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their independent existence and development; Mr. Hugh Main read some notes on the metamorphoses of *Onthophagus taurus* L., illustrated with some remarkable lantern-slides.

The following papers were read:—"Gynandromorphous *Plebeius argus* L.," by Dr. E. A. Cockayne; "Butterflies from the Nile," by Mr. H. Mace; "Types of Oriental *Carabidae* in the Stettin Museum," by Mr. H. E. Andrewes; and "New Genera and Species of Neotropical *Curculionidae*," by Dr. G. A. K. Marshall.

NOTES ON SOME AUSTRALIAN ANTS.

BIOLOGICAL NOTES BY E. B. POULTON, D.SC., M.A., F.R.S.,
AND NOTES AND DESCRIPTIONS OF NEW FORMS BY
W. C. CRAWLEY, B.A., F.E.S., F.R.M.S.

The following paper contains an account of some ants collected during 1914 in West Australia, South Australia, Victoria, and New South Wales. The notes on the habits of each species were made at the time of capture, and Professor Poulton has added further observations from memory. These are indicated by quotation marks and the initials "E. B. P." All captures without the addition of any name or initials were made by Professor Poulton, who contributes the following general notes:—

"During my brief visit to Australia—July 29th to August 27th, 1914, with a few hours at Fremantle on August 31st—I was much struck with the dominant position of the ants in the insect fauna. Other insects were scarce, especially the Lepidoptera; indeed the only day on which I saw an abundance of varied insect life was August 31st, at Cottesloe Beach, Fremantle, where the 'wattle' (*Acacia* spp.) was in bloom and attractive to many species. The important position taken by the ants is shown by the species recorded in the present paper, although allowance must be made for the fact that ants are more easily found in a time of scarcity than most insects. But I do not doubt that their predominance in Australia is real.

"I noticed when collecting *Camponotus nigriceps* race *dimidiata* (*infra* p. 125) under the bark of a prostrate tree-trunk near Healesville, Victoria, that Hemiptera on the bark of an adjacent tree were ant-like in appearance and especially in their movements; also at the same time small Coleoptera under and in rotten logs and on bark were, when running, very ant-like. Mr. R. E. Turner has recorded a unique feature in the mimicry, by a fossorial wasp, *Aphelostoma tasmanica* Westw., of the

formidable 'Bull-dog' ants of the genus *Myrmecia*. When alarmed, the wasp often picks up a fragment of dead stick or leaf, which it carries in its mandibles, thus increasing the resemblance to an ant (Proc. Ent. Soc. Lond. 1919, p. xxxvii). I anticipate that the mimicry of ants will prove to be a special feature of the Australian fauna.

"In making the collection here described I received the kindest help from Mr. L. le Seouef, Director of the Zoological Gardens, Perth, and from Mr. H. M. Giles, the Head Keeper; and at and near Healesville from Mr. R. Kelly. A few of the ants were collected in the Blue Mountains, N.S.W., by Prof. von Luschan, of Berlin."

Sub-family I. *PONERINAE* Lep.

Myrmecia vindex Sm.—♀. From many adjacent nests of various sizes. S. Perth, Swan River bank near Zoological Gardens, 2.viii.14 (*L. le Seouef*; *E. B. P.*).

"This species is one of the well-known 'Bull-dog' ants of Australia, a term no doubt applied to many others in the genus. The number of nests in a small area seemed to be a definite habit and is probably advantageous on the Müllerian principle. An enemy having experienced the defensive powers at the mouth of one nest would carefully avoid disturbing others. Thus each nest would help in guarding the rest. The behaviour of the ants was different from any I have seen. Around and just inside the entrance, which appeared to descend vertically into the earth, was a little group of ants. The head of each ant was always facing outwards in the direction of possible attack. When disturbed, the ants walked slowly, with widely opened mandibles, towards the enemy. I have never seen suggested, in the bearing of an insect, so firm a confidence in the possession of terrible powers of defence and such relentless determination to use them. The result was to make them particularly easy to capture with the forceps; for retreat of any kind or the avoidance of danger by rapid movement was quite foreign to their nature."—*E. B. P.*

Some species of ants, by a system of colonisation in addition to the general mode of founding nests by means of fertilised females, succeed in establishing enormous colonies consisting of scores or even hundreds of separate nests, all the members of the different nests being on friendly terms with each other. This is the case with the common European *Formica rufa* and others, and it is possible that some species of *Myrmecia* have a similar habit. It would be interesting to ascertain

whether the members of the different nests of *M. vindex* referred to above were friendly to each other.

