

## Some notes on the biology and toxic properties of *Arthropterus westwoodi* Macleay (Coleoptera: Carabidae) from Australia

With 1 Figure

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**Abstract:** Some observations are provided on the biology and a lesion produced on human skin caused by a secretion from the Australian carabid beetle, *Arthropterus westwoodi* Macleay (Coleoptera: Carabidae), during the summer of 1982 in south-eastern Queensland. Since *Arthropterus* species have been purported to live in or near the nests of ants, it is proposed here that their potent secretions are used as a defense mechanism against attack from ants in their natural habitats.

**Zusammenfassung:** Beobachtungen zur Biologie des australischen Laufkäfers *Arthropterus westwoodi* Macleay (Coleoptera: Carabidae) und zu einer Reizung menschlicher Haut durch das Sekret dieses Käfers im Sommer 1982 im südöstlichen Queensland werden mitgeteilt. Da *Arthropterus*-Arten Bindung zu Ameisennestern haben, wird hier angenommen, daß ihre starken Sekretionen als Abwehrmechanismus gegen Attacken der Ameisen in natürlichen Habitaten genutzt werden.

### Introduction

The subfamily Paussinae of the Carabidae (often given higher taxonomic rank as a separate family, e.g. McKEOWN 1947), is represented in Australia by the genera *Mystropomus* and *Arthropterus*. The genus *Arthropterus* contains a number of Australian and exotic species, although estimates vary considerably, since the group is a taxonomically difficult one because of the considerable variability amongst species and the paucity of material in museums and of published biological/geographical information concerning them (HAWKESWOOD 1987). Some *Arthropterus* species are known to have a strong association with ants, spending their entire lives in the ant nests, but few of the Australian species have been collected from ants nests (HAWKESWOOD 1987). H. J. Carter, a foremost prewar beetle authority, noted that all of the species that he had encountered, were found under bark, logs or stones, without any apparent association with ants or termites (McKEOWN 1947; HAWKESWOOD 1987). Detailed observations on the biology of even one *Arthropterus* species would add greatly to our knowledge of these rare beetles. Observations are provided here on some general biological aspects of *Arthropterus westwoodi* Macleay and the lesion one specimen produced on the leg of a female human.

### Observations

During November 1982, the author was undertaking field research on Coleoptera in the Barakula State Forest, south-eastern Queensland (26° 25' S, 150° 32' E), with some other naturalists. During one hot night, a number of insects were attracted to the hot, bright illumination from a portable gas light. One person (a female) seated on the ground near the gas light, suddenly felt a sharp pain on her leg and I looked down to see a brown beetle crawling on her thigh and which was also about to take flight. I quickly captured the specimen which later proved to be *Arthropterus westwoodi* Macleay (Coleoptera: Carabidae). A photograph of the specimen was taken (see Figure 1) and is also reproduced in colour in HAWKESWOOD (1987). The following day, an examination of the affected thigh showed that a dark red lesion, slightly swollen, had developed. It



Fig. 1. *Arthropterus westwoodi* Macleay (Coleoptera: Carabidae), from softwood scrubs and woodlands of the Barakula State Forest, near Chinchilla, Queensland. Length of beetle = 12 mm. (Photograph: D. G. Knowles, from HAWKESWOOD 1987).

measured 28 mm long and 3–6 mm wide (widest at one end). It was very sore but not blistering. It resembled a mark (welt) made by a whip on human flesh! The lesion remained painful for about 2 days after which the pain gradually subsided. The mark remained in a similar condition for about 6 days after which it gradually disappeared over the following few days. Applications of skin ointments assisted in easing the pain and soreness. When captured the beetle produced a peculiar strong smell but did not exude any toxic secretions onto my fingers. It appears most likely that the beetle released its secretions in response to alighting on human flesh (i.e. the girl's leg) and being brushed partially onto the skin.

### Discussion

A number of beetles are known to produce toxic secretions or possess body fluids which cause painful and persistent lesions on the unprotected human skin. Mostly, the lesions are characterised by the presence of raised watery blisters on the surface of the skin; hence the common name of blister beetles for those insects responsible. At least 3 families of Coleoptera are presently known to contain species that are injurious to human skin. The family Meloidae are the best known group for having toxic secretions and their natural history in the northern hemisphere is well documented (e.g. FIGUIER 1890). These meloids or typical blister beetles have a very potent toxin which causes severe blistering when the beetles contact the skin. Fortunately, there are no records of Australian Meloidae causing skin lesions; this is probably due to the fact that most of our native species are rare and seldom encountered in the field. Likewise, the family Oedemeridae are known to have some toxic species, but in Australia, these beetles are uncommon and are rarely encountered in the field or in suburban areas. With this fact in mind, both the Australian Meloidae and Oedermeridae would not appear to be of any great health risk to humans at this moment of time. The main group of concern in Australia appears to be with certain members of the genus *Paederus* (Staphylinidae) (WHELAN & WEIR 1987). This is a large, cosmopolitan genus of easily recognised, narrow beetles measuring 5–10 mm long (smaller than *Arthropterus*), with black heads, orange, yellow or red pronotums, metallic blue elytra, and black and/or red abdomens. The defen-

