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THE SEARCH FOR *NOTHOMYRMECIA*

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Despite the world-wide prevalence and great diversity of the ants, the origins of these insects remain shrouded in mystery. Presumably the most primitive forms arose from non-social tiphioid wasps, but the exact intermediate links are unknown. As a consequence, the origin of social behaviour in the ants can only be inferred from the study of living, completely social forms. It is therefore natural that entomologists should devote special attention to the primitive ants, which, it is hoped, will provide valuable clues to the critical early steps in ant evolution (Wheeler, 1933; Haskins and Haskins, 1950, 1951).

On the basis of purely morphological evidence, the most primitive known ant, living or fossil, appears to be the contemporary species *Nothomyrmecia macrops* Clark. This unusual form was described by the Australian entomologist John Clark in 1934 from two specimens collected in the arid country inland from Israelite Bay, in south-eastern Western Australia. It is a curious and unhappy fact that in the intervening twenty-five years, despite strenuous efforts by several teams of entomologists in the field, no additional specimens have been obtained. The purpose of the present paper is to call attention to the significance of *Nothomyrmecia macrops,* to add certain important morphological details omitted in Clark's original description, and to describe briefly the history of the field trips conducted in the area of the presumptive type locality.

Nothomyrmecia macrops looks in many ways like a smallish bull ant or large jumper ant (genus *Myrmecia*), although the jaws are broader and the eyes set farther back on the sides of the head. The ant is tawny yellow in colour and covered with long erect hairs. The claws are strong, with an extra tooth as in the bull ants, and well fitted for climbing trees or shrubs. A strong sting is present and probably used with good effect.

In a recent review of the phylogeny of the ants, one of us (Brown, 1954) has suggested that *Nothomyrmecia* is the most primitive member of the subfamily Myrmeciinae, which includes the most primitive known of the living and fossil ants. The Myrme-

