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## ***Neohyadesia microtricha* (Acari: Astigmata: Algophagidae): a new species from the sub-Antarctic**

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**Abstract** The sub-antarctic mite genus *Neohyadesia* (Acari: Astigmata) is known from two described taxa: *N. signyi* from Signy Island (South Orkney Islands, South Atlantic Province), and a subspecies, *N. s. punctulata* from Ile Kerguelen (South Indian Province). This paper describes a second species distinguishable by, in particular, cuticular microtrichiae covering the dorsal surface. The new species, *N. microtricha* sp. nov., has a similarly disjunct sub-antarctic distribution, occurring on both Marion (SIP) and South Georgia (SAP) islands. A systematic synopsis of the sub-antarctic algophagine mites is given.

### Introduction

The genus *Neohyadesia* was proposed by Hughes and Goodman (1969) for a new species, *N. signyi*, collected from fresh to brackish water pools on Signy Island, South Orkney Islands (Hughes and Goodman 1969; Schenker 1986). Fain (1974) proposed a new subspecies, *N. signyi punctulata*, for a single male specimen collected from halophytic vegetation on Ile Kerguelen. *Neohyadesia*, *Algophagus* Hughes 1955 and *Algophagopsis* Fain and Johnston 1975, constitute the Algophaginae Fain 1974, one of two subfamilies of the Algophagidae Fain 1974, and the only one represented in the sub-Antarctic.

During a recent survey of the terrestrial invertebrates of Marion Island (see Marshall et al. 1999), specimens of *Neohyadesia* were collected from boulder beach sedi-

ments. These mites differed markedly from *N. signyi* in having the dorsal integument ornamented with microtrichiae. The Marion Island *Neohyadesia* specimens, however, compare favourably with a series of specimens collected from South Georgia in 1962 and sent to one of us (B. M. OC.) by the late Dr. Preston Hunter. Specimens from Marion Island tend to be slightly larger and have slightly longer body setae than those from South Georgia, but there is mostly overlap in measurements and sample sizes are relatively small, so we regard these populations as conspecific. This new species from Marion and South Georgia is described herein.

### Materials and methods

Mites were collected from sediments under beach boulders and preserved in 70% ethanol. In the laboratory, specimens were cleared in lactic acid and mounted in Hoyer's medium. Specimens were collected at the following localities: Marion Island, Trypot beach (46°54'S, 37°35'E), May 1996 and May 1998, by R. Mercer (type locality); South Georgia, Bird Island, Stinker Cape (54°00'16"S, 38°03'35"W), 3 April and 23 May 1963, by H. B. Clagg. In the following description, nomenclature for idiosomal chaetotaxy follows Griffiths et al. (1990); leg chaetotaxy follows Grandjean (1939). All measurements are given in micrometres (µm) and are given as follows: holotype female, range of five paratype females, range of five paratype males (three from Marion and two from South Georgia). Because males and females are largely similar except for primary genitalic characters, descriptions are combined. The holotype will be deposited in the Natural History Museum, London, United Kingdom; paratypes in that institution and in the University of Michigan Museum of Zoology, Ann Arbor, Michigan, USA, and the Plant Protection Research Institute, Pretoria, South Africa.

### Results

#### Description

*Neohyadesia microtricha* sp. nov. (Figs. 1, 2, 3, 4)

Holotype: female, Marion Island (idiosomal length 420 µm).

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Paratypes: four males, Marion Island (idiosomal length 416–440  $\mu\text{m}$ ); five females (468–491  $\mu\text{m}$ ), five males (360–518  $\mu\text{m}$ ), South Georgia Island.

Diagnosis: *N. microtricha* sp. nov. differs from *N. signyi* and *N. s. punctulata* in the following characters: (1) dense microtrichiae lateral to propodosomal shield and covering the dorsum (cuticle smooth or pitted in *N. signyi* s. lat.); (2) setae *c1* and *d1* as long or longer than their separating distance (in *N. signyi* and *N. s. punctulata* setae *c1* and *d1* shorter than separating distance).

