. Y. Ent. Soc., **17**, pp. 80-81, ☿ , 1909.
Geographical distribution:
Arizona: Fort Grant, Pinaleño Mts. (Cornell U. Exped.); Tucson W. M. Wheeler).
Mexico: Ojo del Cerro Chilicote, Chihuahua (C. H. T. Townsend).

EXPLANATION OF PLATES

PLATE 1

PLATE 1

Fig. 1. *Pogonomyrmex badius* Latr.; lateral and dorsal aspect of small worker.
Fig. 2. *Pogonomyrmex badius* Latr.; head of large worker, dorsal aspect.



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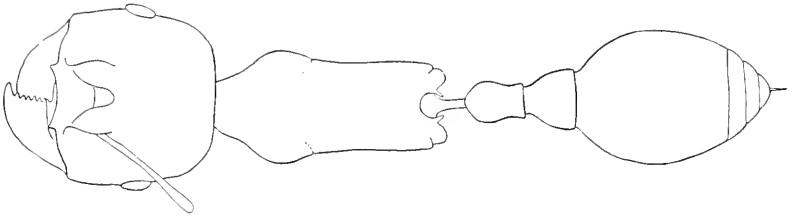

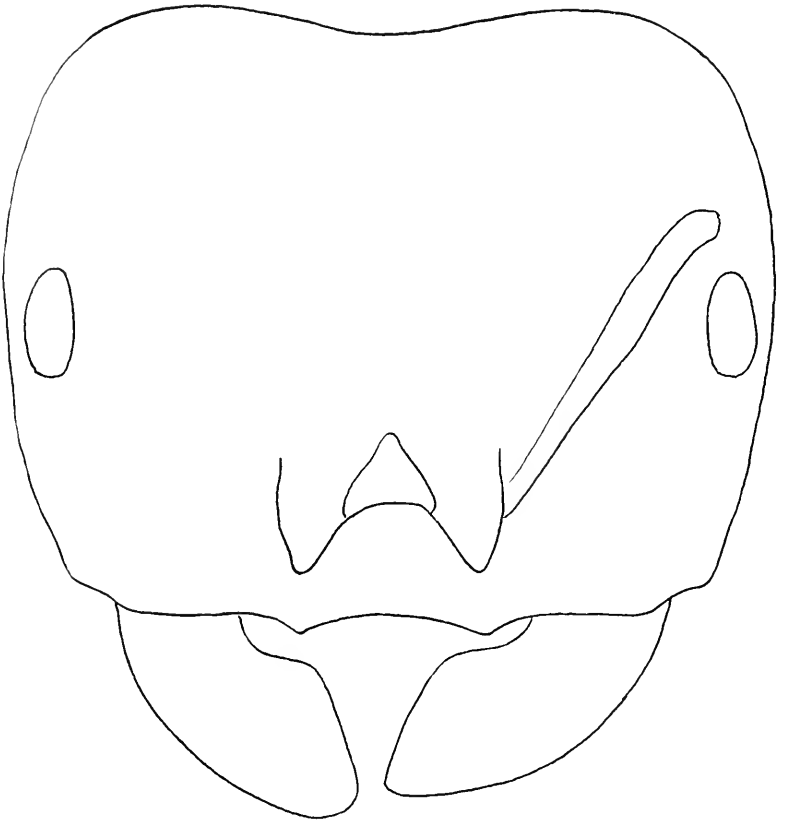

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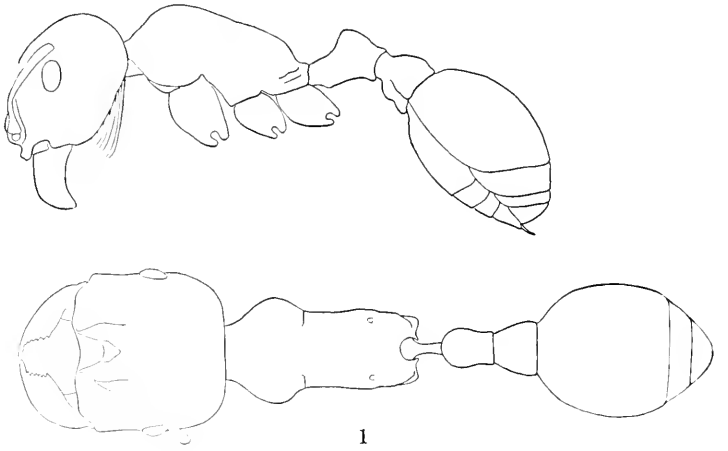
PLATE 2

PLATE 2

Fig. 1. *Pogonomyrmex apache* Wheeler; worker, lateral and dorsal aspect.
Fig. 2. *Pogonomyrmex barbatus* F. Smith; worker, lateral and dorsal aspect.
Fig. 3. *Pogonomyrmex californicus* Buckley; worker, lateral and dorsal aspect.



