

The distribution of the Western Australian pill millipede, *Cynotelopus notabilis* Jeekel (Sphaerotheriidae)

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Abstract – *Cynotelopus notabilis* Jeekel, the sole sphaerotheriid species to be recorded from Western Australia, occurs in high-rainfall habitats along the southern coast of south-western Australia. Given the ecological requirements and low vagility of the species, it is likely to be prone to localized extinction events due to fire and habitat fragmentation.

INTRODUCTION

The south-west forest region of Western Australia has a rich Gondwanan invertebrate fauna (Hopper *et al.*, 1996; Main and Main, 1991). However, some species have been described only recently and much of the terrestrial fauna, including both rare and widespread species, remains unnamed (Main, 1996). An interesting genus of pill millipede, *Cynotelopus*, was recently described by Jeekel (1986) from three specimens collected in 1927 from Nornalup in the south-west. He stated that the specimens and genus were of particular interest because they belonged to the family Sphaerotheriidae, a group which "was never before recorded from the western part of the continent." The purpose of this note is to correct this misconception and to comment on the biology and distribution of the genus.

The specimens that form the basis of this study are lodged in the Western Australian Museum, Perth (WAM), while the type material, which has not been reexamined, is lodged in the South Australian Museum, Adelaide (SAM).

HISTORICAL RECORDS

In his account of the biogeography of the Western Australian fauna, Nicholls (1933) recorded the occurrence of pill millipedes (family Sphaerotheriidae of the order Sphaerotheriida) in the south-west from near Nornalup. He noted that they were from "under logs, in karri country, along the bank of the Deep River...". His opinion on their taxonomic affinity was that the species could not be referred to either of the two genera of sphaerotheriids already known from eastern Australia and Tasmania. Main (1954) and Main and Edward (1968) included the "Oniscomorpha"

(which comprises the Sphaerotheriida and Glomerida) in a key for which the primary purpose was use by naturalists and university undergraduate students in field studies. At that time the pill millipedes, which were listed under the generic name *Cyliosomella*, were considered sufficiently abundant and widespread through the karri forest to be encountered by students and naturalists. Since that time to the present, undergraduate students at the Department of Zoology of the University of Western Australia have regularly examined specimens, mostly collected from the Pemberton area, as part of their arthropod systematics course.

Unfortunately, no representatives of the Deep River species were apparently retained in the collections of either the University of Western Australia (Nicholls' institution) or deposited in the Western Australian Museum, but there can be little doubt that it represents the species later described as *Cynotelopus notabilis* Jeekel, 1986. In view of the early records of the millipedes and the perception that they are abundant on the karri floor (mostly in and under rotting logs) it is unfortunate that the only specimens lodged in the Western Australian Museum are recently collected specimens, the earliest of which was collected in 1962. Thus the question now is whether the species has become rare in the western part of its assumed range, or whether it is a case of a widespread, abundant species having been neglected in the past by collectors. In order to assess the occurrence and distribution of the species, it is clear that it needs to be deliberately searched for and its distribution documented, along with observations on the viability of current habitats and populations. It is possible that some of Nicholls' *Cynotelopus* material was sent to overseas

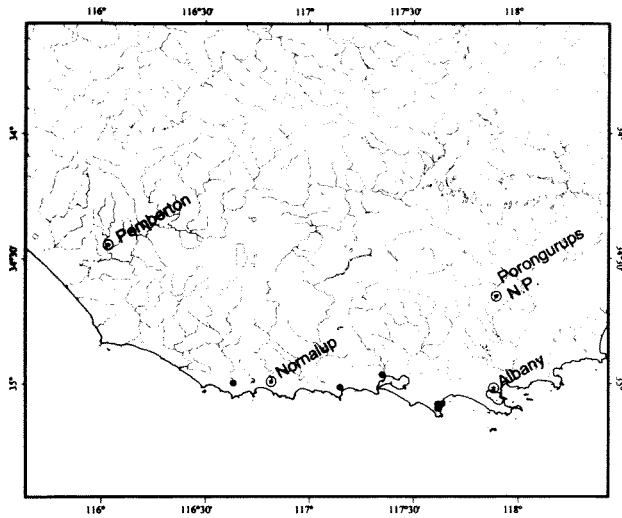


Figure 1 Known distribution of *Cynotelopus notabilis* Jeekel in south-western Australia, based upon the specimens in the collections of the Western Australian Museum. Collection localities represented by solid circles.

museums or to K. Verhoeff, who described two millipede species based upon specimens forwarded by Nicholls (Verhoeff, 1936). Inquiries to the Museum für Naturkunde der Humboldt-Universität, Berlin, failed to locate any specimens of Western Australian pill millipedes.

IDENTITY

Pill millipedes are immediately distinguishable from other millipedes by their extremely stout body that is capable of rolling into a tight ball (Harvey and Yen, 1989). Males of *Cynotelopus notabilis* differ from those of other sphaerotheriids in the form of the pygidium, which is concave and bears a small hook-like structure (Figure 3; Jeekel, 1986). The gonopods of males from Torbay Hill and West Cape Howe National Park were compared with the illustrations of the holotype provided by Jeekel (1986). No differences could be detected, and we are confident that all populations sampled represent a single species.