Adult. Gnathosoma. Chelicerae (Fig. 2c) stout, chelate-dentate, length (76, 76–83, 69–74), tips of digits simple. Subcapitulum (Fig. 2b) quadrate, length from base to tip of palp (68, 71–76, 60–74), bearing ventral subcapitular setae at base of rutella, palpal supracoxal seta absent. Rutella deeply bilobed. Palp with two dorsal setae, ventral seta absent; palp tarsus with thin solenidion and stout ventral eupathid.

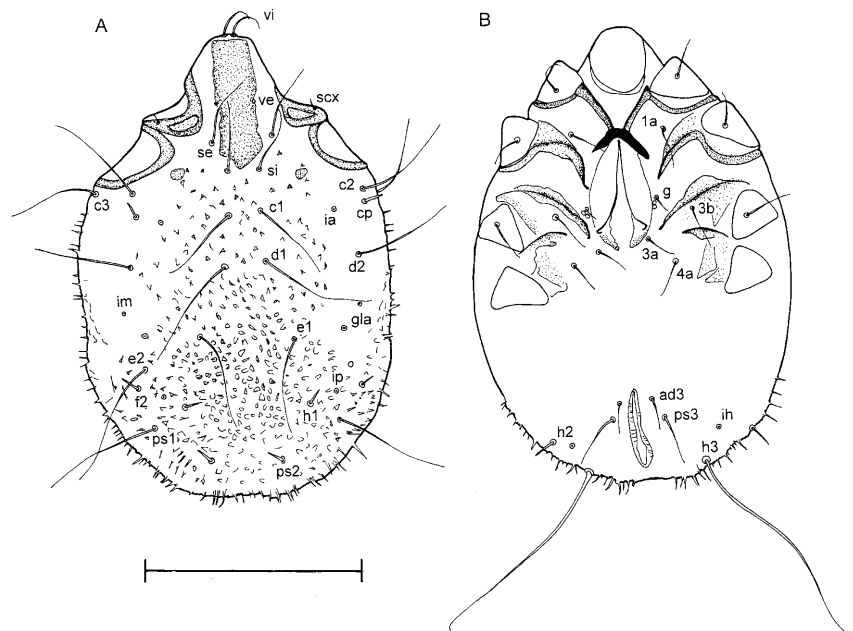
Dorsum: integument generally unsclerotized, but with a small sclerite between the *si* and *c2* setae, in addition to the sclerotized propodosomal shield and axillary organ structures. Integument with a pattern of elongate, tapering microtrichiae minimally consisting of a pair of patches lateral to propodosomal shield and a large patch in posterior lateroventral region. Most adults with microtrichiae covering unsclerotized cuticle of entire dorsum (one male from South Georgia exhibiting minimum pattern). Microtrichiae ranging from 5 to 15  $\mu\text{m}$  in length; those in dorsocentral region often appearing flattened, with ovoid bases resembling punctations. Sejugal furrow absent. Propodosomal shield narrow (39–46) and long (115–138), extending from internal vertical setae (*vi*) to anterior of internal scapular setae (*si*). External vertical setae (*ve*) not observed but alveoli distinct on lateral edge of propodosomal shield. Supracoxal (*scx*) setae present. Axillary organs [termed

supracoxal fossae in Hughes and Goodman (1969)], typical for algophagids, restricted to dorsal surface laterad of propodosomal shield. Bordering sclerite of axillary organ extends latero-anteriorly to middle of propodosomal shield. Additionally, a pair of semi-circular sclerites occurs dorsally of coxae II. Cupules *ia*, *im* and *ip*, and openings of opisthonotal glands (*gla*) distinct (Fig. 1a).