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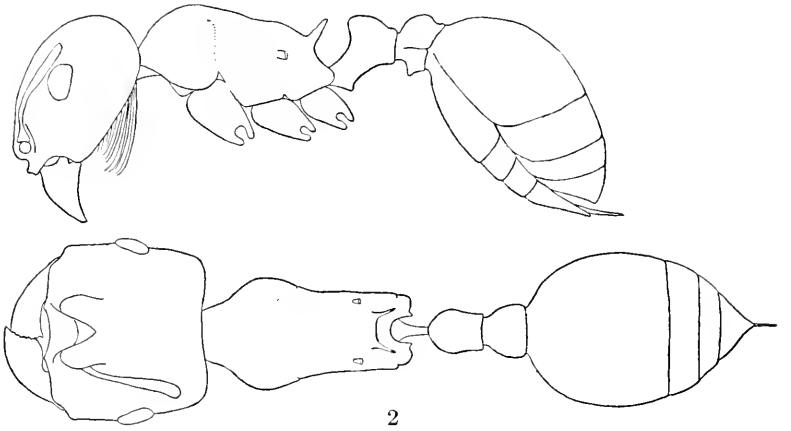

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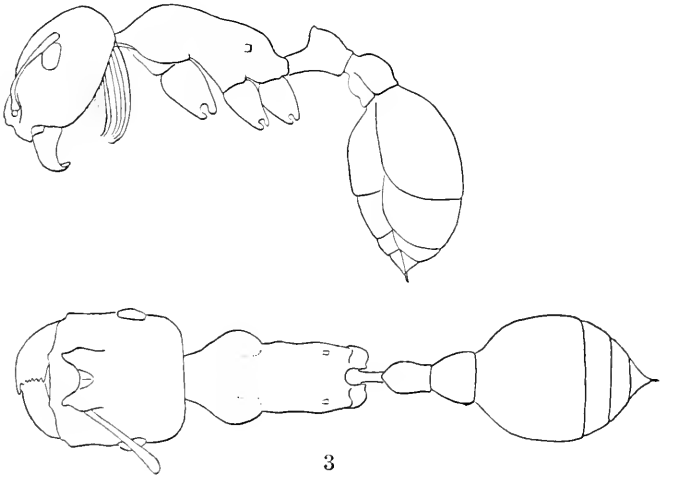

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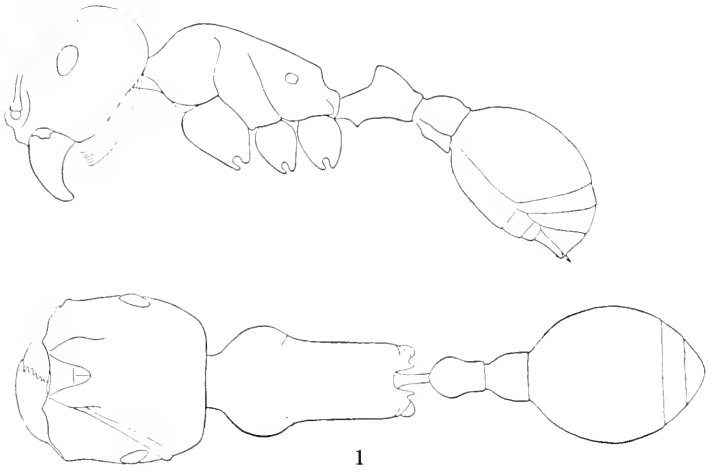
PLATE 3

PLATE 3

Fig. 1. *Pogonomyrmex comanche* Wheeler; worker, lateral and dorsal aspect.
Fig. 2. *Pogonomyrmex desertorum* Wheeler; worker, lateral and dorsal aspect.
Fig. 3. *Pogonomyrmex guatemaltecus* Wheeler; worker, lateral and dorsal aspect.



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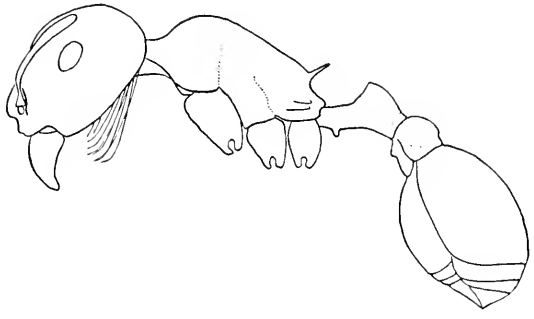

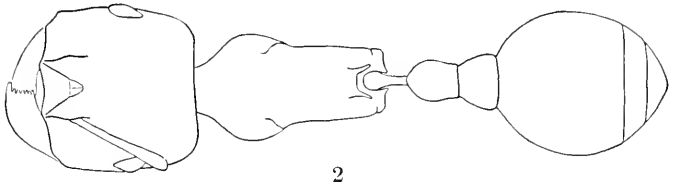

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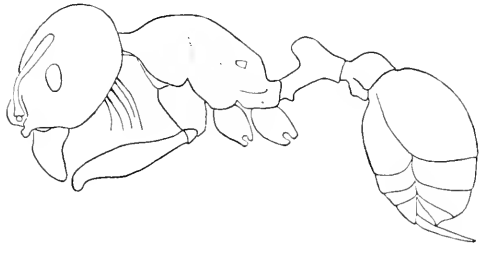