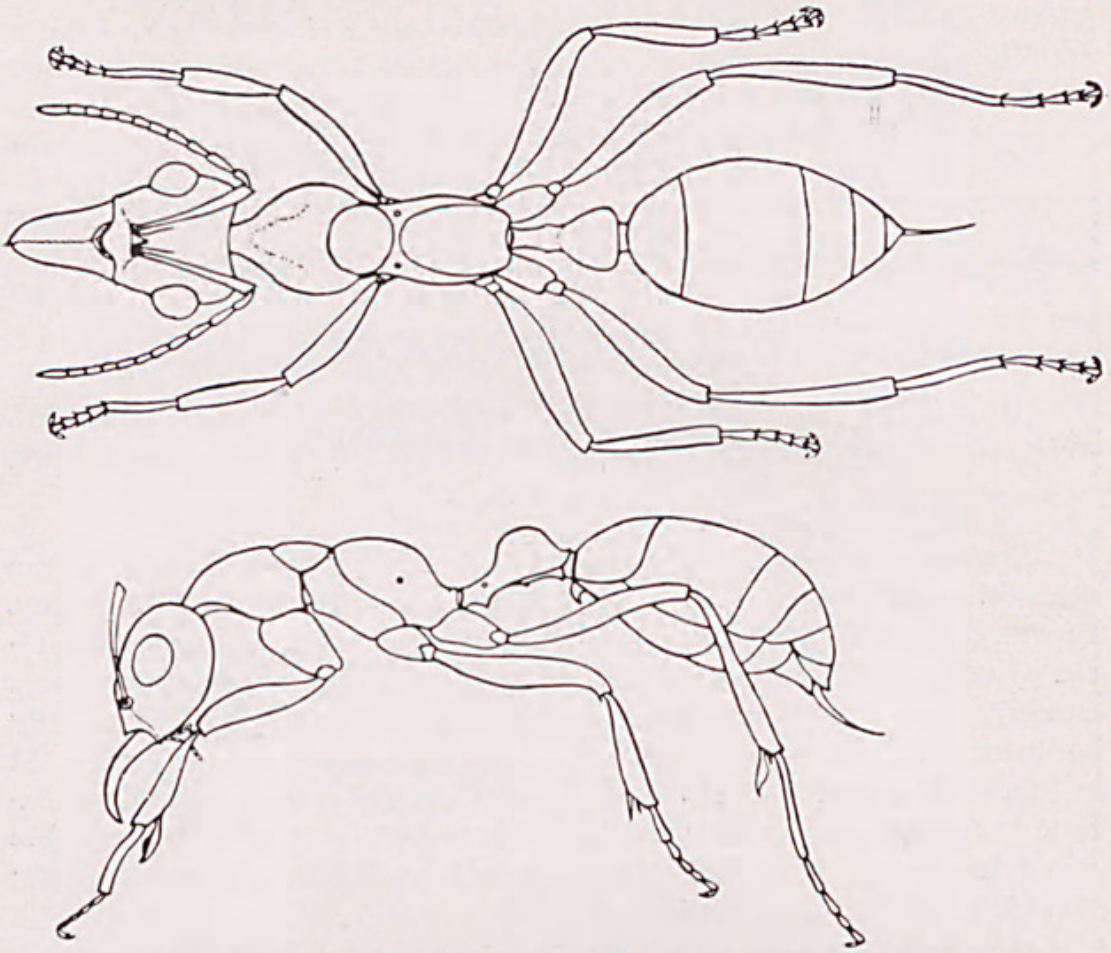

Fig. 1.—Reproduction of Clark's original figure of the *Nothomyrmecia macrops* worker, slightly retouched. A few minor errors in the drawings are left uncorrected. In actual size, *Nothomyrmecia* is about a half inch long.

ciinae have three genera: *Myrmecia* Fabricius,, the bull and jumper ants of Australia, with one species in New Caledonia; *Prionomyrmex* Mayr of the Oligocene Baltic amber of Europe; and *Nothomyrmecia*. One great difference shown by *Nothomyrmecia* as against *Myrmecia* and the fossil *Prionomyrmex* is that it has a single pedicellar node—in other words, the waist consists of but a single pinched-off segment instead of two. *Nothomyrmecia* differs from *Myrmecia* in its broader, serially dentate mandibles, the toothed borders of which meet at full closure; bull ant mandibles are much more slender, and cross when closed. *Prionomyrmex,* so far as we can see in the fossils available, has mandibles more as in *Nothomyrmecia,* and thus is intermediate between the two living genera. But *Nothomyrmecia* is more specialized than the other two genera in that it has greatly reduced ocelli and uniformly light body pigmentation.

A recent re-examination of the *N. macrops* types in the National Museum of Victoria, Melbourne, has resulted in the correction of one error made in Clark's description. These specimens were represented by Clark as completely lacking ocelli or ocellar pits, an important character with reference to the phylogenetic position of the species. In actuality, distinct but small ocellar pits are present. At the highest magnification used (100X), it was not

possible to determine whether true ocelli are also present or not. If so, they are extremely reduced. Other important features noted were the well-developed metapleural glands, a basic diagnostic character of the Formicidae, and the irregular, serially arranged mandibular dentition.

The two *Nothomyrmecia* workers were collected by a small excursion party journeying in the isolated mallee and heath country south of Balladonia, during the period December 7, 1931, to January 7, 1932. A general collection of insects was made by several persons in the party, and this was later turned over to Mrs A. E. Crocker (neé Baesjou), of Balladonia Station, an amateur entomologist. Unfortunately, no specific locality records were kept,

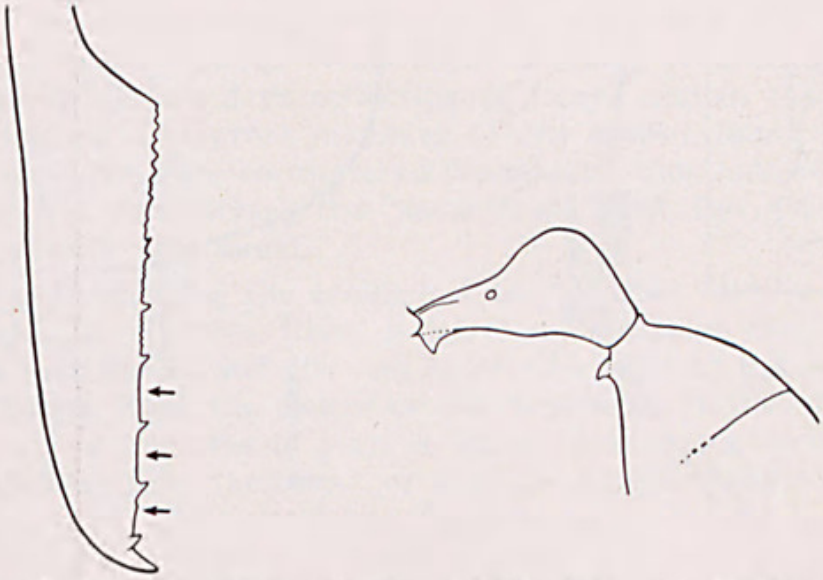

Fig. 2.—(Left) Drawing of the right jaw of *Nothomyrmecia macrops,* much enlarged, showing teeth. The arrows indicate parts of the border that were seen to be very finely serrate at higher magnifications. (Right) Detail of the petiole or "waist" of *N. macrops* and its attachment to the gaster. These drawings were made by E. O. Wilson in 1955 from one of the two original specimens.

