

***Psorergatoides nyctali* (Prostigmata: Psorergatidae), a new mite species parasitizing the bat *Nyctalus noctula* (Mammalia: Chiroptera) in the British Isles**

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Abstract

Psorergatoides nyctali **sp. nov.** is described from the wing membrane of a captive adult female *Nyctalus noctula* originating from Devon, England.

Key words: *Psorergatoides nyctali*, new species, British Isles, bat, *Nyctalus noctula*

Introduction

Members of the genus *Psorergatoides* Fain (Prostigmata: Psorergatidae) are exclusively parasites of bats (Mammalia: Chiroptera), and are distinguished from other psorergatids by the presence of four pairs of minute lateral setae on the dorsal shield (Fain 1959a,b). Of the 17 species described previously, one has been recorded from each of the host families Desmodontidae (Lukoschus *et al.* 1979), Hipposideridae (Fain 1959b), Megadermatidae (Fain 1959a), Nycteridae (Fain 1959a) and Rhinolophidae (Fain 1959a,b), two from Molossidae (Lukoschus *et al.* 1973, Giesen *et al.* 1982b) and Vespertilionidae (Giesen *et al.* 1982a), four from Emballonuridae (Fain 1959b, Lukoschus *et al.* 1973, Lukoschus *et al.* 1979) and five from Phyllostomidae (Fain 1959b, Lukoschus *et al.* 1973, Lukoschus *et al.* 1979). Only one species, *P. lonchorhina* Fain, has been found on members of more than one host family (Fain 1959b, Giesen 1990). *Psorergatoides* species have been collected in the Australian, Oriental, Palearctic, Ethiopian and Neotropical regions, with the majority of records emanating from the latter two. *Psorergatoides kerivoulae* Fain and *P. rhinolophi* Fain are the only Palearctic representatives, respectively identified from *Plecotus auritus* (Linnaeus) in Belgium (Fain 1959b), and *Rhinolophus* species in Belgium, France, Italy and Spain (Fain 1959b, Lukoschus *et al.* 1973).

In October, 2002, the carer of a captive adult female *Nyctalus noctula* (Schreber) (Chiroptera: Vespertilionidae) noticed unpigmented patches developing on both wings of the bat (Fig. 1). The patches slowly spread, and were observed to incorporate small cysts, and the finger joints became inflamed. The host was apparently not distressed by its condition and irritation did not seem to be a problem. Such symptoms were not exhibited by two other noctules sharing the same enclosure as the affected bat. Using a six millimetre skin biopsy punch, a cyst was removed from the anaesthetized host by a veterinary surgeon and examined. The skin showed marked epidermal hyperplasia and mild lymphoplasmacytic superficial dermatitis, with abundant intra-epithelial cross sections of mites (*P.* Briggs, pers. comm.). Two other cysts removed by the same method were examined by the present author and found to contain an unnamed species of *Psorergatoides* (Fig. 2). *Psorergatoides nyctali* **sp. nov.** is here described.

Observations were made on specimens temporarily mounted in 60% lactic acid. Measurements are given in micrometres (μm) and as a mean followed by the range or as a range only. Because of

the difficulty of measuring the long setae due to their curvature and finely tapering ends, values given for these are somewhat approximate. Morphological terminology follows that of Giesen (1990). The description of the male includes only those character states that differ from the female.



FIGURE 1. *Psorergatoides nyctali* **sp. nov.** Extended wing of host (*Nyctalus noctula*) showing unpigmented areas of infestation.



FIGURE 2. *Psorergatoides nyctali* **sp. nov.** Dissected cyst, mite displaced from indentation arrowed in black, separated mite arrowed in white.