M. forficata F.—4 ♀ ♀. Under log in bush, Victoria, near Healesville, Narbethong, Springbank. One ♀ has a ♀ of *Camponotus ferruginipes*, sp. n., fixed to its leg. “When the two were captured and put in the same box, the *Camponotus* seized the leg of the Ponerine. When the box was opened a few hours later the *Camponotus* was dead but still holding on tightly to the living *Myrmecia*.”—E. B. P.

One deälated ♀ was taken under a log in the same locality (*R. Kelly*), and 3 ♀ under a stone near Black Spur in the same district (*E. B. P.*), 15.viii.14.

Amblyopone ferruginea Sm.—8 ♀ ♀. From nest under stone, Blue Mts., N.S.W., near Mt. Victoria, 23.viii.14.

A. australis Erichs.—2 ♀ ♀. Victoria, Healesville to Narbethong, Maryville road, 15.viii.14.

Euponera (Brachyponera) lutea Mayr.—♂ ♂. Near Perth, Yallingup to Mammoth and Lake Caves, under log or stone in bush, 31.vii.14.

♀ ♀, 5 ♂ ♂, and one alate ♀ were taken by H. M. Giles at Munding Weir, near Perth, 3.viii.14, and a single deälate ♀, taken at an earlier date by the same collector, bears the note “Probably Perth District.” ♂ ♂ and ♀ ♀ of this very abundant species are often taken after the marriage flight without ♀ ♀, and it was probably from such a ♂ and ♀ that Mayr described the sexes of his species, as he says “Probably belonging to this species.” Up to recent years I had never received either ♂ ♂ or ♀ ♀ taken with the ♀ ♀, and therefore when Prof. Poulton showed me some ♀ ♀ and one deälate ♀ (queen) taken together under a stone close to the platform at Picton Junction, near Perth, 1.viii.14, the ♀ differing entirely from Mayr’s ♀, it occurred to me that this ♀ was the true female of *E. lutea*. I described this ant in 1918 (*Ent. Rec.* xxx. 5, p. 86) as the true ♀ of this species, or alternatively a “B” form. There is no doubt, however, that the ♀ described by Mayr is the typical ♀ of *lutea*, and therefore the very interesting one discovered by Prof. Poulton must be considered as a “B” form. It is just possible that it may be a parasitic ♀ of another species, though this is not so probable from its appearance. I have recently received many ♂ ♂ and ♀ ♀ taken in nests with ♀ ♀ from different parts of Australia, all the ♀ ♀ being the typical forms. It is a very variable ant as regards colour, ranging from pale yellow to almost black in the same colony, and numerous myrmecophiles are found in its populous nests. The figures

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THE NATURALIST:

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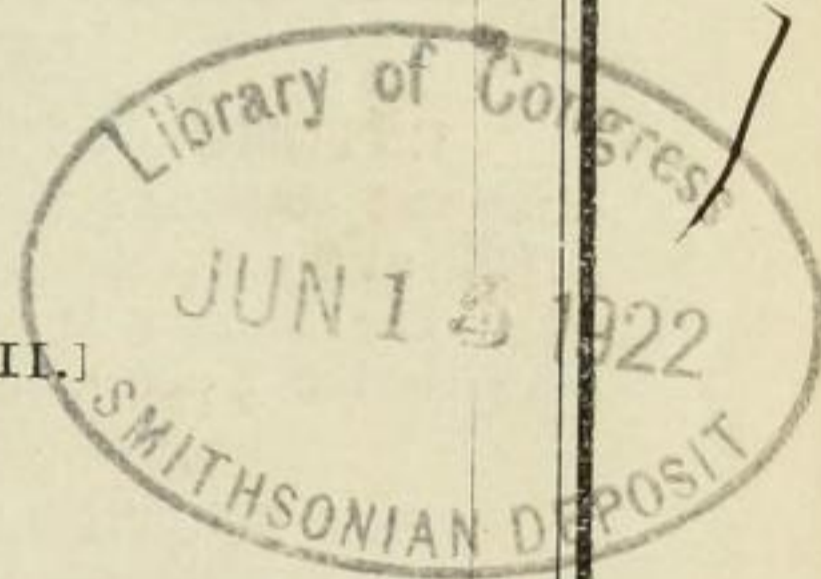
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The Letchworth and District Naturalists' Society, who manage Letchworth Museum, are endeavouring to work up the lists of fauna and flora of the region covered by their activities (a twelve-mile radius). The writer, being entomological recorder for the above Society, would therefore be extremely grateful for any records of insects, other than Lepidoptera, taken by entomologists who have collected at Royston, or any other locality in North Herts or South Beds.