and all of the material was placed together in common collecting bottles. Mrs Vern Thomas, who was a member of the party, recalls *(in litt.)* that most of the travelling was done by truck, with horses being used for occasional side trips into rough country. On the first day (December 7) a luncheon stop was made at Mt. Ragged, but apparently very little collecting was accomplished there. The same night, camp was made south of Mt. Ragged at a spot sometimes referred to locally as "Goora" (see map). Here insects were collected in mallee-heath transition during the early evening. The following day, camp was made south of Thomas River on the coast. In the next several weeks numerous excursions were made inside a ten-mile radius, and during this time insects were collected intermittently. On the final trip from the Thomas River to Esperance, collecting was conducted in the sandplain heath along the Esperance-Israelite Bay track. Mrs Thomas has no specific recollection of the collection of the *Nothomyrmecia,* but Mrs Crocker person-

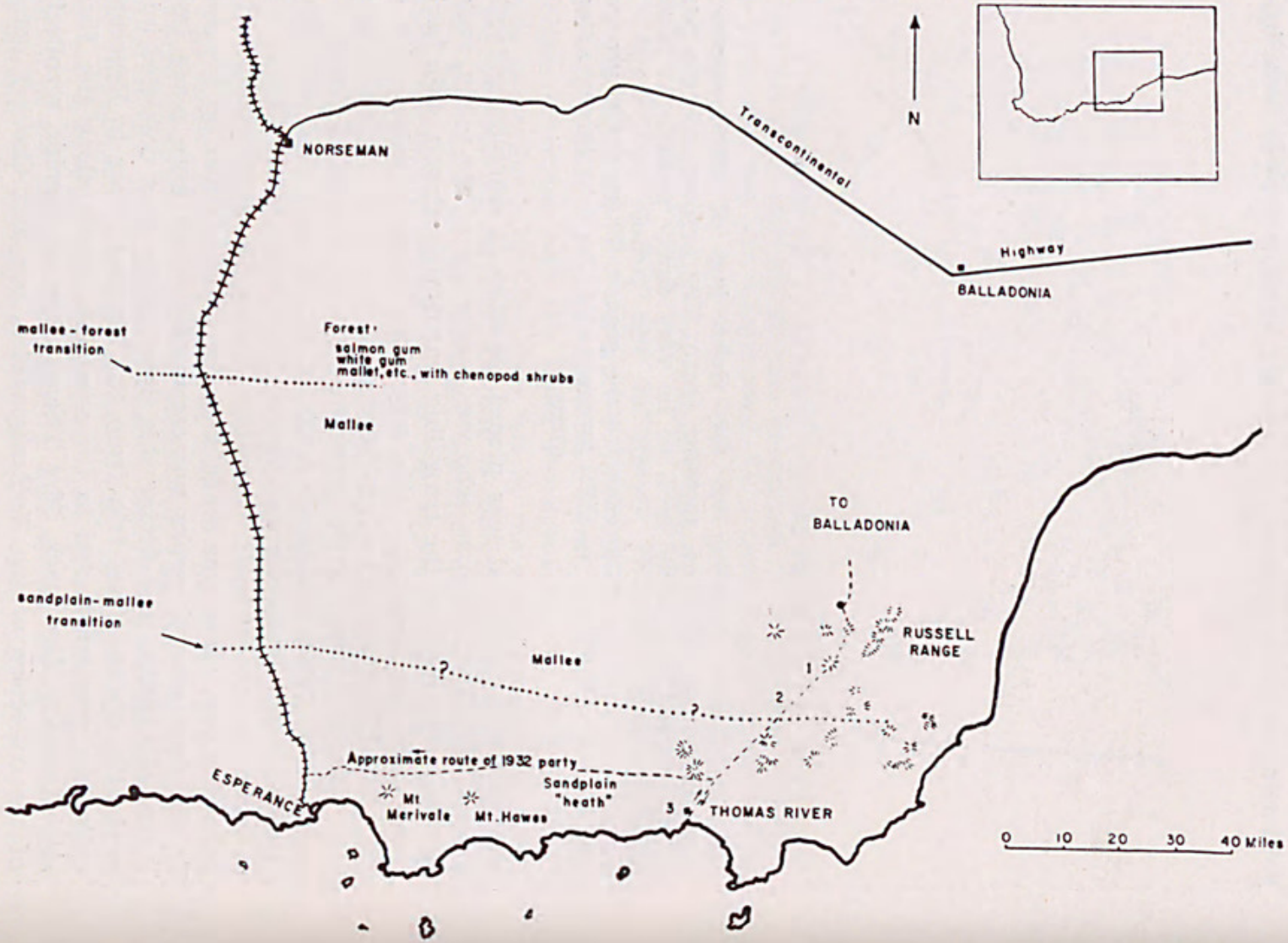

Fig. 3.—Map of the Esperance - Norseman - Balladonia area of Western Australia, showing the route taken by the party that collected *Nothomyrmecia* originally while travelling from Balladonia to Esperance via Thomas River. Stops were made at Mt. Ragged (1), at "Goora" (2), and at the abandoned Thomas River Station (3). The locality of collection along this route was not recorded.

ally affirms that the specimens were among the fresh insect collections turned over to her by the excursion party.