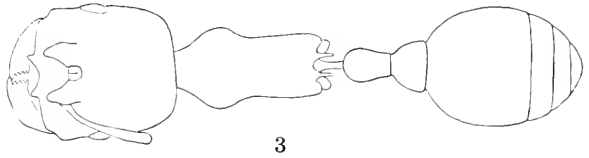

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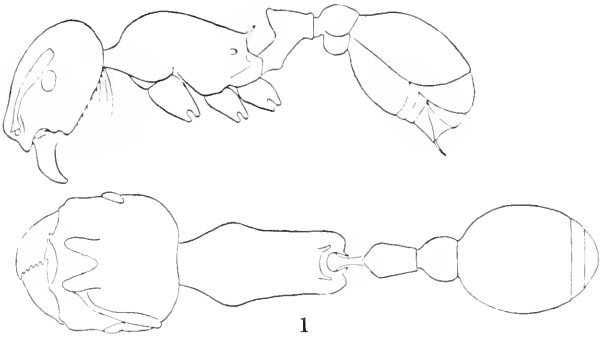
PLATE 4

PLATE 4

Fig. 1. *Pogonomyrmex huachucanus* Wheeler; worker, lateral and dorsal aspect.
Fig. 2. *Pogonomyrmex occidentalis* Cresson; worker, lateral and dorsal aspect.
Fig. 3. *Pogonomyrmex subnitidus* Emery; worker, lateral and dorsal aspect.



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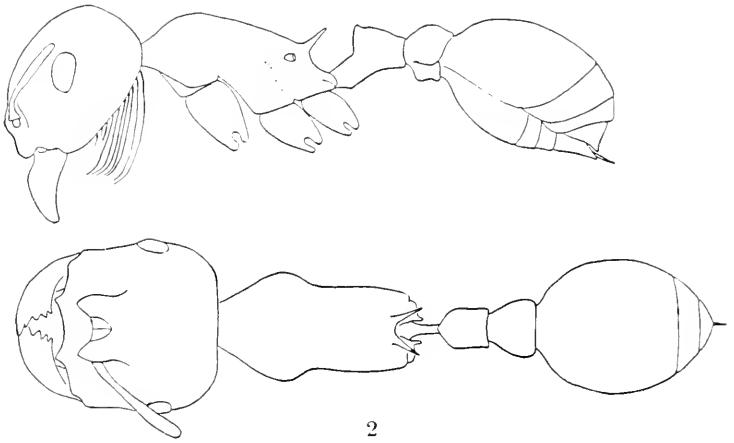

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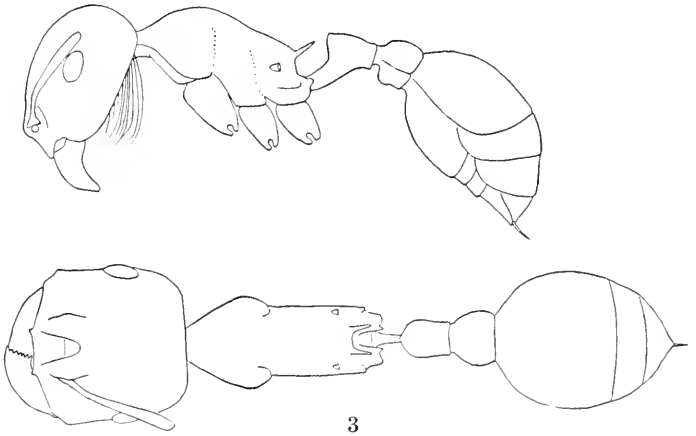

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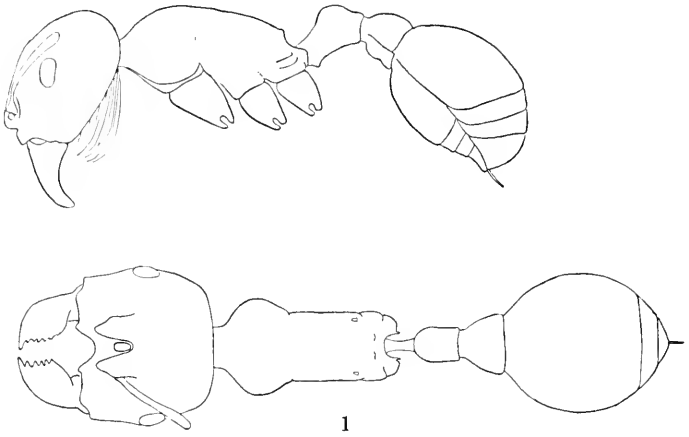
PLATE 5

PLATE 5

Fig. 1. *Pogonomyrmex sancti-hyacinthi* Wheeler; worker, lateral and dorsal aspect.

Fig. 2. *Pogonomyrmex subdentatus* Mayr; worker, lateral and dorsal aspect.

Fig. 3. *Pogonomyrmex salinus* Olsen; worker, lateral and dorsal aspect.