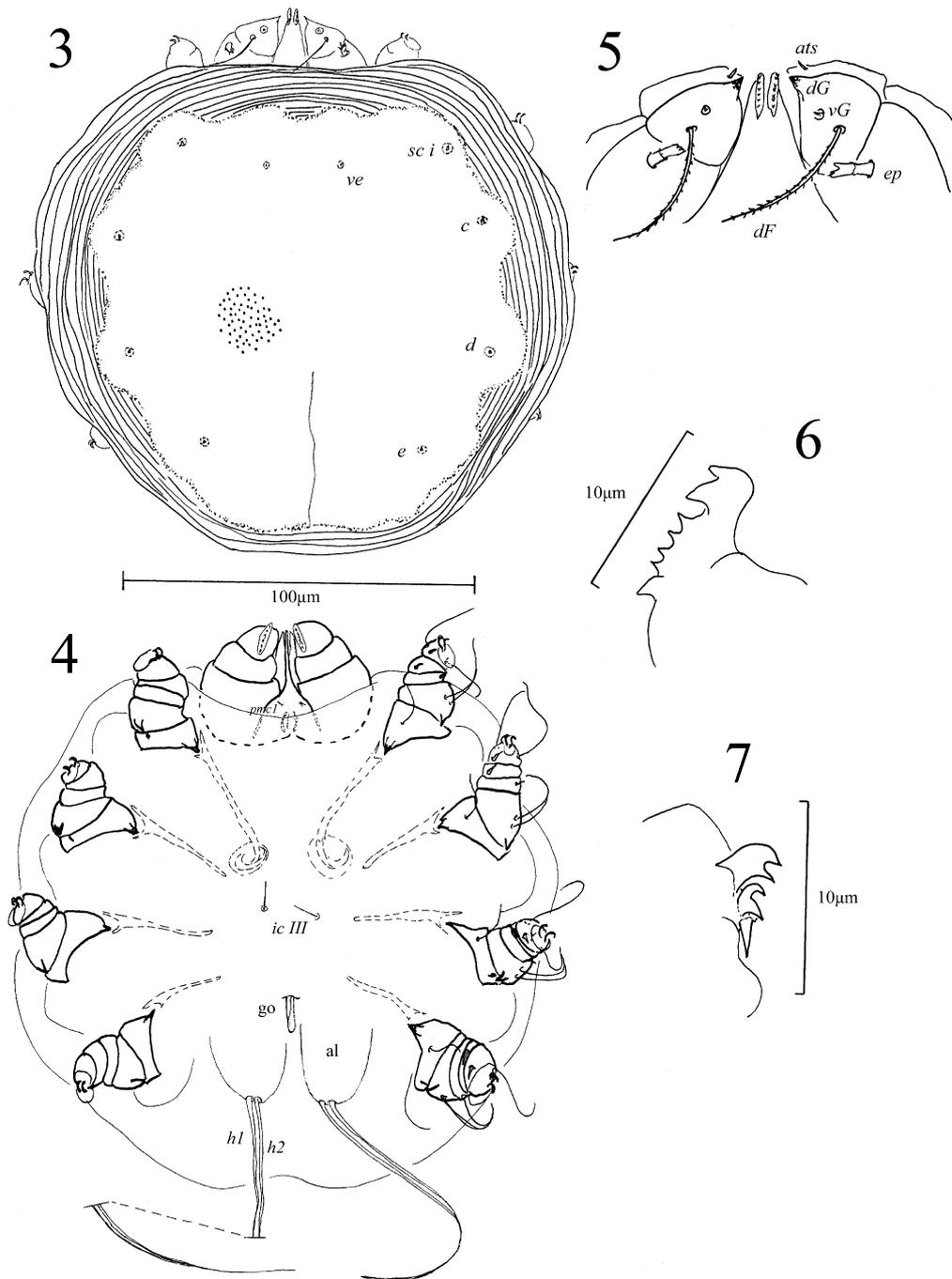
***Psorergatoides nyctali* sp. nov. (Figs. 3–17)**

Psorergatoides sp. A, Baker & Craven, 2003: 13.

Material examined

Holotype female: ENGLAND, Hertfordshire, Bushey, captive adult female *Nyctalus noctula* (Chiroptera: Vespertilionidae), ex cyst in wing membrane (host rescued on 14.viii.1997 at

Dartington Hall, near Totnes, Devon, England), coll. P. Briggs, x.2002. Paratypes (20 females, 5 males, 2 deutonymphs, 7 protonymphs): same data as holotype. [Specimens mounted in Hoyer's medium. Deposited in the Natural History Museum, London; acc. no. BMNH(E)2005-143.]



