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IRIDOMYRMEX PURPUREUS (HYMENOPTERA: FORMICIDAE) IN
AUSTRALIA**

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THE DISTRIBUTION OF THE THREE FORMS† OF THE MEAT ANT *IRIDOMYRMEX PURPUREUS* (HYMENOPTERA: FORMICIDAE) IN AUSTRALIA

By T. GREAVES*

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Abstract

Distributions of the three nominal forms of the meat ant *Iridomyrmex purpureus* (Smith), *I. viridiaeneus* Viehmeyer and *I. sanguineus* Forel have been studied. Each ranges widely, and seems characteristically to be developed in areas within prescribed limits of rainfall and vegetation. The most common form, *purpureus*, is found over one third of the Australian mainland; it is sometimes found in association with the other two forms and in places it appears to occupy a buffer zone between areas where *viridiaeneus* or *sanguineus* are common. Examples of apparent character displacement are given, with discussion of how the variation in nest structure could enable colonies to survive extreme conditions. Evidence suggesting effects of soil, altitude, rainfall and vegetation in limiting the distribution of each form is discussed.

INTRODUCTION

The meat ant *Iridomyrmex purpureus* (Smith) (= *I. detectus* (Smith)) and its nominal forms *I. viridiaeneus* Viehmeyer, and *I. sanguineus* Forel form a distinct group within the genus *Iridomyrmex*. They are very common ants of the Australian mainland and each form ranges very widely.

Information on the distribution of the three forms has been extracted from collections made during expeditions organized by the Division of Entomology, C.S.I.R.O. during the period 1935-1967. Many of these expeditions were in sparsely populated areas where collections were made at 10-20 mile intervals or at any point of major change in vegetation.

The material collected, together with specimens loaned by the principal museums and research institutions in Australia, was examined in 1967 by Dr. G. Ettershank.

Meat ant colonies may occupy a single unit nest, the ants of which are associated with one or more shrubs or trees; or a multiple nest system, comprising several nests with a number of food trees within the foraging area. Colonies of the *purpureus* form often occupy a large central nest with several smaller subsidiary satellite nests (Greaves 1939, unpublished data 1970).

All three forms find their maximum abundance in open woodland country, where exudates from sap-sucking insects provide the bulk of their food.

Although similar in size and shape, the three forms differ in colour and nest structure: *purpureus* has a red head, thorax and petiolar node, over which there is a blue metallic sheen, the gaster is bluish-purple, *sanguineus* is yellowish with a bluish-purple gaster, while *viridiaeneus* is uniformly metallic bluish to purplish-black. Specimens of *viridiaeneus* from very low rainfall areas sometimes have a greenish metallic sheen on the head. There is some colour variation in each form.

DISTRIBUTION

The distribution of the three forms is shown in Figure 1. *Purpureus* is the most wide-ranging form and is most common in savannah woodland within the 14 in. to 30 in. isohyets; it can persist in much drier areas where surface water and food trees are available, for example situations along river banks, around station properties and in irrigated areas.

Viridiaeneus is usually found within the 9 in. to 14 in. isohyets and is rarely found in very dry areas with a rainfall of less than 9 in. In these drier areas one finds the

† The term form is here used to denote certain recognizable taxa whose status has not yet been determined.