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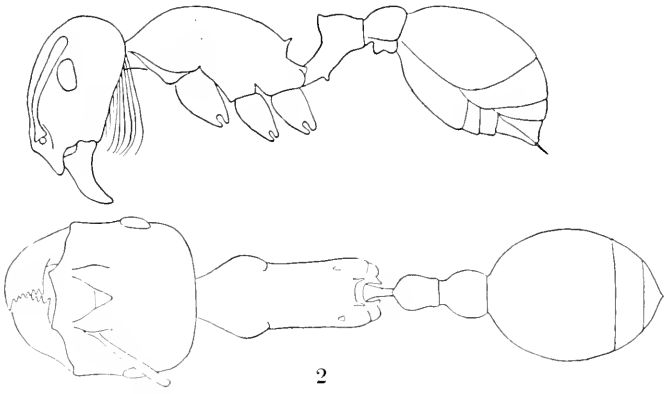

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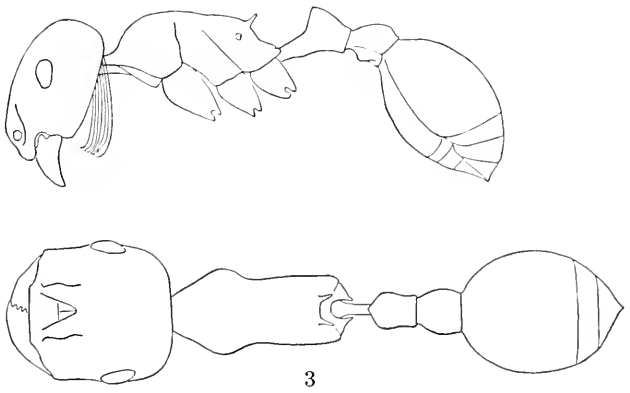

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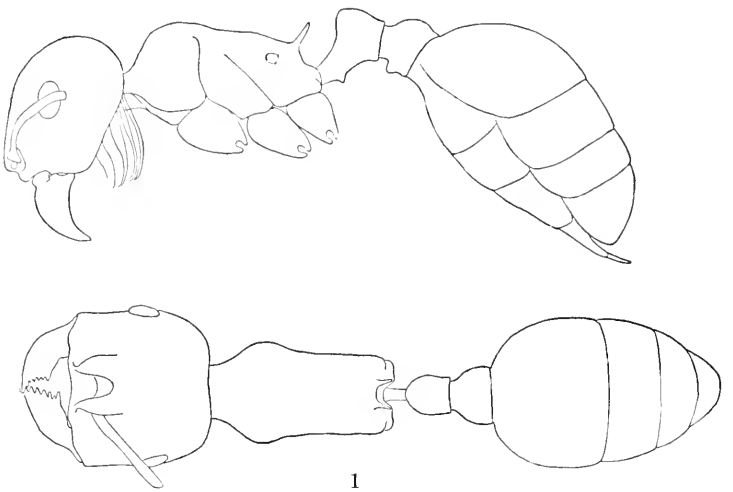
PLATE 6

PLATE 6

Fig. 1. *Pogonomyrmex wheeleri* Olsen; worker, lateral and dorsal aspect.
Fig. 2. *Pogonomyrmex similis* Olsen; worker, lateral and dorsal aspect.
Fig. 3. *Pogonomyrmex* (*E.*) *imberbiculus* Wheeler; worker, lateral and dorsal aspect.



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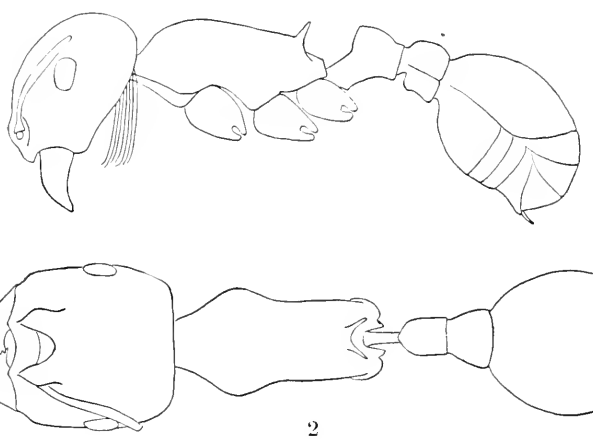

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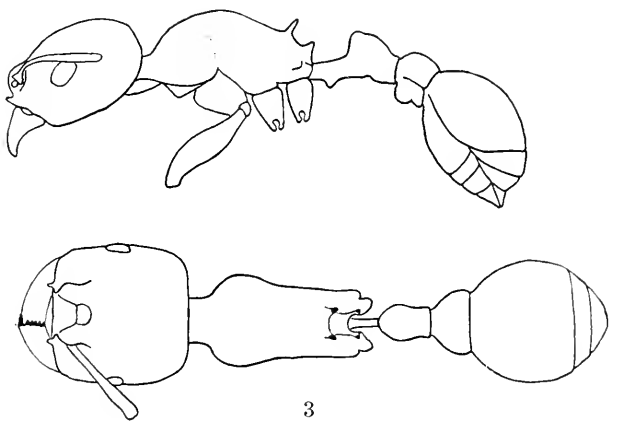