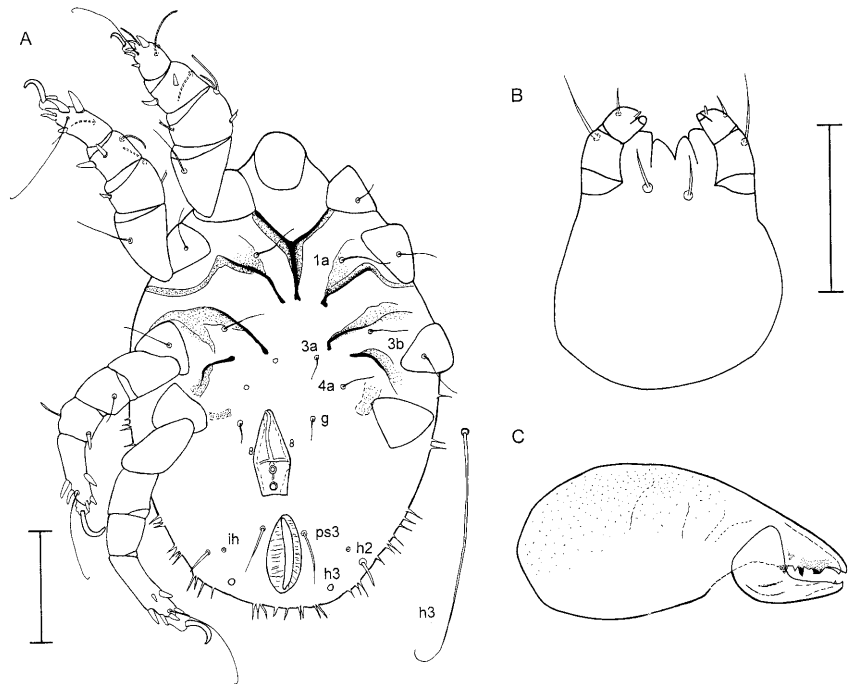
Dorsum with 15 pairs of setae: verticals (*vi*) arise from the vertex of propodosomal shield. Internal scapulars (*si*) slightly shorter than external scapulars (*se*). Dorsal setae are either thinly filiform, or short stout spines (*cp*, *f2*, *h1* and *ps2*; Fig. 1a). Setal lengths similar in both sexes and are as follows (Marion Island specimens tend to be larger): *vi* (34, 16–21, 18–34), *se* (71, 62–76, 62–81), *si* (63, 51–60, 51–67), *c1* (81, 37–69, 35–91), *c2* (97, 78–87, 78–106), *c3* (81, 90–108, 83–108), *cp* (20, 14–16, 16–24), *d1* (91, 58–85, 76–102), *d2* (95, 58–81, 69–93), *e1* [87 (Marion female), 25–53 (South Georgia females), 87–95 (Marion males), 23–30 (South Georgia males)], *e2* (106, 76–99, 81–112), *f2* (20, 16–23, 18–25), *h1* (20, 12–14, 12–20), *ps1* [112 (Marion female), 55–87 (South Georgia females), 108–120 (Marion males), 55–62 (South Georgia males)], *ps2* (20, 16–23, 16–21).

Venter. Four pairs of ventral setae *h2*, *h3*, *ps3*, *ad3* and one pair of cupules (*ih*) in female, but *ad3* absent in male (Figs. 1b, 2). Setae *h3* characteristically long, and *h2* a short stout spine. Setal lengths are as follows: *h2* (20, 21–25, 21–26), *h3* (199, 230–246, 217–253), *ps3* (49, 39–55, 41–53), *ad3* (female only) (30, 28–35). Four pairs of thinly filiform coxal setae and one pair of genitals (*g*) in both sexes, lengths as follows: *1a* (32, 35–39, 26–37), *3a* (26, 18–28, 16–24), *3b* (35, 30–37, 35–41), *4a* (49, 28–35, 30–35), *g* (30, 25–30, 16–25). Apodemes moderate to lightly sclerotized and excepting I are free

**Fig. 1A, B** *Neohyadesia microtricha* sp. nov.. **A** Dorsum of female. **B** Venter of female. Scale bar indicates 200  $\mu\text{m}$



**Fig. 2A–C** *Neohyadesia microtricha* sp. nov.. **A** Male venter. Scale bar indicates 100  $\mu\text{m}$ . **B** Subcapitulum and palps and **C** chelicera. Scale bar indicates 40  $\mu\text{m}$



