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Tarsal pads of *Centrobolus* Cook (Spiroboloidea: Trigoniulidae)

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Abstract
The tarsal pads of three species of *Centrobolus* were examined using Scanning Electron Microscopy (SEM). Tarsal pads of *C. inscriptus* are robust and prominent (± 1018 um, n = 10) extending to about the mid length of the tarsal claws compared to *C. annulatus* (± 540 um, n = 8) which were abbreviated. Elaborate tarsal pads of the males appear not to be an adaptation for supporting the body column but sexually selected.

Keywords: Sexual dimorphism, tarsus, tarsal pad

1. Introduction
Millipedes possess tarsal pads in various degrees of development [1]. The tarsal pads were used as a secondary taxonomic character to describe eight new species of *Centrobolus* [2]. Differences were noted in their distribution as well as extension relative to the tarsal claw. The ultrastructure of the male walking legs were examined here using SEM to determine whether they may be modified other than for the support of the body column. Cryptic female choice can be predicted from this kind of sexual dimorphism e.g. in the wings of decorated crickets *Gryllodes sigillatus* [3]. The aim was to confirm this character is species-specific and sexually selected.

2. Materials and methods
Millipedes belonging to the species *Centrobolus inscriptus* (Attems 1928) and *Centrobolus annulatus* (Attems 1934) were collected from Twin Streams Farm (February 1996); and *C. digrammus* were collected from Simon's Town Waterfall (March 1997). A single leg was removed from a midbody ring of dead males for three of the species and viewed using SEM. Specimens were fixed, first in 2.5% glutaraldehyde (pH 7.4 phosphate-buffered-saline) at 4°C for 24 hours, then in osmium tetroxide (2%). Dehydration through a graded alcohol series (50, 60, 70, 80, 90, 100% ethanol) and critical point drying followed. Specimens were mounted on stubs and sputter-coated with gold-palladium. Tarsal pads were viewed under a Cambridge S200 SEM. The SEMs provided an opportunity to calculate the exact extent of the tarsal pad relative to the tarsal claw.

3. Results and Discussion
The tarsal pads of *C. inscriptus* (Figure 1 A) are robust and prominent (± 1018 um, n = 10), extending to about the midlength of the tarsal claws. In comparison, the tarsal pads of *C. annulatus* (Figure 1 B; ± 540 um, n = 8) and *C. digrammus* (Figure 1 C) are relatively abbreviated. The ratios of tarsal pad: total tarsus were calculated from the SEMicrographs as 1.04 and 0.83 for two of these species. *C. digrammus* exemplifies how each pad is subtended on the oral and aboral sides by setae and a gripping ridge around the periphery.
Allometry consistent with Rensch's rule can be attributed to allometric growth of secondary sexual characters in males [4-5]. Despite female forest millipedes having greater body volumes, their tarsal pads are ambulatory (abbreviate) relative to those of the male. Thus, the elaborate tarsal pads of the males are not an adaptation for supporting the body column, and if they are not under any other form of natural selection [6], their function to grip females before and during copulation, by increasing the potential reproductive rates of males, they can be expected to correlate with body size.

Fig 1: Distal podomeres of typical male walking legs from the midbody segments showing the tarsal pads (tp): A. *Centrobolus inscriptus*; B. *C. anulatus*; C. *C. digrammus*. macroseta (ms), postfemur (pt), seta (s), tarsus (t), tarsal pad (tp), tibia (ti), tarsal claw (tc).

4. Conclusion

Elaborate tarsal pads of the *Centrobolus* males appear not to be an adaptation for supporting the body column but sexually selected.

5. References

1. Stoev P, Enghoff H. A review of the millipede genus *Sinocallipus* Zhang, 1993 (Diplopoda: Callipodida: Sinocallipodidae), with notes on gonopods monotony vs. peripheral diversity in millipedes. Zoo Keys. 2011; 90:13-34.
2. Lawrence RF. The Spiroboloidea (Diplopoda) of the eastern half of southern Africa. Annals of the Natal Museum. 1967; 18:607-646.
3. Sakaluk SK. Is courtship feeding by male insects parental investment? Ethology. 1986; 73:161-166.
4. Rensch B. Evolution above the species level. Cambridge University Press, New York. 1960.
5. Cooper MI. Sexual size dimorphism and corroboration of Rensch's rule in Chersastus millipedes (Diplopoda: Pachybolidae). Journal of Entomology and Zoology Studies. 2014; 2(6):264-266.
6. Darwin CR. The descent of man and selection in relation to sex. John Murray, London. 1871.