sive fluids of these beetles are usually streaked over the skin as the beetle is brushed off and this results in a linear lesion, often referred to as whip-lash dermatitis (MCKEOWN 1942; HAWKESWOOD 1987; WHELAN & WEIR 1987). The irritating compound is known as pederin (WHELAN & WEIR 1987). *Paederus* beetles are commonly known as whiplash beetles and have been the subject of a number of studies in Australia (e.g. JOYCE 1952; MCKEOWN 1951; MILLARD 1954; WHELAN & WEIR 1987).

Little is known of the biology and distribution of *Arthropterus*. BAEHR (1990) recently noted that he found species of *Arthropterus* under the bark of certain *Eucalyptus* trees in Australia. LAWRENCE & BRITTON (1994) noted that the related taxon, *Megalopaussus amplipennis* from northern Queensland has been found in the nest of the ant *Notostigma* sp. (Hymenoptera: Formicidae). The adults of *A. westwoodi* are nocturnal, sluggish and occasionally attracted to bright lights at night during summer in natural, relatively undisturbed habitats (HAWKESWOOD 1987). From my observations in the Barakula State Forest, it does appear that at least one species, *A. westwoodi*, is capable of causing lesions on exposed human skin if contacted and thus this note adds another toxic species to the literature. However, since *Arthropterus* species are rare, are found mostly in arid, northern Australia and are nocturnal, they would not appear to pose any great health risk to humans in general.

LEA (1910) appears to be one of the first Australian entomologists to note the presence of *Arthropterus* in ant nests. It is possible that some members of the genus still spend part of their lives in the nests of ants, while others have advanced evolutionarily to spend only a partial amount of time or no time at all in ant nests. Those in the last category may still live close to ant nests, such as under bark or logs and stones. *Arthropterus* has probably evolved the potent defensive mechanism against the attack of these various ant species, in a similar way to that of the bombardier beetles (i.e. *Pherosophus* of the subfamily Brachininae of Carabidae). It is interesting to note that LAWRENCE & BRITTON (1994) failed to mention anything specific about defensive glands and secretions in *Arthropterus*, an interesting aspect of these elusive beetles which should be closely studied further.

## References

- BAEHR, M. (1990): The Carabid community living under the bark of Australian eucalyptus. – 3-11. – In STORK, N. E. (Ed.): The role of ground beetles in ecological and environmental studies. – Andover, United Kingdom, 1–424
- FIGUIER, L. (1890): The Insect World: being a popular account of the order of insects: together with a description of the habits and economy of something of the most interesting species. – Cassell, Dettler & Galpin, London, Paris, New York, 1–538
- HAWKESWOOD, T. J. (1987): Beetles of Australia. – Angus & Robertson Publishers, Sydney, 1–248 + viii
- JOYCE, B. (1952): Dermatitis apparently caused by a staphylinid beetle in Australia. – Medical Journal of Australia, **1952**, 553
- LAWRENCE, J. F. & BRITTON, E. B. (1994): Australian Beetles. – Melbourne University Press, 1–192
- LEA, A. M. (1910): Australian and Tasmanian Coleoptera inhabiting or resorting to the nests of ants, bees, and termites. – Proceedings of the Royal Society of Victoria, **23**, 116–230
- MCKEOWN, K. C. (1942): Australian Insects. – Royal Zoological Society of New South Wales, Sydney, 1–304
- MCKEOWN, K. C. (1947): Australian Insects, XXIX, Coleoptera 6-Paussidae, Cupidae, and Rhysodidae. – Australian Museum Magazine, **9**, 127–128
- MCKEOWN, K. C. (1951): Dermatitis apparently caused by staphylinid beetles in Australia. – Medical Journal of Australia, **1951**, 772–775
- MILLARD, P. T. (1954): Whiplash dermatitis produced by the common rove beetle. – Medical Journal of Australia, **1954**, 741–744
- WHELAN, P. I. & WEIR, T. A. (1987): Skin lesions caused by *Paederus australis* Guérin-Meneville (Coleoptera: Staphylinidae). – Journal of the Australian Entomological Society, **26**, 287–288

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