Material Examined

Australia: Western Australia: 1 ♀, Denmark, Pinger's Pimple, 34°58'S, 117°21'E, 17 July 1962, under rock on large granite tor, P. Cawthorn (WAM 98/2120); 2 ♂, 1 ♀, Torbay Hill, 35°05'S, 117°37'E, 1978, B.Y. Main (WAM 98/1247-1249); 1 ♂, 1 ♀, same data except 30-31 January 1978 (WAM 98/1250-1251); 1 ♀, same data except 2 December 1982 (WAM 98/1252); 1 ♀, same data except 3 March 1983 (WAM T40851); 1 ♀, 1 juvenile, same data except 5 March 1983 (WAM 98/1263-1264); 6 ♀, 4 juveniles, Torbay Hill, cottage site, 'Beck's Place', 19

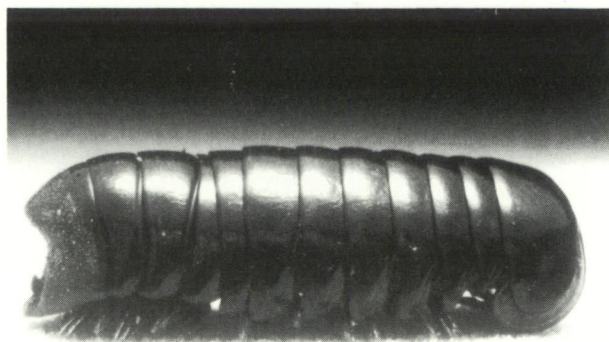
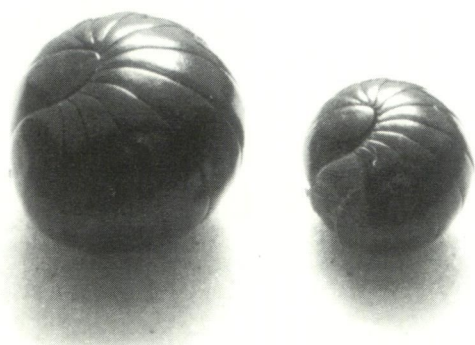
February 1983, B.Y. Main (WAM 98/1253-1262); 1 ♀, Torbay Hill, Lot 40, 35°05'S, 117°37'E, 14 October 1997, B.Y. Main (WAM 98/1265); 1 ♂, 3 ♀, Torbay Hill, W. of Torbay, 35°05'S, 117°37'E, 29 December 1981, leaf litter of karri forest, G.W. Kendrick (WAM 98/2121-2124); 1 juvenile, Walpole-Nornalup National Park, Tinglewood, 35°00'S, 116°38'E, 7 January 1999, under karri bark, S.L. Judd (WAM 99/2538); 3 ♂, 3 ♀, 6 juveniles, West Cape Howe National Park, 35°06'S, 117°37'E, 26 April 1990, M.S. Harvey, J.M. Waldoock (WAM 98/1266-1277); 10 ♂, 8 ♀, 10 juveniles, West Cape Howe National Park, S. of Torbay Hill, 35°05'S, 117°38'E, 27 March 1993, M.S. Harvey, J.M. Waldoock (WAM 98/1279-1307); 2 ♀, William Bay National Park, granite rocks at northern end of Petrified Forest, on sandy rocky scree, 35°01'S, 117°09'E, 26 May 1996, F. Malcolm (WAM 98/1308-1309).

DISTRIBUTION AND HABITAT

Based upon recently collected material lodged in the Western Australian Museum, we are able to present further locality records for this enigmatic species and make some observations on its distribution and ecology.

Cynotelopus notabilis appears to possess a very restricted range and the only available specimen-based records are from localities stretching along 115 km of the southern coast of Western Australia ranging from Tinglewood in the west, to Torbay Hill in the east (Figure 1). It has not been found at any other localities despite the careful examination of a wide range of moist habitats in south-western Australia over the past decade. Areas deliberately searched include Dog Pool on Shannon River (34°46'S, 116°22'E), Porongurups National Park (ca. 34°42'S, 117°53'E) and Stirling Range National Park (ca. 34°25'S, 118°00'E), sites that contain a plethora of relictual taxa. Mr Brad Maryan (Western Australian Museum) has informed us of a large population of *C. notabilis* at Mt Clare near Tinglewood, which was found in deep litter in unburnt forest in December 2000.

Sphaerotheriids are generally known from deep litter and under logs (Holloway, 1956; Jeekel, 1981), and our records include specimens from such habitats as well as under rocks. Specimens have been found under rocks associated with granite tors, from under logs and karri bark, and in leaf litter. On Torbay Hill *C. notabilis* readily colonises a garden adjacent to the bush and also pockets of disturbed, but unburnt, areas within the forest where it occurs under pieces of wood, debris and stones. The material collected from West Cape Howe National Park by MSH and JMW was found in very deep litter in a patch of mixed karri/redgum eucalypt/*Allocasuarina decussata* forest which clearly had remained unburnt for many years. The depth of the



Figures 2–3 *Cynotelopus notabilis*: 2, female (left) and male (right), in coiled position; 3, adult male showing the peculiar terminal segment typical of the species.

litter and the lack of burning probably explains the high abundance of *C. notabilis* at this site which raises the distinct possibility that fire – both natural and human-induced – plays a significant role in the distribution of *C. notabilis*. Like many other millipedes, pill millipedes lack any significant dispersive stage and are vulnerable to localized extinction events, especially when the available habitat is severely disrupted by land clearing.

The bulk of the known range of *C. notabilis* occurs within the conservation estate of Western Australia, including three National Parks – Walpole-Nornalup, William Bay and West Cape Howe – but there are no available data on the persistence of populations after prescribed burns, which occur at frequent intervals in most Western Australian forests.

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