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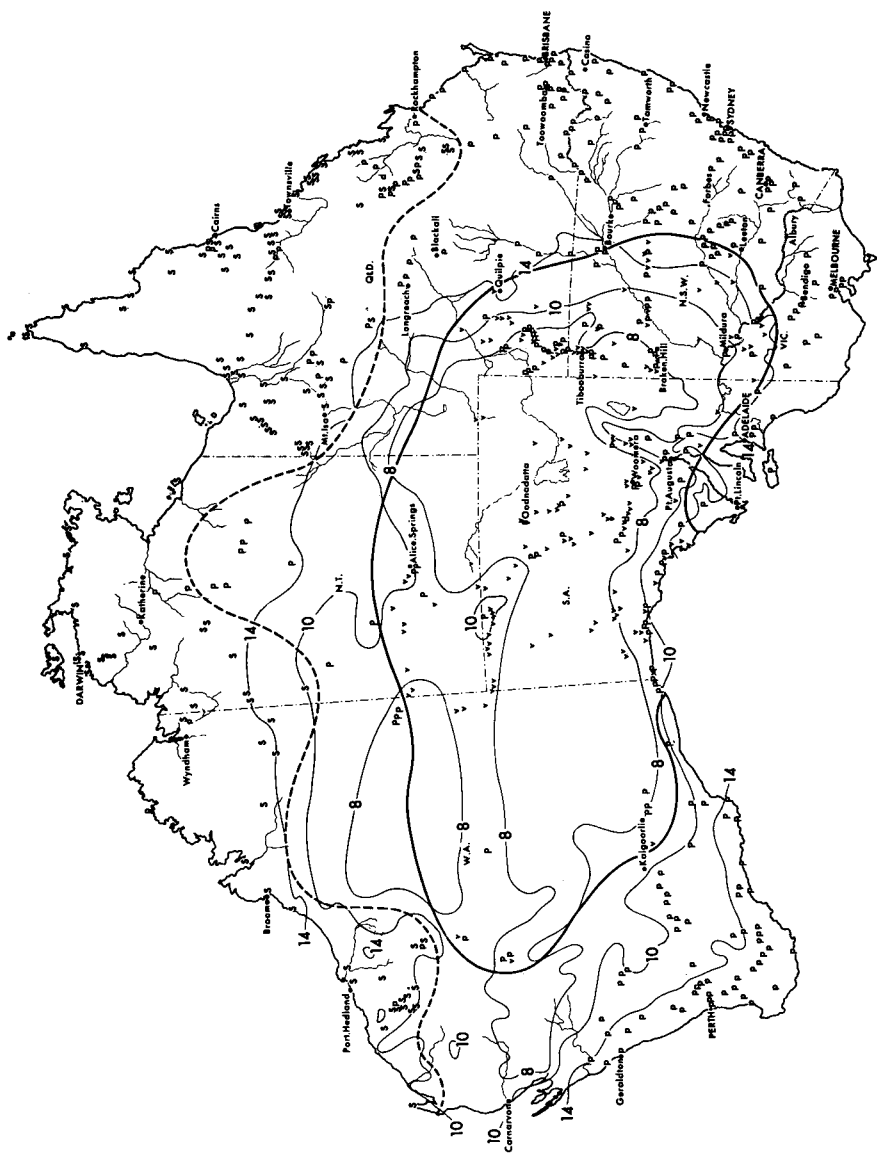


FIG. 1.—Known distribution of the three forms of the meat ant,
 p = *Iridomyrmex purpureus*
 s = *I. sanguineus*, distribution limits - - - - -
 v = *I. viridiaeneus*, distribution limits ———

