

A NEW SPECIES OF MITE IN THE GENUS *NANORCHESTES*  
(ACARI, PROSTIGMATA) FROM SIGNY ISLAND, SOUTH  
ORKNEY ISLANDS

R. G. BOOTH

*Department of Biology, University of York, York YO1 5DD, UK*

**ABSTRACT.** *Nanorchestes triclavatus* n. sp. (Nanorchestidae) is described from Signy Island, South Orkney Islands. This species was extracted from fine sand and gravel, collected from a fellfield habitat. It is readily distinguished from all other Antarctic species of *Nanorchestes* by the clubbed sensilla. A key to the species of *Nanorchestes* occurring in the Antarctic is included.

INTRODUCTION

The terrestrial arthropod fauna of Signy Island is relatively well known. During the 1960s and 1970s, the taxonomic nomenclature remained more or less stable and the list of indigenous species, compiled between 1971 and 1974 by Goddard (1980), was largely the same as that compiled by Tilbrook (1973), working a decade earlier. However, more recent work (Strandtmann, 1982a, c; Usher and Booth, in press) has shown that a number of taxonomic changes are necessary. In addition, although the arthropods of moss-turf habitats have been extensively studied, attention has only recently been turned to fellfield habitats. During the 1981–82 austral summer, samples of small rocks and fine gravel were collected from a fellfield study site (Grid reference 103° 044<sup>s</sup>, Directorate of Overseas Surveys, map 210, Signy Island 2nd Edition, with 1-km grid, 1975) above Paal Harbour, Signy Island, and arthropods were extracted using a high gradient extractor. The extracts contained several specimens of a new species of *Nanorchestes*. This species differs from all other known Antarctic *Nanorchestes* species by the clubbed sensilla.

All measurements given in the description are in micrometres ( $\mu\text{m}$ ), and terminology follows Strandtmann (1982c).

***Nanorchestes triclavatus* n. sp.**

(Figs. 1a–d, 2a–c)

**Diagnosis:** Sensory seta *nb* with three-segmented club. Naso entire, convex. Heliceral seta bifurcate.

**Adults:** Length ♂ 240  $\mu\text{m}$  (235–250), ♀ 260  $\mu\text{m}$ .

**Dorsum:** Naso entire, convex (Fig. 1b). Seta *na* 40 (39–41), stout, with weak adpressed cilia on apical half. Sensillum *nb* 16–19, apical half composed of a three-segmented club, the central segment largest, partially enveloped by two leaf-like outer segments. Seta *nm* 10 (8–12), densely ciliated. Seta *nr* 22–24 finely ciliated, *ne* 4–5. Hysterosomal setae c. 5, branched, tree-like. Hysterosoma puncto-striate, strongly contracted in region of posterior pair of coxae (Fig. 1a). Propodosoma striate, mostly without punctured effect.

**Venter:** Puncto-striate, with branched tree-like setae as dorsum, but coxae, genital covers and underside of gnathosoma simply striate, without punctures. Genital setae 8 pairs, some branched, tree-like, others forked near base. Internal genital setae, 7 pairs male, 3 pairs female. Coxae setal formula 3–1–2–3, all setae ciliated, simple, bifurcate or trifurcate.