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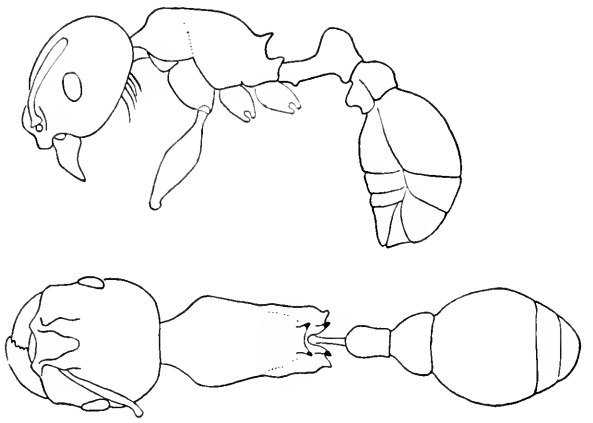
PLATE 7

PLATE 7

Fig. 1. *Pogonomyrmex* (*E.*) *pima* Wheeler; worker, lateral and dorsal aspect.
Fig. 2. *Pogonomyrmex* (*E.*) *saucius* Wheeler and Mann; worker, lateral and dorsal aspect.



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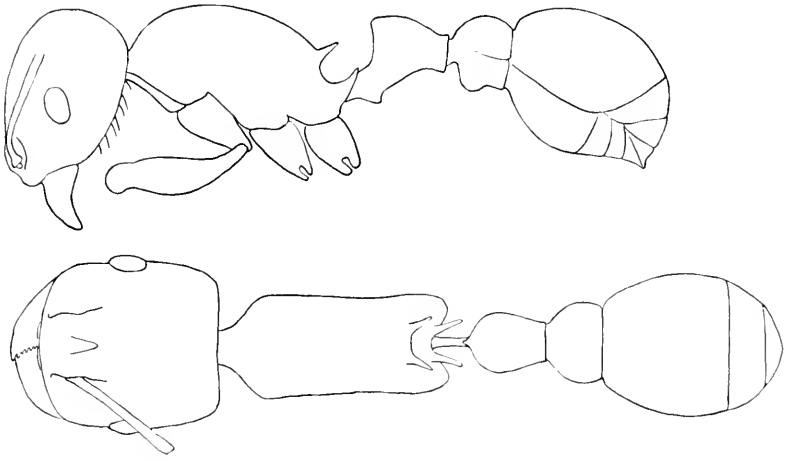

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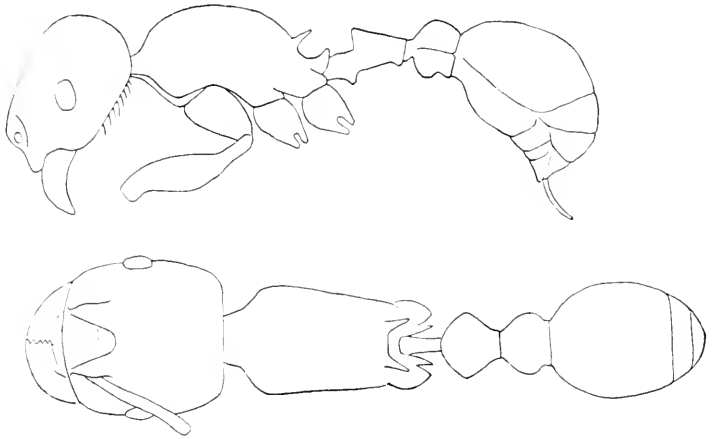
PLATE 8

PLATE 8

Fig. 1. *Pogonomyrmex* (*E.*) *schmitti* Forel; worker, lateral and dorsal aspect.
Fig. 2. *Pogonomyrmex* (*E.*) *townsendi* Wheeler; worker, lateral and dorsal aspect.