RAY PALMER, F.E.S., "Ingleholme," Norton Way, Letchworth.

MEETINGS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON, 41 Queen's Gate, S.W. 7
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THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, Hibernia Chambers, London Bridge. The Second & Fourth Thursdays in each month, at 7 p.m. The lantern will be at the disposal of Members for the exhibition of slides.

THE LONDON NATURAL HISTORY SOCIETY, now meets in Hall 40, Winchester House, Old Broad Street, E.C. 2, on 1st and 3rd Tuesdays in the month at 6.30 p.m. General meetings 1st Tuesdays, Sectional meetings 3rd Tuesdays. (No meetings in July or August indoors, but field excursions instead.)

Hon. Sec.: W. E. GLEGG, The House, Albion Brewery, Whitechapel Road, E. 1.

Chingford Branch. The Chingford Local Branch meets at the Avenue Café, opposite Chingford Station, at 8 p.m., on the 2nd Monday in each month.

ENTOMOLOGICAL SOCIETY OF HAMPSHIRE AND THE ISLE OF WIGHT.—This Society has developed from the Southampton and District Entomological Society. Meetings are held on the First Saturday afternoon of each month at Southampton, and other meetings will be arranged in important centres in the county from time to time. Activities being undertaken at the present time include the formation of a library, of collections of insects, and the compilation of a county insect fauna list. Will keen entomologists in the county who are interested please communicate with the

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show the great difference in size and structure in the two forms of ♀. In profile the scale of the "B" ♀ is thick like that of the ♂, not knife-edged as in the normal ♀.

Rhytidoponera (Chalcoponera) metallica Sm.—♂. One under log, Mundaring Weir, 3.viii.14; one ♀, Mundaring Weir, 3.viii.14 (*H. M. Giles*); and 6 under stone, Adelaide, Mt. Lofty Range, 10.viii.14.

The specimens from the latter locality are all uniform dark metallic green, and the coarse longitudinal striae on the front do not continue so