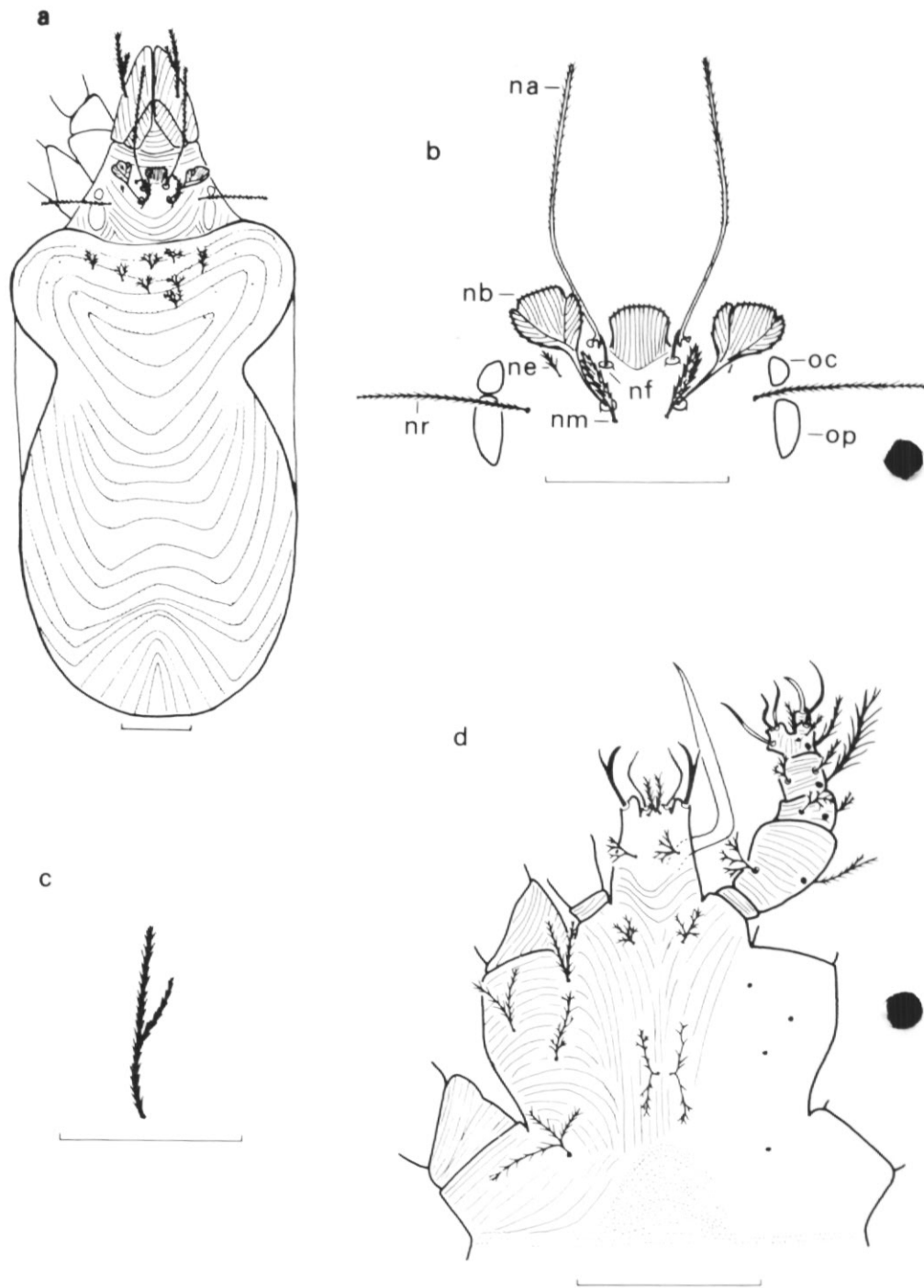


Fig. 1a-d. *Nanorchestes triclavatus* n. sp.: a, dorsum of holotype; b, details of propodosomal sensory region; c, cheliceral seta; d, ventral view of gnathosoma and coxae I and II. *na*, *nb*, *ne*, *nf*, *nm*, *nr*, setae of dorsal sensory region; *oc*, ocellus; *op*, ocular plate. Scale marker = 25  $\mu$ m.

