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 Mundaring 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

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

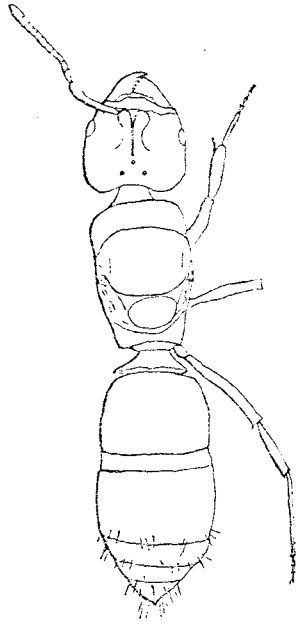

Fig. 1.—Normal ♀ of *Euponera lutea* Mayr. (On same scale as fig. 2.)

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.