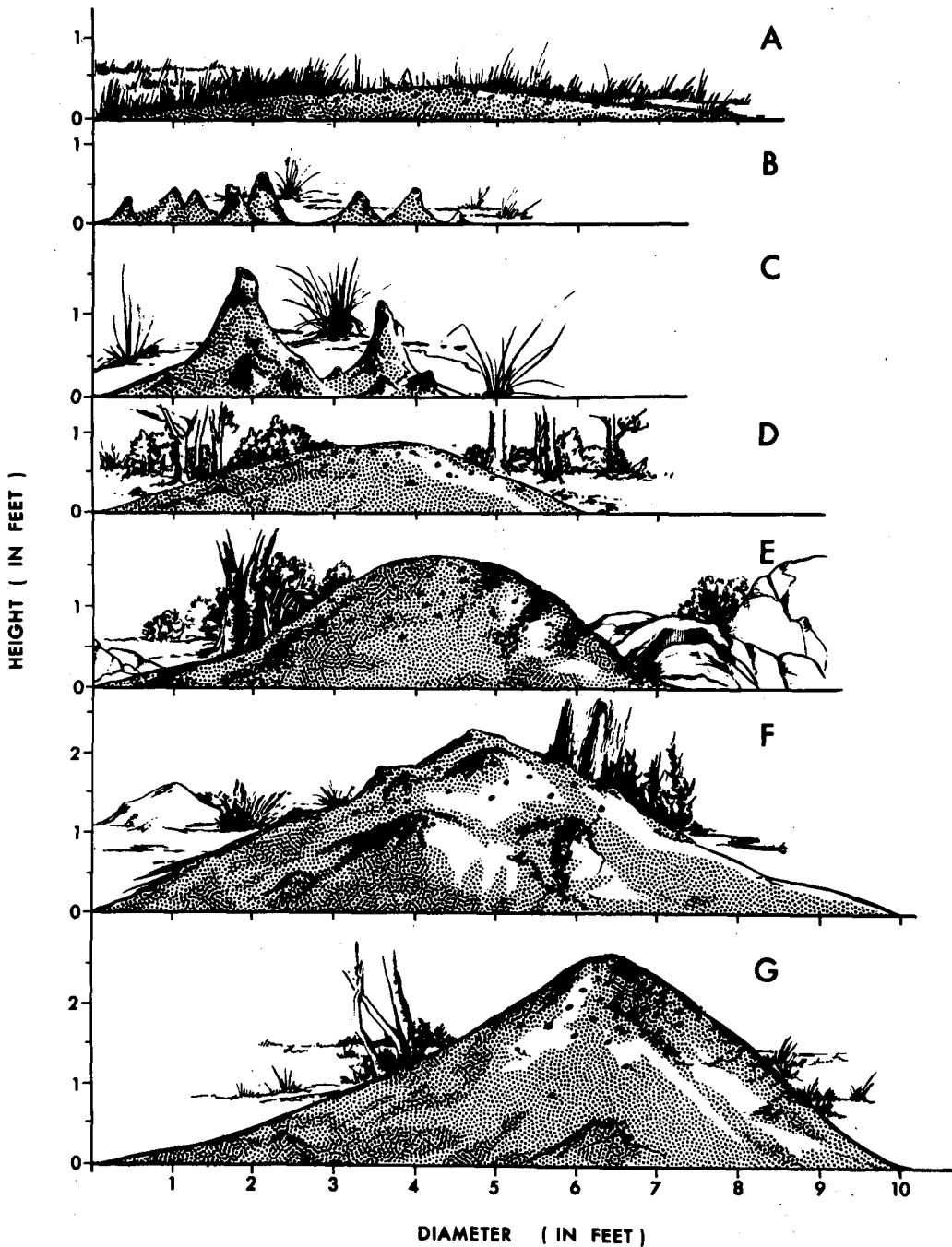


FIG. 2.—Variation in nest structure of meat ant (*Iridomyrmex purpureus* form) colonies.

- (A) Fairly flat nest in open savannah.
 (B, C) Turreted nest surfaces, along bank of Flinders River, Queensland.
 (D) Nests higher in open forest, near Canberra, A.C.T.
 (E) Nest in granite areas of New England; soil shallow, most of the galleries are above ground level.
 (F, G) On the bank of the Ward River, near Tallwood, Queensland; nests built up in areas liable to flood. Few galleries in soil.

purpureus form along river banks, etc. A surprising discovery by a collecting expedition in 1949 to the west and north of Tibooburra, N.S.W. was the occurrence of colonies of *purpureus* along Coopers Creek at Nappamerrie.

The northern limit of the *viridiaeneus* form is lat. 22°S—just north of Alice Springs, N.T.

The *sanguineus* form is most abundant in open woodland within the coastal littoral area of tropical Australia and it occurs away from the coast where moisture permits. In the drier and cooler parts of the tropics *sanguineus* is replaced by ants of *purpureus*-type. These forms may occur together in the Queensland tropics around Clermont and between Cloncurry-Camooweal, and south of Port Hedland in north western Australia (see Fig. 1).