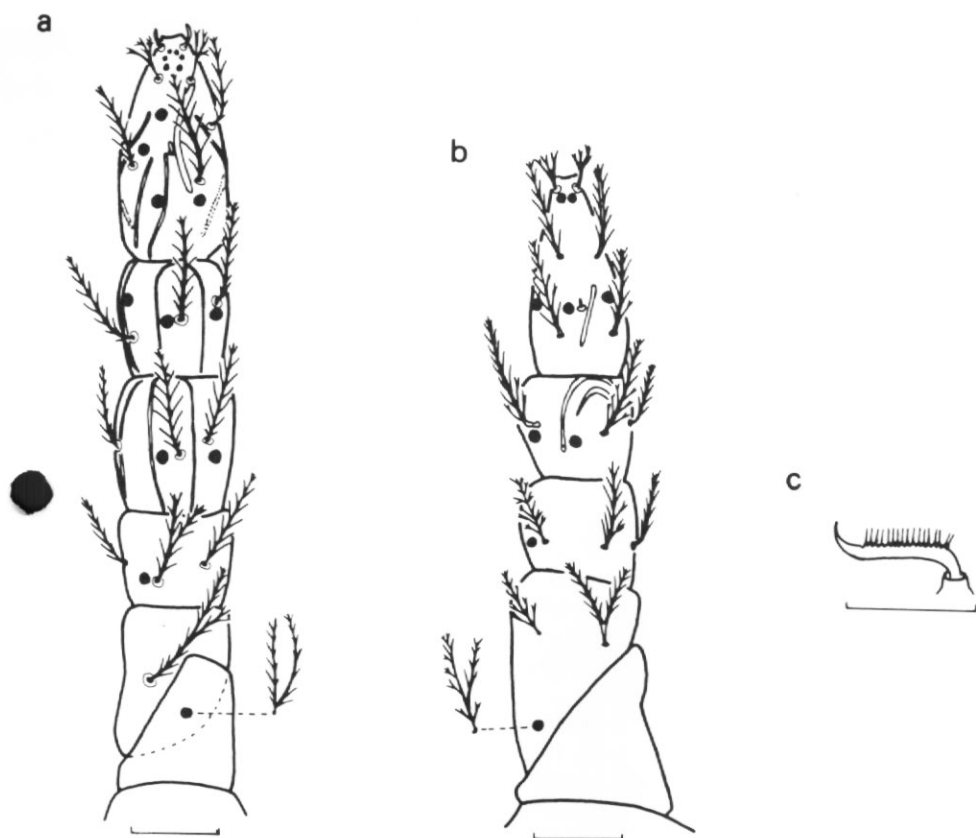


Fig. 2a-c. *Nanorchestes triclavatus* n. sp.: a, dorsal view of left leg I (black dots mark the positions of ventral setae); b, dorsal view of left leg II; c, empodial claw. Scale marker = 10  $\mu$ m.

**Gnathosoma:** Cheliceral seta (Fig. 1c) stout, 26 (24-27), weakly ciliated, bifurcate in basal third, secondary arm 11 (9-12). Rutella 2-tined. Basal palpcoxal seta usually forked, almost as strong as adjacent coxal setae (Fig. 1d). Pedipalp setal formula, trochanter to tarsus, 0-2-2-3-8, claw bearing tubercle on pedipalp tarsus elongate.

**Legs:** Striated, without punctures. Fine sensory lines on tarsi I and II, tibiae I-III and genu I. Empodial claw (Fig. 2c) strong, elongate, curved apically and multi-rayed (at least ten pairs of rays, exact number undeterminable). Dorsal leg setae generally strongly barbed, some forked (Fig. 2a, b). Tarsus I with 5 pairs apical setae clustered around empodium, tarsi II-IV with 2 pairs, constant in all life stages examined. Mid-dorsal famulus on tarsi I and II. Leg chaetotaxy: I, 17-6-5-4 + 2; II, 11-5-4-3; III, 8-3-3-3; IV, 11-3-3-2 + 1. Trochanters without setae.

**Tritonymph:** length 240  $\mu$ m (1 specimen only). Seta *na* 38. Cheliceral seta 24/8. External genital setae, 6 pairs, 2 pairs genital papillae. Dorsal setae, mostly as adult, perhaps more obviously forked and less tree-like. Leg chaetotaxy as adults.

**Deutonymph:** Length c. 200  $\mu$ m. Seta *na* 35-36, *nb* 15-16. Cheliceral seta 20-23/9-11. Dorsal setae 5-8, forked and branched. Three pairs genital setae, 2 pairs genital papillae. Leg chaetotaxy as adults.

**Protonymph:** Length c. 155  $\mu$ m. Seta *na* 34-35, *nb* c. 16. Cheliceral seta 20/8-11. Dorsal setae 8-11 ciliated, strongly forked at base. One pair of both genital setae and

papillae. Coxae setal formula 3-1-2-2. Leg chaetotaxy: I, 17-6-5-3+1; II, 11-5-4-2; III, 8-3-3-3; IV, 7-3-1-0. Pedipalp as adult.

*Larva*: Unknown.