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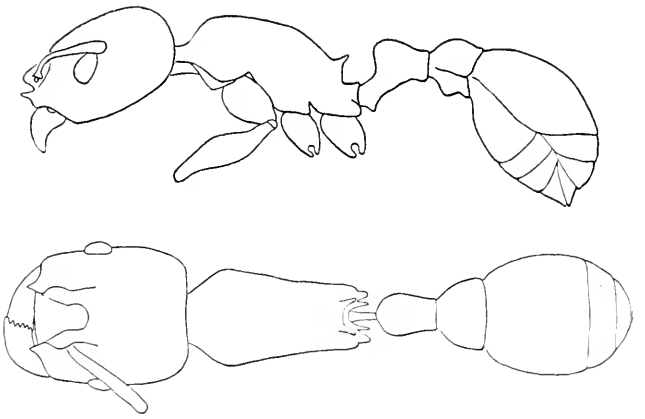
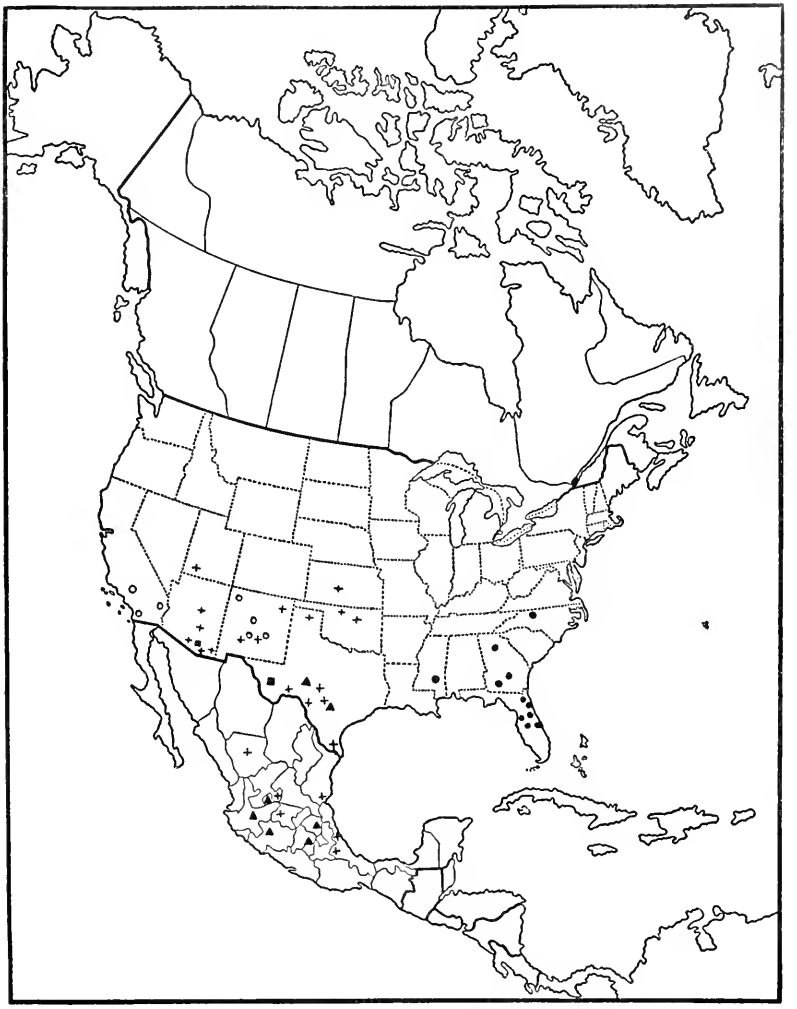


2

PLATE 9

PLATE 9

Distribution of Pogonomyrmex in North America.



Distribution of Pogonomyrmex in North America.

■ Pog. apache Wh.
● Pog. badius Lat.
▲ Pog. barbatus F. Smith
\+ Pog. barbatus var. molefaciens Buck.
○ Pog. barbatus subsp. rugosus Emery

PLATE 10

PLATE 10

Distribution of Pogonomyrmex in North America.

Distribution of Pogonomyrmex in North America.

■ Pog. barbatus var. fuscatus Emery

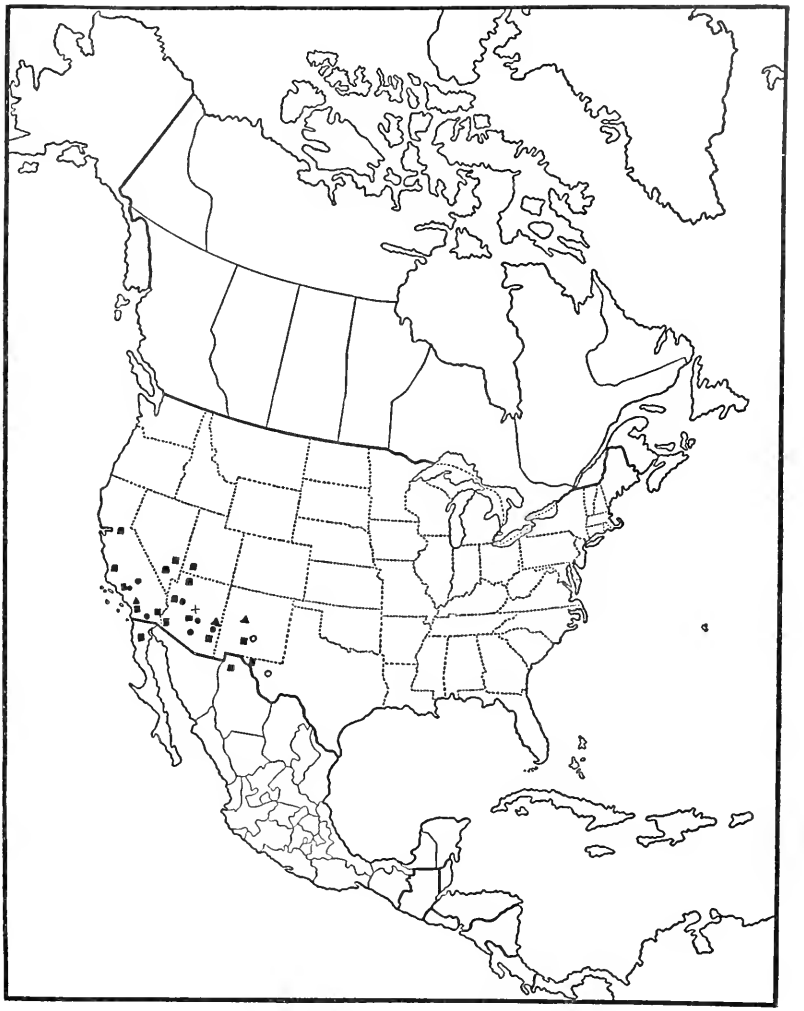
● Pog. barbatus var. marfensis Wh.