Between the 10 in. and 14 in. isohyets the two forms *purpureus* and *viridiaeneus* are often found together. While *purpureus* is found associated with the two other forms, *viridiaeneus* has not been found with *sanguineus*. It will be seen in Figure 1 that between the northern boundary occupied by *viridiaeneus* and the southern boundary where *sanguineus* predominates there is a corridor across most of the continent in which the *purpureus* form alone is found.

CHARACTER DISPLACEMENT

Throughout its range, *purpureus* forms large nests. Where *purpureus* and *viridiaeneus* are found together the nests are different, those of *purpureus* being large and several feet in diameter and each with numerous entrance holes, while those occupied by *viridiaeneus*-type ants are small and flattened with between two and four entrance holes, often connected with other nests (Figs. 2 and 3).

In areas of less than 14 inches rainfall and where the *purpureus* form is not present, the *viridiaeneus* form may occupy large nests with 20 or more entrance holes in man-made situations, such as along the banks of table drains or in formed road-works. Similarly, where the *purpureus* and *sanguineus* forms are found together, their nests are quite different, *sanguineus* having a nesting habit similar to *viridiaeneus*;

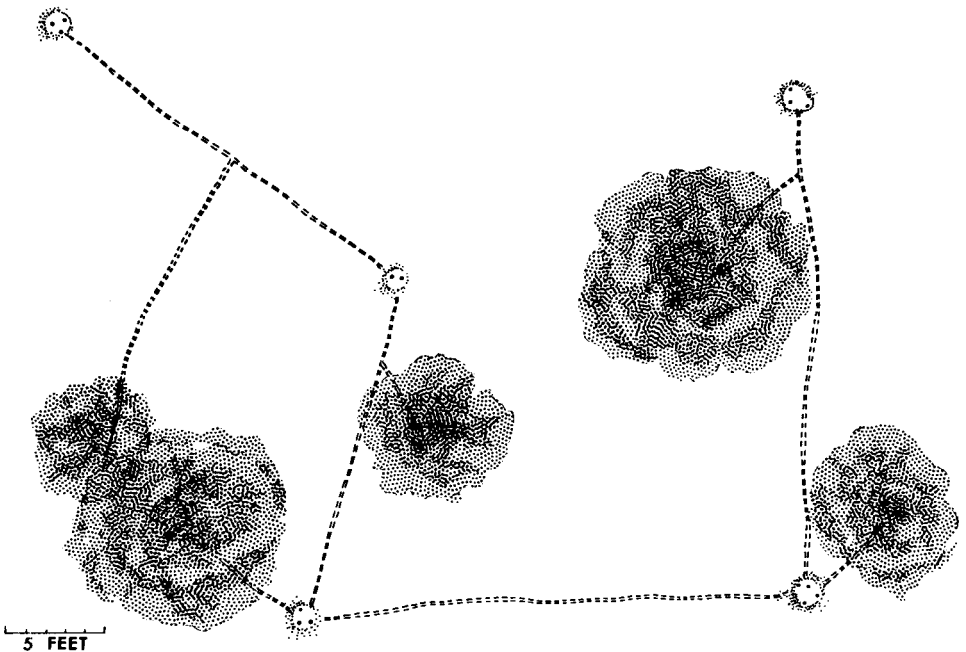


FIG. 3.—General pattern of nests of meat ants, *sanguineus* form and *viridiaeneus* form, comprising several small nests sites each with 2-4 entrance holes and connected by well defined trails. Note trails to trees.