*Type material*: Holotype ♂, ANTARCTICA: Signy Island, South Orkney Islands, (60°43'S, 45°36'W), fellfield site on the col above Paal Harbour, 9 December 1981, R. G. Booth. (BMNH 1983.10.5.1). Paratypes: 5♂, 1♀, 1 tritonymph, 3 deutonymphs, 3 protonymphs, same data as holotype. Paratypes deposited in the British Museum (Natural History), British Antarctic Survey, Cambridge, UK, and Bernice P. Bishop Museum, Honolulu, Hawaii.

#### DISCUSSION

Although, at first sight, this species appeared to differ markedly from other *Nanorchestes* species by the structure of the clubbed sensilla and the constricted hysterosoma, structurally it clearly belongs to *Nanorchestes*. The arrangement of setae and the presence of a small pair of ocelli and larger pair of ocular plates on the propodosoma, the structure and chaetotaxy of the pedipalps, the tree-like hysterosomal setae, the short legs bearing an empodial claw, sensory lines and the clustering of small setae around the apex of tarsus I, and the structure and setation of the genital region of the nymphal and adult life stages, are all characteristic of this genus. In prepared slides, the hysterosomal constriction seen in fresh material is no longer obvious, and the body assumes a short cylindrical appearance. The clubbed sensilla are also apt to be lost during mounting.

The genus *Neonanorchestes* was erected by McDaniel and Bolen (1981) for two new species of Nanorchestidae from Texas, both of which possessed capitate sensilla. However, apart from the clubbed sensilla, they do not differ from more typical *Nanorchestes* species, and for that reason, the present species is assigned to *Nanorchestes* rather than to the putative genus *Neonanorchestes*. The reference to a seta on trochanter I in *Neonanorchestes* species, but which is absent from *Nanorchestes* species, including the new species from Signy Island, is in error (Strandtmann, pers. comm.), it being mistaken for the ventral femoral seta.

Little variation between specimens was observed, although, in one or two individuals, the posterior pedipalp coxal setae were only weakly forked. Between life stages, there was less variation in the lengths of the sensory and cheliceral setae than in other species. Seta *na* only increased by about 2 µm in length between successive life stages, compared with about 10 µm recorded for *Nanorchestes gressitti* by Strandtmann (1982c). For the life stages examined, there was no variation in chaetotaxy of the pedipalps or leg III. Protonymphs lacked some setae on femora I, II and IV, and on the genu and tarsus of leg IV. The protonymph also differed from most other *Nanorchestes* species in possessing forked rather than arborescent dorsal setae, which are usually restricted to the larval stage.

That such a distinctive mite should have remained undiscovered for so long, despite the extensive collecting of terrestrial arthropods in the Antarctic since the early 1960s, is surprising. Since the species appears to be restricted to mineral material of fellfields and is not associated with turf or carpet-forming mosses, its distribution must be presumed to be very restricted, since many bare areas and sandy habitats in other parts of the Antarctic have been sampled (e.g. Strandtmann and others, 1967; Rounsevell, 1977). Until other suitable habitats along the Antarctic Peninsula, the South Shetland Islands or South Georgia are sampled, preferably by sieving, flotation or by heat extraction, *Nanorchestes triclavatus* must be regarded as

endemic to the South Orkney Islands. The other Antarctic species of *Nanorchestes* are either generally distributed or known from widely separated areas (Strandtmann, 1982a, c; Usher and Booth, in press), but on Macquarie Island, three of the five species are endemic (Strandtmann, 1982b).