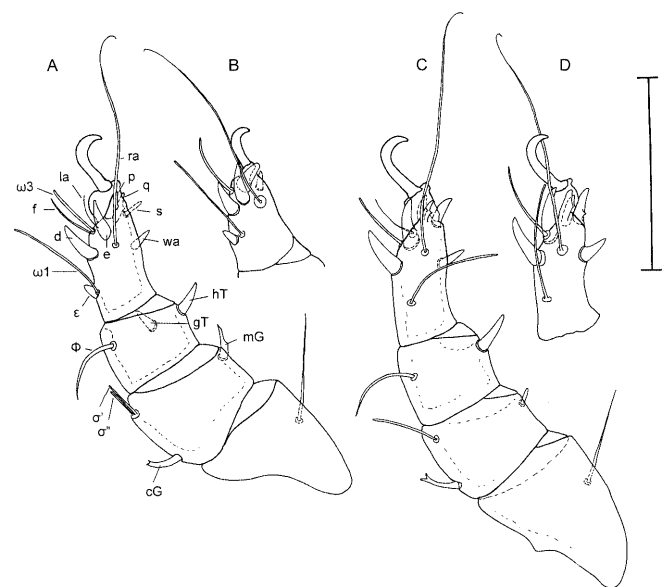
medially. In females, coxal field I apodemes fuse to epigynal apodeme (Fig. 1b) while, in males, apodemes I fuse to form a sternum (Fig. 2). Female ovipore large and elongated extending from level of setae *la* to near *3a*, with ovipore anterior of coxal fields IV. Two pairs of small genital papillae just posterior to genital setae in female, but clearly posterior to them in male. Male genital organs concealed by triangular plate. Aedeagus an anteriorly directed tube, largely straight but distinctly hooked distally, length (including basal piece) 58–71.

**Legs.** Typically possess flexible, membranous pretarsus with empodial claw. Claws of legs I and II slightly smaller than those of legs III and IV, with male claw I distinctly smaller than the others. Chaetotaxic formula (tarsus, tibia, genu, femur, trochanter) typical for *Neohyadesia*: leg I, 9.2.2.1.1; leg II, 9.2.2.1.1; leg III, 7.1.1.0.1; leg IV, 8.1.0.1.0. Solenidiotaxy: leg I, 2 + famulus.1.2.0.0; leg II, 1.1.1.0.0; leg III, 0.1.1.0.0; leg IV, 0.1.0.0.0. (Figs. 3, 4).

**Leg I.** Terminal tarsal spines *p* and *q* possess a small medial fork, which is also seen on other legs. Dorsal setae *d* and *e*, and ventral setae *s* and *wa*, spinous, lateral seta *ra* long, hooked apically, *la* and *f* thinly filiform. Basal solenidion  $\omega 1$  longer than other solenidia,  $\omega 3$  apical;  $\omega 2$  absent. Large, spinelike famulus arises near base of  $\omega 1$ . Tibia with *gT* and *hT* stout spines, solenidion  $\phi$  short. Genual setae *cG* and *mG* thick, forked and serrated, respectively; solenidion  $\sigma'$  subequal in length to  $\sigma''$ . Setation of leg II similar to leg I, but solenidion  $\omega 3$ , and famulus, of tarsus, and one solenidion of genu missing. Setation of legs III and IV typical for genus. Tarsus III with only basal seta *w*, whereas both setae *r* and *w* occur on tarsus IV.

## Discussion

Specimens from the Marion Island and South Georgia populations differed in the absolute lengths of idiosomal setae *el* and *ps1*, with individuals from South Georgia having distinctly shorter setae. However, the longer, filiform dorsal setae were quite variable in length in both populations, and since sample sizes from both populations were small, we regard the differences in these two setae as indicative of intraspecific variation.