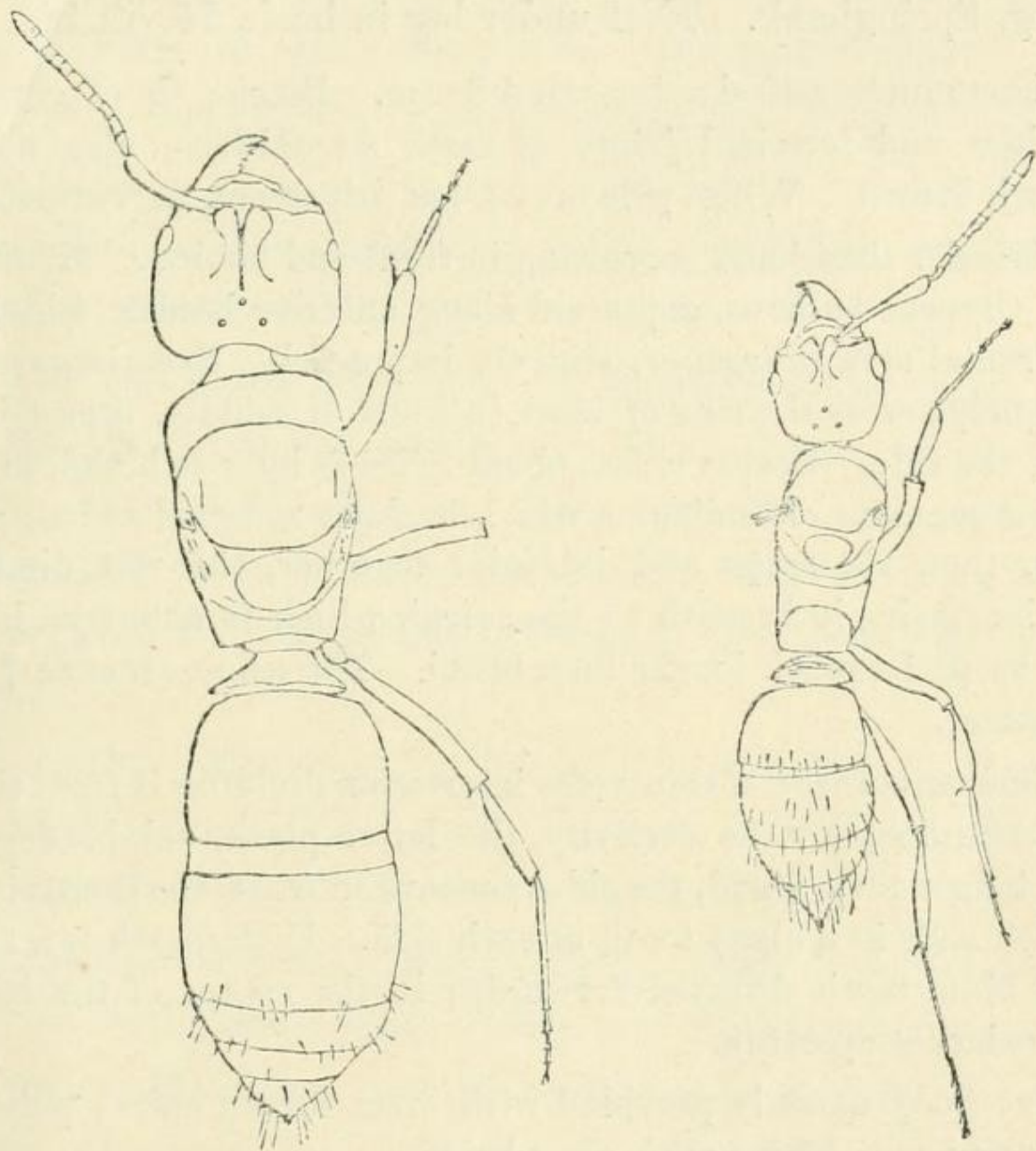


Fig. 1.—Normal ♀ of *Euponera lutea* Mayr. (On same scale as fig. 2.)

Fig. 2.—"B" ♀ of *Euponera lutea* Mayr. (On same scale as fig. 1.)

far as in typical specimens; the scale is straight, not concave, behind; the first segment of gaster has shallow punctures among the fine striae, and the second segment has fewer and shallower ones. The anterior border of the clypeus has a somewhat more pointed form, and the head is not quite so emarginate behind as in typical forms.

This very abundant ant varies greatly, and a number of varieties in addition to those already described might readily be named, but in all probability many of these slight variations are found in the same colony, especially the colour variations. The metallic sheen ranges in all shades from red and purple to green and blue.

R. (C.) metallica Sm., var. *tasmaniensis* Emery.—5 ♀. Near Perth, Yallingup to Mammoth and Lake Caves, under log or stone in bush, 31.vii.14.

R. (C.) metallica Sm., var. *cristulata* Forel.—♂ ♀. Blue Mts., N.S.W., near Mt. Victoria. Nest under stone, 23.viii.14.

For description of the ♂, which was taken on this occasion for the first time, see Ent. Rec. xxx. 5, p. 88 (1918).

R. (C.) victoriae André.—2 ♂, 6 ♀. Victoria, near Healesville, Narbethong, Springbank. Nest under log in bush, 15.viii.14.