KEY TO ANTARCTIC SPECIES OF *NANORCHESTES*

1. Seta *nb* long (at least 30  $\mu\text{m}$  in adults), slender, sometimes weakly branched; hysterosomal setae short (15  $\mu\text{m}$  or less), arborescent (larvae excepted); cheliceral setae branched near base. .... 2  
     Seta *nb* short (less than 20  $\mu\text{m}$ ), strongly clubbed; *or* hysterosomal setae long and bifurcate; *or* cheliceral seta unbranched. .... 7
2. Naso entire, either convex, truncate or weakly emarginate; shorter arm of cheliceral seta about half length of longer arm. .... 3  
     Naso deeply divided into two parts, either contiguous or widely separated at their base; shorter arm of cheliceral seta at least three-quarters length of longer arm. ... 4  
     Femur IV with 3 setae (2 on telo-femur, 1 on basi-femur); naso truncate to emarginate. .... *lalae* Strandtmann  
     Femur IV with 2 setae (1 on telo-femur, 1 on basi-femur); naso convex. ....  
     ..... *bellus* Strandtmann & Sømme
4. Tarsus III with 8 setae; two flaps of naso long and narrow, widely separated (sometimes difficult to see in slide preparations, folded around base of seta *na*). ... 5  
     Tarsus III with 10 setae; two flaps of naso broad at base, contiguous. .... 6
5. Seta *nb* elongate, finely ciliated, unbranched (c. 65  $\mu\text{m}$  in adults); seta *na* long, at least 70  $\mu\text{m}$  (in adults). .... *gressitti* Strandtmann  
     Seta *nb* shorter (c. 35  $\mu\text{m}$  in adults), sparsely ciliated, with 2 short branches in apical half; seta *na* shorter, usually less than 60  $\mu\text{m}$  (in adults). *berrysi* Strandtmann
6. Femur II with 2 setae. .... *antarcticus* Strandtmann  
     Femur II with 3 setae. .... *wilbanksi* Strandtmann
7. Seta *nb* short, strongly clubbed; hysterosomal setae arborescent; cheliceral seta stout, bifurcate in basal third. .... *triclavatus* n. sp.  
     Seta *nb* elongate, slender; hysterosomal setae elongate, c. 40  $\mu\text{m}$  long, bifurcate; cheliceral seta branched near base. .... *bifurcatus* Strandtmann  
     Seta *nb* elongate, slender; hysterosomal setae arborescent; cheliceral seta strongly ciliated, not divided. .... *brekkeristae* Strandtmann & Sømme

## ACKNOWLEDGEMENTS

I wish to thank Miss Anne Baker, Dr W. Block, Mr K. H. Hyatt, Professor R. W. Strandtmann and Dr M. B. Usher for their helpful suggestions on an earlier draft of this paper, and the British Antarctic Survey for logistical support in the Antarctic. Funding was provided by a Natural Environment Research Council research grant to Dr M. B. Usher (University of York).

Received 12 October 1983; accepted 29 November 1983

## REFERENCES

- GODDARD, D. G. 1980. Biological observations on the free-living mites of Signy Island in the maritime Antarctic. *British Antarctic Survey Bulletin*, No. 49, 181–205.  
 McDANIEL, B. and BOLEN, E. G. 1981. A new genus and two new species of Nanorchestidae from Padre Island, Texas (Acari: Prostigmata). *Acarologia*, **22**, 253–6.

- ROUNSEVELL, D. E. 1977. The ecology of the pan-Antarctic mite *Nanorchestes antarcticus* (Strandtmann). (In LLANO, G. A. ed. *Adaptations within Antarctic ecosystems*. Houston, Texas, Smithsonian Institute and Gulf Publishing Co., 1023-33.)
- STRANDTMANN, R. W. 1982a. Notes on *Nanorchestes* II. Four species from Victoria Land, Antarctica (Acari: Nanorchestidae). *Pacific Insects*, **24**, 60-8.
- STRANDTMANN, R. W. 1982b. Notes on *Nanorchestes* IV. Four new species from Macquarie Island, Australia (Acari: Endeostigmatides: Nanorchestidae). *Pacific Insects*, **24**, 171-8.
- STRANDTMANN, R. W. 1982c. Notes on *Nanorchestes* V. Two new species of *Nanorchestes* (Acari: Nanorchestidae) from the Antarctic Peninsula and South Atlantic islands. *Pacific Insects*, **24**, 252-8.
- STRANDTMANN, R. W., PITTARD, D. and SCHAEFER, P. 1967. Prostigmatic mites and other terrestrial arthropods of Antarctica. *Antarctic Journal of the US*, **2**, 106-7.
- TILBROOK, P. J. 1973. *Terrestrial arthropod ecology at Signy Island, South Orkney Islands*. Ph.D. thesis, University of London. [Unpublished.]
- USHER, M. B. and BOOTH, R. G. (in press). Arthropod communities in a maritime Antarctic moss-turf habitat: three dimensional distribution of mites and Collembola. *Journal of Animal Ecology*.