In November, 1951, W. L. Brown visited the Esperance area in an attempt to obtain additional specimens of *Nothomyrmecia*. Several days' collecting in the vicinity of Esperance and Mt. Merivale proved fruitless. In January, 1955, a second, more intensive search was conductd by a party consisting of Bob Douglas, Caryl Haskins, Vincent Serventy and Edward Wilson. This group proceeded by truck directly to the abandoned Thomas River Station. From January 26 to 29, ants were collected in the Thomas River basin and in the sandplain heath for a distance of seven miles north of the Thomas River, or two miles north of the junction of the Balladonia-Thomas River and Esperance-Israelite Bay tracks. Collections were made during both the day and night and involved excavations and sweeping. When these efforts proved unsuccessful, the group spent two days collecting at Goora and in the vicinity of Mt. Ragged. The great majority of ant species found at these several localities were encountered repeatedly, thus indicating that collecting was approaching the "saturation" level. But not a single *Nothomyrmecia* was found.

A note concerning the ecology of the Thomas River area is in order here. The Thomas River is set in a depression that appears to range between 75 and 100 feet below the level of the surrounding sandplain. Near the centre of the depression is the old homestead location, and this in turn is about three miles north of the beach. At least four "hollows," or shallow valleys, radiate outward from the centre and extend for distances of a mile or more. The bottoms of the hollows are irregular, dry, salt stream beds, covered with a good growth of succulent halophiles and scattered paperbark trees *(Melaleuca cuticularis)*. Some of the latter are of very large size. According to Mr Bob Douglas, a resident of Esperance, the depression was originally covered with large yate trees *(Eucalyptus cornuta)* and paperbark, and the floor supported a rich growth of grass. The locality was settled in 1875, and overgrazing by sheep and the cutting of many of the yate trees has altered it greatly. In 1955 the grass were found to be mostly gone, and large stretches of wattle (*Acacia* spp.) covered much of the area. In only a few spots, e.g., a quarter-mile north of the homestead, did the yate forest appear to approach a relatively primitive condition. The most abundant ant in the depression was *Iridomyrmex detectus* Fr. Smith (the common meat ant); this species appeared to be most abundant in disturbed situations. Species of *Myrmecia, Rhytidoponera, Crematogaster, Camponotus,* and *Polyrhachis* were also abundant. Less common genera included *Amblyopone, Ponera, Meranoplus, Podomyrma, Oligomyrmex,* and *Stigmacros.* Perhaps less than 30 species occurred in the Thomas River depression, a much sparser local fauna than is to be found in the forested regions from Norseman to Balladonia in the north.

On leaving the Thomas River depression and proceeding onto the sandplain, a distinctly different fauna was encountered. This included distinctive species of *Myrmecia, Rhytidoponera, Merano-*

plus, Dacryon, Colobostruma, Iridomyrmex, Notostigma, Camponotus and *Polyrhachis*. The fauna is probably smaller than that of the Thomas River depression and appears to share almost no species with the latter. It is further marked by having a much more distinct division between the diurnal and nocturnal elements. Several of the nocturnal sandplain species in *Colobostruma, Dacryon, Iridomyrmex* and *Camponotus* are notable for their very light coloration and large eyes, characteristics that are shared with *Nothomyrmecia macrops*. For this reason we consider it a strong possibility that *N. macrops* is nocturnal and a sandplain dweller.

In February 13-14, 1955, Athol Douglas and Edward Wilson collected in the arid eucalyptus forest from Norseman to Balladonia along the Transcontinental Highway. Other trips in the Norseman-Esperance-Balladonia area have been conducted independently by Athol Douglas, Tom Greaves and John Calaby. All of these efforts, like the ones before them, have been unsuccessful in finding *Nothomyrmecia*.

Few insect species have been the objects of such concentrated but consistently unsuccessful search as has the elusive *Nothomyrmecia macrops*. Because of its important phylogenetic position and our complete lack of information concerning its ecology and behaviour, its rediscovery and study in the living condition provide, in our opinion, one of the principal challenges of modern Australian entomology.

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COLOURING MATTERS FROM WESTERN AUSTRALIAN SUNDEWS II. THE RELEASE OF FREE PIGMENT.

By M. C. RUSSELL, Como.

INTRODUCTION

The following description by Rennie (1887) of the occurrence of free pigment in *Drosera whittakeri* is apt and can be applied to related Western Australian sundews: "This species is provided with a tuber, one apparently to each plant, which is found attached to a straight stem at a depth of 3 or 4 inches. These tubers invariably consist of an inner solid but soft nucleus, full of reddish sap