**Fig. 3A–D** *Neohyadesia microtricha* sp. nov.. **A** Leg I female, **B** tarsus I male, **C** leg II female, and **D** tarsus II male. Scale bar indicates 80  $\mu\text{m}$

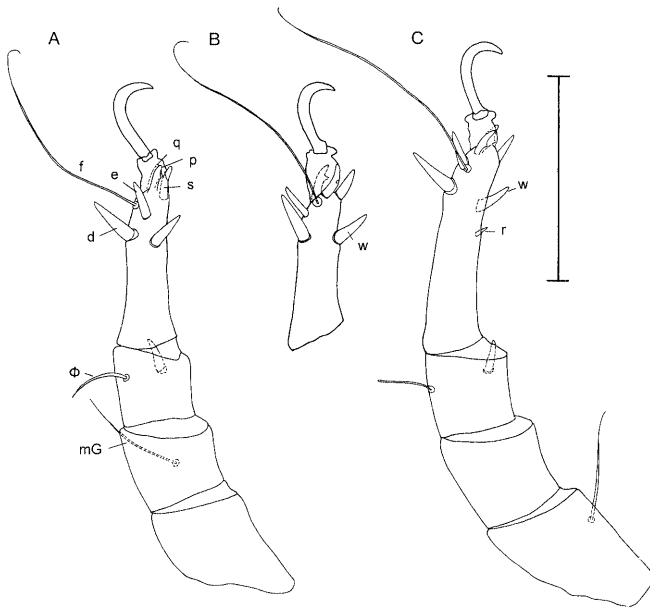


Fig. 4A–C *Neohyadesia microtricha* sp. nov.. A Leg III female, B tarsus III male and C leg IV female. Scale bar indicates 80  $\mu$ m

Hughes and Goodman (1969) originally distinguished *Neohyadesia* from *Algophagus* by the following characters: (1) apodemes II in male are not fused; (2) males lacking “genital sense organs” (genital papillae); (3) male genital folds replaced by a hinged plate; (4) solenidion  $\omega$ 2 missing from tarsus I; and (5) ventro-terminal spines *p* and *q* forked. In their key to algophagid genera, OConnor and Moser (1985) used only the reported presence of external vertical setae to separate *Neohyadesia*. Examination of the holotype and recently collected specimens of *N. signyi* (six males and eight females by Matt Edworthy in February 2000, for deposition in Natural History Museum, London, UK), as well as the new species described above, and comparison of these taxa with subsequently described algophagine species, allow us to rediagnose the genus. Of the character states noted above: (1) is no longer diagnostic of *Neohyadesia* as the male apodemes are not fused in *Algophagus pennsylvanicus* and *Algophagopsis pneumatica*. They are fused only in sub-antarctic *Algophagus* species. Character state (2) is not diagnostic as the genital papillae were overlooked by the original describers. They are reduced but still present in *Neohyadesia*. Character state (3) is not diagnostic as all algophagine males have a relatively large, sclerotized aedeagus and supporting structures (the “hinged plate” of Hughes and Goodman). The genital valves (folds of Hughes and Goodman) are reduced in all these taxa. Character state (4) is not diagnostic as solenidion  $\omega$ 2 is absent in *Algophagopsis* as well as *Neohyadesia*. Character state (5) remains diagnostic, as the forked condition of tarsal setae *p* and *q* remains unique to

*Neohyadesia*. Finally, the holotype of *N. signyi* and all specimens of *N. microtricha* actually lack external vertical setae. The structures noted by Hughes and Goodman are actually just the alveolar vestiges of these setae, which are lacking in all other Algophagidae as well as all other families of Hemisarcoptoidea (sensu OConnor 1982).

In addition to the form of tarsal setae *p* and *q*, there are other character states of *Neohyadesia* which are diagnostic: (1) the fusion of the epigynial apodeme with the ends of the apodemes of coxae I in the female (epigynial apodeme unfused and coxal apodemes fused to form sternum in other algophagines); (2) seta *d* of tarsi I–II in the form of a large spine (seta *d* I–II thin in other algophagines); (3) restriction of the axillary organs to a completely dorsal position (axillary organs extending at least somewhat ventrolaterally in other algophagines). On the basis of these derived character states, we continue to regard *Neohyadesia* as a valid genus.

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