♂ (hitherto undescribed). Length 4.8 mm. Black; tip of gaster, articulations of legs and terminal joints of tarsi, ferruginous, also mesonotum; antennae dark brown. Wings pale brown and iridescent, nervures dark brown.

Head broader than long, narrowing in front and behind. Mandibles with 7-8 teeth. Clypeus bulbous, depressed along anterior border, which is feebly convex. Frontal area triangular, slightly impressed. Eyes large and oblong, placed obliquely across the side of head in front of middle, occupying a little more than $\frac{1}{2}$ the side. Scapes short, about twice as long as broad, nearly twice as long as 1st segment of funiculus which is about as broad as long; 2nd joint long, longer than the scape and 1st joint together, the rest diminishing in length and increasing in breadth to the apical, which is about as long as the 2nd. All except 1st much longer than broad. The whole antenna $\frac{3}{4}$ as long as the whole insect.

Scutellum prominent, a transverse impression dividing it from the scutum. Base of epinotum equals the declivity, the latter plane, sub-bordered. Scale from above longer than broad, the sides concave in front, the concavity forming a ridge which ends in a blunt tooth at each side. Underneath is a flat lamella ending in a blunt tooth directed forwards; in the centre of the lamella is a circular translucent aperture.

Pilosity: body sparsely provided with erect brown hairs; pubescence nil except on antennae. Tibiae with erect hairs.

Gaster and mandibles shining, the rest sub-matt. Mandibles with very few small punctures; rest of head roughened, mostly longitudinally. Scutum anteriorly with a short longitudinal impression from which radiate fine striae. Mayrian furrows with broad transverse grooves, shining, the rest and the scutellum irregularly and longitudinally rugose-striate. Epinotum irregularly and coarsely transversely reticulate. Node with irregular lines. Gaster shining and smooth, with traces here and there of superficial striae.

Sub-family III. *MYRMICINAE* Lep.

Aphaenogaster (Nystalomyrma) longiceps Sm.—13 ♀ ♀, near Healesville, Victoria, under rotting log, 16.viii.14. These ♀ ♀ agree perfectly with Smith's type.

A. (N.) poultoni Crawley.—Three ♀ ♀, taken by Prof. Poulton in the Zoological Gardens, Perth. I have received numbers of this species from the neighbourhood of Perth.

“I have no special recollection of the nest of *longiceps*, but I feel sure that the log when raised only disclosed a series of tunnels from which the ants were taken. The openings to the nests of *poultoni* in the Zoological Gardens were very characteristic. They were scattered sparingly over the bare turf and were all alike, being deep, circular, little craters, from memory about $1\frac{1}{2}$ inches in diameter, with a small central hole passing vertically downward. The crater was surrounded by a wall of pure yellow sand evidently brought up from below the superficial soil, from which it was entirely free. The yellow sand also lined the crater, which, with its wall, was a very conspicuous object. Very few ants were seen in the craters, never more than one or, at the most, two in each.”—E. B. P.

A. poultoni is described in a paper now being printed for the Ann. and Mag. Nat. Hist.

Pheidole variabilis Mayr var.—A single \mathcal{Q} under stone, Blue Mts., N.S.W., near Mt. Victoria, 23.viii.14. This appears to be one of the numerous varieties of this species. It is very like var. *rugocciput* For. from Queensland, as it has the whole head longitudinally striate and reticulate between the striae, but the scapes are somewhat shorter than in *rugocciput*.

Monomorium (Mitara) ilia For.— \mathcal{Q} \mathcal{Q} and 4 \mathcal{Q} \mathcal{Q} , from nests in rotten wood, S. Perth, Zoological Gardens, and Swan River Bank, 2.viii.14 (*L. le Seouef*; *H. M. Giles*; *E. B. P.*).

Crematogaster australis Mayr.— \mathcal{Q} \mathcal{Q} , many \mathcal{M} \mathcal{M} , 3 alate and one dēalate \mathcal{Q} , S. Perth, Swan River bank, near Zoological Gardens. From 3 nests in rotten *Melaleuca* trunk, 2.viii.14 (*L. le Seouef*; *E. B. P.*). “The nests, of which two were found on one tree, were excessively populous.”—E. B. P.

