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NO BULL ABOUT *MYRMECIA* ANTS!

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About the genus

Myrmecia ants are Australian entomological icons. They are very distinctive in appearance and are conspicuous elements of our insect fauna. Within the Formicidae (ant family) this subfamily has long been considered to be a monogeneric taxon, only comprised of the genus *Myrmecia*. The genus is well known under the vernacular term 'Bull' ants, for which two forms are colloquially identified: the 'inch' or 'giant bull' ants for their large size, as well as 'jack-jumper' or 'jumping jack' ants, for their ability to hop.

The genus is diverse, comprising 91 described species at present, with 90 of these endemic to Australia. The remaining species occurs in New Caledonia (*M. apicalis*) where it is rarely encountered. One species has accidentally been introduced into New Zealand (*M. brevinoda*). These ants are widespread throughout the continent, and can be found in a wide range of habitats in temperate and arid climatic zones, being particularly abundant in woodlands, coastal heath and open forests. They are not well represented in the northern tropical regions.

Myrmecia has long been considered a taxonomically difficult genus, with many of its species displaying internal variations in size and colour. Nevertheless, morphological and molecular data strongly indicate that nine species-groups exist within the genus, each representing quite distinct morphological types.

Identification and general biology

Myrmecia ants are unlikely to be confused with any other ants. Some *Myrmecia* ants are among the largest of all ant species, ranging from 36 mm in total length to relatively small species of 8 mm in length. They can also be recognised easily by their large protruding eyes, elongate toothed mandibles and the powerful functional sting characterising most of the larger species. Many of the smaller diurnal species display bright or contrasting coloration patterns, in different shades of red or yellow and black, as a warning of their sting to vertebrate predators. Two species commonly found in the South-west of Western Australia

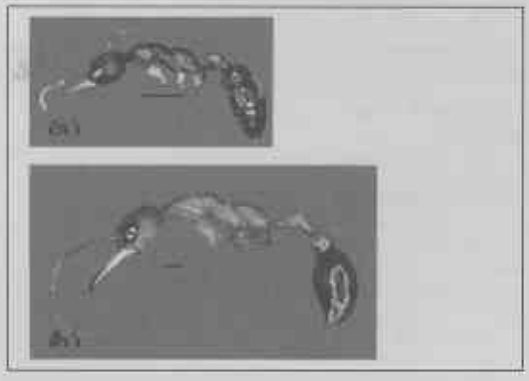

Fig 1. Two species commonly found around the S-W of WA. (a) The small *M. urens* 'Baby Bull ant', is found on vegetation of our coastal heath; and (b) the large *M. vindex* 'Bull ant', is a conspicuous ground dweller found in our woodlands. These two species exemplify well the variations in ecology and morphology found across the genus. Scale = 2mm. (Photos: P-U Achour)

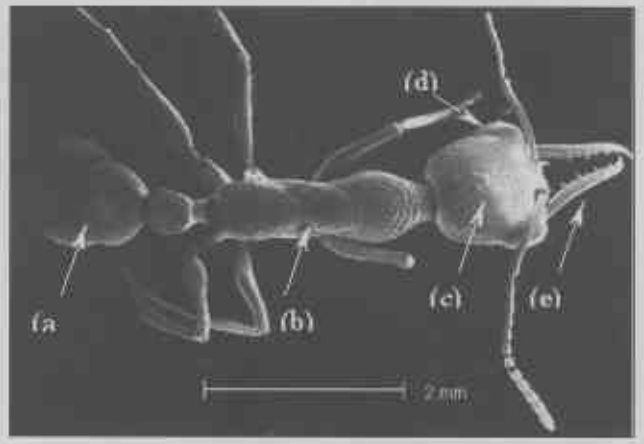

Fig 2. General *Myrmecia* morphology, using *M. urens* in dorsal view. Typical features include: (a) a constricted abdominal segment, (b) a distinctly defined abdomen (mesonotum), (c) a group of ocelli on top of the head, (d) large anterior eyes and (e) long toothed mandibles. Note that the protruding sting is not visible in this illustration. (Photo: P-U Achour)

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Myrmecia *ants continued from page 1*

are depicted in Figure 1. Some diagnostic morphological features of a typical *Myrmecia* worker have been identified in Figure 2.