\+ Pog. barbatus var. nigrescens Wh.

PLATE 11

PLATE 11

Distribution of Pogonomyrmex in North America.



Distribution of Pogonomyrmex in North America.

■ Pog. californicus Buck.
● Pog. californicus var. estebanius Perg.
▲ Pog. californicus var. hindleyi Forel
\+ Pog. californicus subsp. barnsei M. R. Smith
○ Pog. californicus subsp. longinodis Emery

PLATE **12**

PLATE 12

Distribution of Pogonomyrmex in North America.

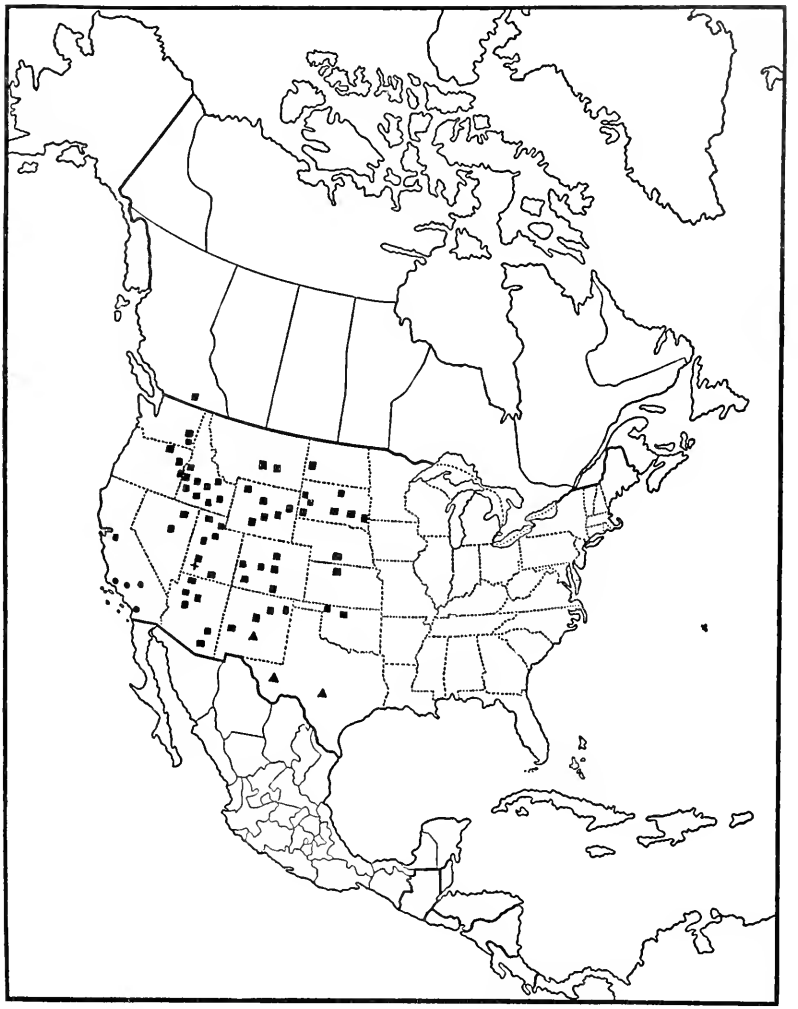
Distribution of Pogonomyrmex in North America.

■ Pog. californicus subsp. maricopa Wh.
● Pog. californicus subsp. sinaloaensis Olsen
▲ Pog. comanche Wh.
+ Pog. dentatus Olsen

PLATE 13

PLATE 13

Distribution of Pogonomyrmex in North America.



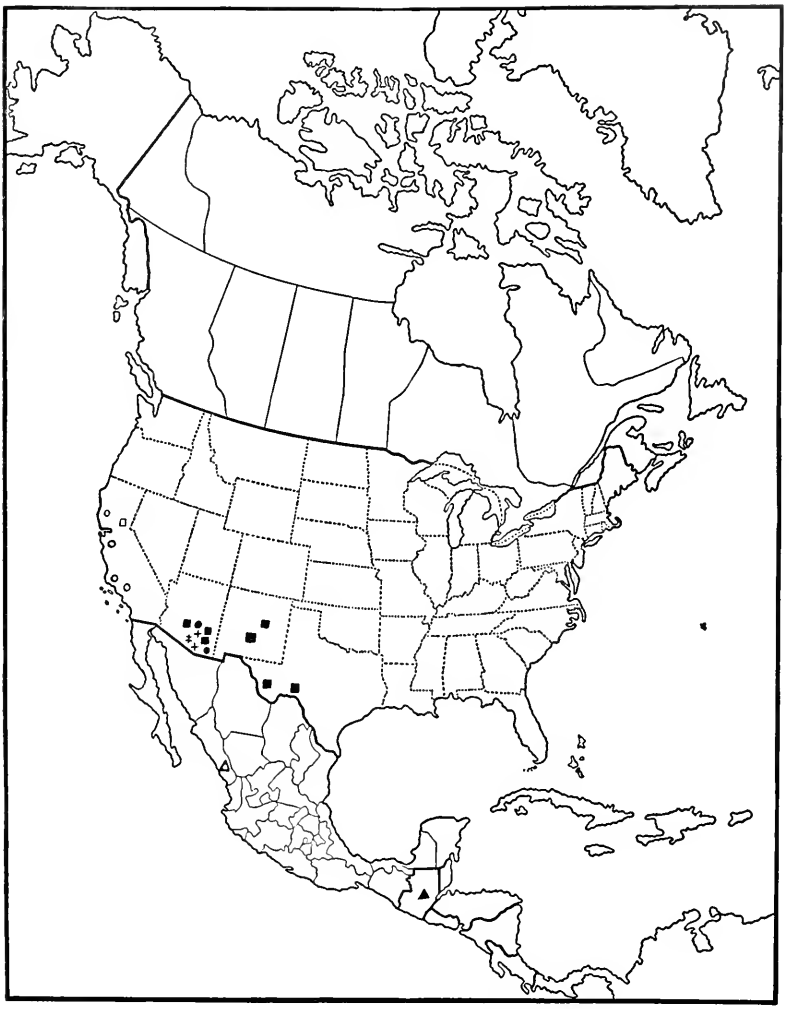
Distribution of Pogonomyrmex in North America.