This I take to be Mayr’s species from his description, though I have never seen a co-type or a specimen named by a myrmecologist who has seen the type, and I am not completely satisfied that this is *australis*.

C. rufotestacea Mayr.—5 \mathcal{Q} \mathcal{Q} , under log or stone in bush, near Perth, Yallingup to Mammoth and Lake Caves, 31.vii.14.

This is a very abundant species in Western Australia.

Sub-family IV. *DOLICHODERINAE* Forel.

Iridomyrmex detectus Sm.— \mathcal{Q} \mathcal{Q} . Mundaring Weir, near Perth, 3.viii.14; Perth, stations on railway to Busselton, 30.vii.14; Adelaide, Outer Harbour, 27.viii.14. “The entrance to the nests was very characteristic, being a single opening, leading vertically downwards, in the

centre of a bare, smooth, circular patch, from memory about a foot in diameter. Across this patch the ants ran with great rapidity in their journeys to and from the nest. Known as the 'meat ant.'—E. B. P.

Abundant almost over the whole continent.

I. discors For.—♂ ♀. Under log or stone in bush, near Perth, Yallingup to Mammoth and Lake Caves, 31.vii.14. Also a very abundant species in West Australia.

I. conifer For.—♂. Perth, stations to Busselton; Yallingup, close to sea, 30.vii.14. An extremely abundant species in W. Australia. The nests harbour a great number of myrmecophiles.

“The nests, which were especially common near the sea at Yallingup, resembled a small *Formica rufa* nest, but the material was coarser, grey in colour, and freely intermixed with sand. Near one of the nests in this locality a crowd of ants was seen busily engaged in attacking some object. One scoop with a moderate-sized pill-box secured 32 ♀ with their prey, a Noctuid larva. The contents of the box were poured into a cyanide bottle, and, when examined later, were found to include a large larva of the Myrmeleonid genus *Palpares*. It seems probable that this predaceous insect had been attracted by the number of ants at one spot and had tunnelled towards and beneath them. Its flexible limbs suggested that it had been alive when put into the bottle.”—E. B. P.

I. emeryi Crawley.—♂ ♀ ♀. This species was described in Ent. Rec. xxx. 5, p. 90, 1918. “A moderate-sized flat stone formed the roof of a chamber the floor of which was crowded with winged ♀ ♀, while the ♂ ♂ were hanging, as densely packed, from the ceiling. The close proximity of the sexes—for the chamber was low—combined with their absolute segregation, was a very striking sight.”—E. B. P. In the original description the locality was given as Victoria; it should be N. S. Wales, Blue Mts., near Mt. Victoria, 23.viii.14.

I. fornicatus Em.—10 ♀ ♀, under stone, Blue Mts., N.S.W., near Mt. Victoria, 23.viii.14. Kindly determined for me by Prof. Emery.

I. itinerans Lowne, race *nitidiceps* André.—1 ♀, near Perth, Yallingup to Mammoth and Lake Caves, under log or stone in bush, 31.vii.14. The specimen is damaged, but it is almost certainly this species, which I have frequently received from the Perth district.

I. rufoniger Lowre.—4 ♀ ♀, in flower of pink *Mesembryanthemum*, Adelaide, Outer Harbour, 27.viii.14.

I. sp.—♀ ♀, under stone, Victoria, near Healesville, near Black Spur, 15.viii.14. I am unable to identify this species at present.

I. (Doleromyrma) darwinianus For., var. *flida* For.—8 ♂♂. Yallingup to Mammoth and Lake Caves, under log or stone in bush, 31.vii.14. Kindly identified by Prof. Emery.

Leptomyrmex erythrocephalus F.—1 ♀, under stone, Blue Mts. N.S.W., near Mt. Victoria, 23.viii.14 (*von Luschan*).

Turneria frenchi For.—7 ♂♂, under stone, Blue Mts., N.S.W., near Mt. Victoria, 23.viii.14. Not having been able to compare this striking little species with Forel's co-types, I place it with some hesitation under *frenchi*, though it agrees fairly well with the description.