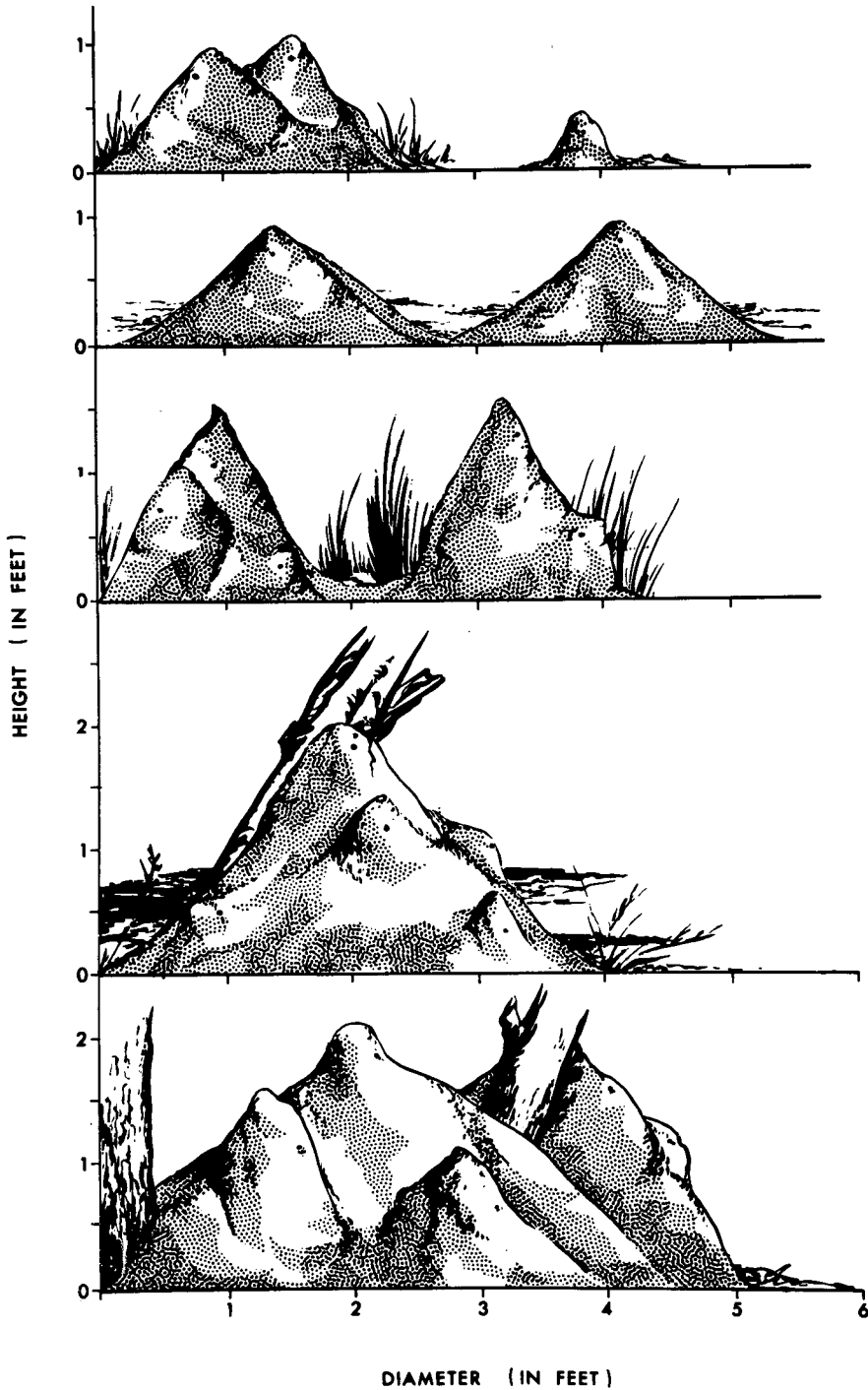


FIG. 4.—Nests of the meat ant, *sanguineus* form, near Normanton, Queensland, in areas liable to be waterlogged. Each turret has one fairly large entrance hole.

however, in the regions bordering the Gulf of Carpentaria where the *sanguineus* form alone is present, it constructs large nests several feet across, with a series of turrets, each having one large hole near the apex, as shown in Figure 4.

FACTORS LIMITING DISTRIBUTION

(i) Soil

None of the three forms occurs in large areas of Australia with quartz sand soils, although the climate would seem to be suitable for their occurrence. Possibly the soil type is a limiting distributional factor.

All three forms are common on lateritic ridges, granite outcrops and clay formations that provide well drained sunny situations.