■ Pog. occidentalis Cresson
+ Pog. occidentalis var. utahensis Olsen
● Pog. subnitidus Emery
▲ Pog. sancti-hyacinthi Wh.

PLATE **14**

PLATE 14

Distribution of Pogonomyrmex in North America.



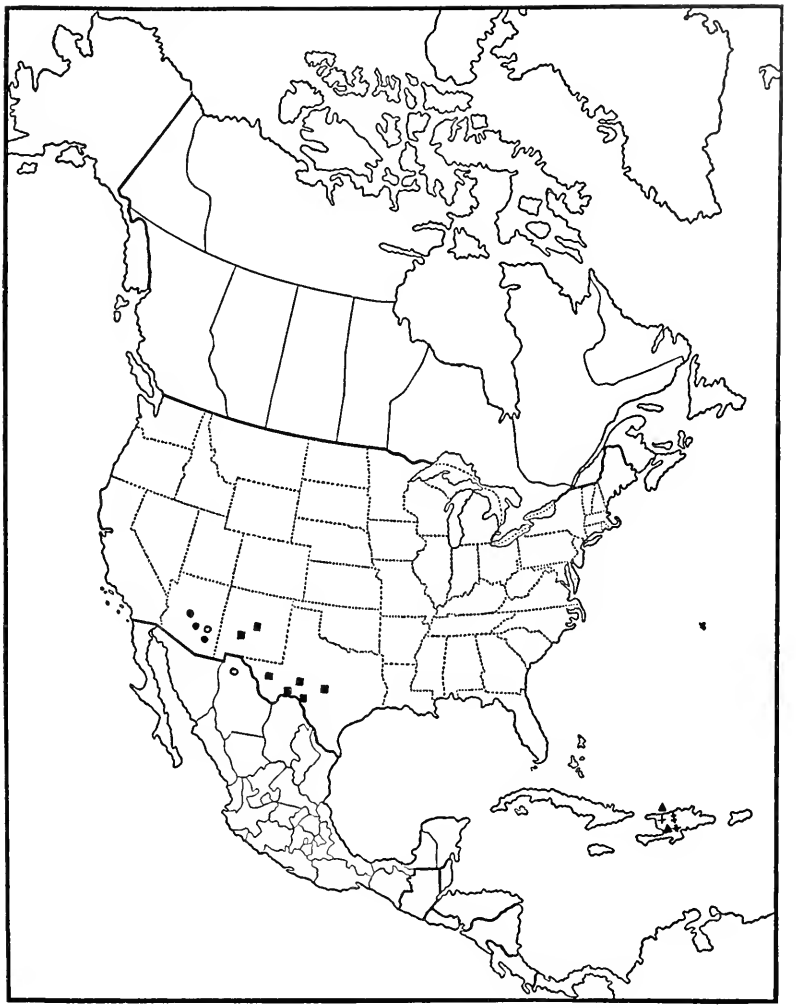
Distribution of Pogonomyrmex in North America.

- ▲ Pog. guatemalteeus Wh.
- \+ Pog. huachucanus Wh.
- ○ Pog. subdentatus Mayr
- □ Pog. salinus Olsen
- △ Pog. wheeleri Olsen
- ≠ Pog. similis Olsen
- ■ Pog. desertorum Wh.
- ● Pog. desertorum var. ferrugineus Olsen

PLATE 15

PLATE 15

Distribution of Pogonomyrmex in North America.



Distribution of Pogonomyrmex in North America.

■ Pog. (E.) imberbiculus Wh.
● Pog. (E.) pima Wh.
▲ Pog. (E.) saucius Wh. and Mann
\+ Pog. (E.) schmitti Forel
≠ Pog. (E.) schmitti var. sublaevigatus Wh. and Mann
○ Pog. (E.) townsendi Wh.

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