Following is a point summary providing the central features of myrmeciine biology:

- *Mymecia* colonies range from only a few dozen workers to a few thousand workers, depending on the species. Most species nest in soil, often constructing large mounds with single or multiple nest entrances, which are sometimes decorated with stones or fragments of plant material. A few species nest in rotten logs, while one tropical species (*M. mjobergi*) nests arboreally in epiphytic ferns. Workers of the larger species are considered aggressive and will relentlessly defend their nest, especially if it is well populated. The smaller and more timid species build small, protected nests with inconspicuous entrances and contain fewer individuals.
- The workers are generally noctidiurnal and forage on the ground or on low vegetation. Adult ants are nectarivorous and feed primarily on plant exudates. Animal prey is collected extensively in summer, however, as soon as young larvae have appeared, and is fed to them after being cut up. The foraging workers use stealth, rapid movements, their long mandibles and their potent sting to capture a large variety of arthropods. Vision is well developed among *Myrmecia* ants, and they rely predominantly on that sense for their external activities.
- *Myrmecia* species produce large, fully winged virgin queens, which leave their parental nests with virgin males to mate in a mass nuptial flight. Deviations from this pattern do arise in some species, with the production of queens that are wingless or have reduced wings. They are inseminated on the ground. In addition, a few species of temporary and complete social parasites are known in the genus. These deviations are rare however, and thought to be secondary evolutionary trends.
- Once the female is inseminated, she sheds her wings and excavates a new nest chamber in a suitable location. She does not, however, follow the 'claustral' patterns of colony founding seen in higher ants, when the queen remains in the cell and uses her own metabolized tissues to feed the brood. In contrast, *Myrmecia* founding queens follow a 'partially claustral' pattern, where they emerge from nest and forage for prey to feed larvae, until workers emerge.
- In the larger species, the worker caste may be differentiated in two overlapping size subclasses despite body proportions remaining the same. Some basic division of labor, based on age differentiations has been observed between these subclasses: larger workers partake in foraging, while the smaller ones undertake nest duties and care for the brood.

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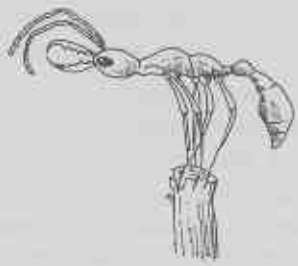
Evolutionary significance

Ants from the *Myrmecia* genus have attracted much scientific interest on the basis that they are considered, along with *Nothomyrmecia* (the famous South-Australian 'fossil ant') and *Amblyopone,* as some of the most primitive examples of living ants. A primitive taxon, in essence, is one that has retained many basal states when compared with other taxa at the same classification level. These states can be purely morphological characters or more complex behavioural and social characters.

Indeed, *Myrmecia* has retained a variety of morphological character states which are taken as primitive within the Formicidae as a whole: their long bodies, distinctly defined abdomen, large anteriorly positioned eyes, ocelli and protruding sting are some of the more obvious. *Myrmecia* ants are morphologically very generalised and show little specialisation to the subterranean environment.

The primitive status of *Myrmecia* species is also reflected in their behaviour and ecological patterns. For example, their brood-care habits and the social interactions occurring between adults are not as elaborate as in other ant taxa. The chemical ecology and exocrine make-up of these ants also appears to be generalised. Particularly, the 'partially claustral' mode of colony founding described earlier is of evolutionary significance, since it is regarded as a remnant of the primitive colony foundation provisioning practiced by the queens of putative wasp-like ancestors.

Fossil records indicate that there is little doubt that *Myrmecia* has originated from a single ancestral stock, having emerged around 75 million years ago. Since *Myrmecia* and *Nothomyrmecia* are presently endemic to the Australian continent, while some related fossil taxa have been identified in other parts of the world (Europe and South America), it implies that myrmeciine ants were previously much more widespread across Gondwana than their actual distribution may have suggested. Myrmeciines are now extinct everywhere in the world, except in Australia and New Caledonia, where they survive as relict taxa.



So remember, the next time a Bull Ant threatens to sting you, that it is a unique part of the Australian fauna!

Pierre-Ulric Achour completed an honors project at the Department of Environmental Biology at Curtin University of Technology. He conducted a study investigating the physiology, biochemistry and functional significance of metapleural glands in M. vindex *and* M. urens. *You may contact Pierre-Ulric Achour to obtain further information concerning this topic at pachour@hotmail.com.*