(ii) Altitude and rainfall

In southern New South Wales where the *purpureus* form is found, the meat ant does not occur above 3,000 ft, and at this altitude colonies are usually associated with *Eucalyptus rubida* Deane and Maiden. In the New England area of northern New South Wales ants of this form are found at slightly higher altitudes. The other two forms are confined to areas of relatively low relief.

The *sanguineus* form is found in coastal areas of tropical Australia with *purpureus* in the cooler, drier or elevated areas, particularly on the banks of inland rivers.

Within the 10 in. isohyet the *viridiaeneus* form is characteristic except where *purpureus*-type populations occur along river banks, watercourses etc. where there are eucalypts.

(iii) Floods

Some types of nests built by *purpureus* colonies can survive complete immersion in flood water for several days (Figs. 2F and G). In the Darling and Murray River basins this form is usually common on the alluvial flats containing black box (*E. largiflorens* F. Muell.) or river red gum (*E. camaldulensis* Dehn.). These flats may be flooded for long periods, resulting in the death of all meat ant colonies in the flooded areas. The repopulation of these areas from colonies at the boundary of the flooded areas, may take a number of years.

Professor W. L. Brown (personal communication) has observed that *I. purpureus* builds large mounds, shaped as in Figure 2 E, F and G, in the yate (*E. cornuta* Labill.) swamps on the sandplain around Esperance, Western Australia: periodic flooding is undoubtedly a factor in this situation.

(iv) Effect of vegetation

Trees and shrubs in open situations are essential to all three forms, nests are rarely found on open treeless areas; and meat ants cannot tolerate the closed-canopy conditions of wet sclerophyll and rainforest. In eastern New South Wales, the most common trees in many areas occupied by *purpureus*-type populations are yellow box (*E. melliodora* A. Cunn.) and Blakely's red gum (*E. blakelyi* Maiden). Hemipterous insects such as scale insects, psyllids, leaf hoppers, etc. infesting host trees exude sweet secretions and are attended by meat ants and these exudations are apparently an essential part of the ants' food.

Large areas of coastal New South Wales and Victoria, which were originally covered with wet sclerophyll and rain forest apparently contained no meat ants. An area of over 1,000 square miles was evidently virtually free of the species before clearing. On the north coast of New South Wales the meat ant was not found between latitudes 29°50' and 32°0' S, a distance of over 150 miles. With the establishment of railways and roads, creating open situations through forests, the *purpureus* form has spread northward from latitude 32°0' S to 31°50' S and it appears to be only a matter of time before this ant will spread over most cleared areas within the region.

On the south coast of New South Wales, *purpureus*-type meat ants occur in dry heath land, but not on the heavily timbered slopes. Meat ants do not occur in wet sclerophyll forests in Western Australia.

In north Queensland the *sanguineus* form is absent from the wet sclerophyll and rain forests in the higher rainfall zone between Townsville and Cape York, but is invariably present in open woodland of drier areas.

Meat ants are not found nesting on dense pasture. The Canberra suburb of Turner was built on a subterranean clover pasture where meat ants were absent. Within ten years, after shrubs and trees had been planted, meat ant colonies (*purpureus* form) were numerous around houses.

DISCUSSION

One or other of the three forms of the meat ant is present over most of the Australian mainland and some islands off South Australia. It has not been recorded from Tasmania.

Each form has a wide distribution within its own environmental limits. The typical *purpureus* form is by far the most widespread, occurring over one third of the continent. It replaces the *viridiaeneus* form where moisture is available in otherwise dry areas, and the *sanguineus* form in the cooler, drier areas of tropical Australia.

Nel (1965) reported studies on the water loss by *purpureus*-type meat ants and showed that without a ready source of moisture the ants cannot survive hot dry conditions. This suggests a further reason for the field relationship between meat ants and trees and shrubs.

In a recent paper, Greenslade (1970) records data on the nest structure and foraging activities of *viridiaeneus* at Coober Pedy, South Australia.

ACKNOWLEDGMENTS

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