Sub-family V. *CAMPONOTINAE* Forel.

Notoncus sp.—4 ♂♂, 1 ♀ alate. These 5 specimens do not quite agree with any of the published descriptions. They are very like *gilberti* For., from Queensland, but are without the striae on the thorax. There are so few representatives of this genus in our collections in this country that I let them stand over for further material. The ♂♂ measure 4.5 to 5.1 mm. Near Perth, Cottesloe Beach, sea to railway station, in one nest, under a stone or piece of tin.

Notoncus sp.—A single specimen, a ♀, differing from the above, but indeterminable at present. Near Perth, Yallingup to Mammoth and Lake Caves, under log or stone in bush, 31.vii.14.

Camponotus (Myrmoturba) nigriceps Sm., race *dimidiata* Rog.—20 ♂♂, from nest under bark of prostrate trunk, Victoria, near Healesville, 16.viii.14. 9 ♂♂, under stone, Blue Mts., near Mt. Victoria, 23.viii.14 (*von Luschan*). "The ant-like Hemiptera and beetles with ant-like movements (*supra*, p. 118) were found near the Healesville nest."—E. B. P.

C. (Myrmophyma) testaceipes Sm.—6 ♂♂, 16 ♀♀, under log, near Perth, Mundaring Weir, 3.viii.14.

C. (Myrmogonia) claripes Mayr, race?—4 ♂♂ minor, near Perth, Yallingup to Mammoth and Lake Caves, under log or stone in bush, 31.vii.14.

Difficult to identify without ♂♂ major.

C. (Myrmosphincta) suffusus Sm., var. *bendigensis* For.—A single ♂ under stone, Blue Mts., N.S.W., near Mt. Victoria, 23.viii.14 (*von Luschan*).

C. (Myrmosaga) ferruginipes, sp. n.

♂ major. Length 9 mm. Deep black; masticatory border of mandibles reddish, funiculi dark red-brown, legs bright ferruginous.

Head very slightly broader than long, widest at eyes, sides feebly convex. Mandibles 6-dentate. Scapes pass the occiput by more than a quarter of their length. Clypeus feebly carinate. Anterior border very sinuate. Eyes flat, placed above the middle of sides.

Pronotum broad in front, the shoulders rather prominent and bordered. Base of epinotum $1\frac{1}{4}$ as long as declivity, saddle-shaped. Scale in profile twice as high as broad, bluntly rounded at top. From above it is wider than long.

Pilosity sparse, brown-yellow. A slight pubescence on head and gaster. Tibiae and scapes without erect hairs.

Moderately shining. Mandibles shining, with a few punctures and lines at base; clypeus, cheeks, and the space between the frontal carinae have small, scattered, irregular punctures. Whole of head and thorax minutely and closely reticulate and semi-matt; on sides of thorax and on base of epinotum the sculpture has a more or less transverse direction. Scale with extremely fine encircling striae; gaster with even finer transverse striae. Legs microscopically reticulate-striate.

A single specimen, fastened, as related on p. 120, to the leg of a *Myrmecia forficata*, near Healesville, Victoria. The gaster is unfortunately somewhat damaged and some legs are missing. It is quite unlike any of the described forms of this subgenus from Australia. The *C. (M.) chalceus* Crawley, originally taken at Yallingup, comes nearest this species, but differs principally in colour. It has since turned out to be a very abundant species in Western Australia. See Ent. Rec. xxx. 5, 1918.

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SOME INDIAN COLEOPTERA (8).*

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The eighth contribution of this series contains descriptions of, or notes on, the few known Dasytids inhabiting the Himalaya, the Nilgiri Hills, etc., nineteen in all. Three others have already been recorded by me from India, *Eulobonyx exasperatus* and *E. sericeus* Champ. (Ent. Mo. Mag. 1920, pp. 71, 72) and the cosmopolitan *Acanthocnemus nigricans* Hope (= *ciliatus* Perris) (*op. cit.* 1922, pp. 77-79). A peculiar *Cis* is also described. The species enumerated in this paper are

* Continued from *ante*, p. 76.