FIGURES 3–7. *Psorergatoides nyctali* sp. nov. (female). 3, dorsal view; 4, ventral view; 5, gnathosoma, dorsal view; 6, fixed digit of chelicera, lateral view; 7, palp tibiotarsal setae, lateral view. al = adanal lobe, go=genital opening.

Diagnosis

The female of *Psorergatoides nyctali* **sp. nov.** is distinguished from that of the other members of the genus by the presence of two setae on femora I–III, and usually on at least one femur IV, in combination with terminal setae *h1–2* being longer than 75µm and the tarsal spine being pointed. Males differ because they lack leg trochanteral and femoral setae.

FEMALE (10 SPECIMENS MEASURED)

Total length (idiosoma and gnathosoma) 151(140–170); maximum idiosomal width (ca. at level of legs III) 141(133–150).

Idiosoma – dorsum (Fig. 3). Integument surrounding dorsal shield striated. Shield punctate with irregular outline, median crease extends from posterior margin almost to level of setae *d*; median length 116(111–123), greatest width (ca. at level of *d*) 121(113–128); 5 pairs minute setae present (*ve*, *sc i*, *c*, *d*, *e*), *ve* located slightly posteromedially to lateral seta *sc i*.

Idiosoma – ventral (Fig. 4). Integument smooth. Epimera I curve outwards distally and with circular sclerotization associated with curved part, epimera II–IV more or less straight. Ventral setae (*ic III*) 6–8 long, inserted 17–23 apart. Genital opening (*go*) just anterior to adanal lobes (*al*). Adanal lobes each bear 2 smooth, subequal tapering setae (*h1* & 2), 90–112 long.

Gnathosoma (Figs 5–7). Internal subcapitular setae (*pmc 1*) minute. Supracoxal seta (*ep*) two-segmented, ends in 3 prongs, ca. 6 long. Palp: dorsal setae *ats* spiniform, ca. 2 long, *dG* a broad spine, *vG* minute, *dF* serrate, 21–24 long; two ventro-apical tibiotarsal setae claw-like and bifid, one spiniform (Fig. 7). Chelicera: fixed digit with 7 teeth, proximal 1 and distal 2 larger than median 4 (Fig. 6).

Legs (Figs 8–11). Trochantera with one anterobasal and one small posterodistal spur ventrally, femora with posterobasal spur. Setal formulae (trochanter-tarsus) (solenidion in round, variations in square brackets): I 1-2[1]-1-2-4(1); II 1-2-1-2-4(1); III 1-2[1]-1-2-3; IV 1-2[1,0]-1-2-2; in 19 specimens examined, femoral setal variations on legs I, III and IV occurred as follows [I/I, III/III, IV/IV (number of specimens)]: 2/2, 2/2, 2/1 (5); 2/1, 2/2, 2/1 (4); 2/2, 2/2, 2/2 (3); 2/2, 2/2, 1/1 (2); 2/1, 2/2, 2/0 (1); 2/1, 2/2, 1/0 (1); 1/1, 2/2, 1/1 (1); 2/1, 2/2, 1/1 (1); 2/2, 2/1, 2/1 (1). Trochanteral seta 11–15 long. Proximal femoral seta ca. 0.7–0.8 length distal, respectively 14–18 and 17–22 long. Posterolateral genual seta I–III spiniform, 2–3 long, that of IV slender, 17–19 long. Ventrolateral tibial seta robust, spiniform, mediodorsal seta slender, 20–30 long. Tarsi with ventral robust spiniform seta; I–III also with 2 slender dorsolateral setae (*tc'*, *tc''*), 15–23 long on I–III; *tc'* of IV 14–17 long, *tc''* absent; I and II with enveloped seta (*p''@*) and 1 solenidion (ω). Apotele with two subequal pointed claws and membranous empodium, comprising small dorsal and large ventral lobe.

MALE (5 SPECIMENS MEASURED)

Total length 121(118–125), maximum width 114(108–120).

Idiosoma – dorsal (Fig. 12). Shield 93(89–95) long, greatest width 102(100–108), without median crease, bears 6 pairs minute setae (*ve*, *ps*, *sc i*, *c*, *d*, *e*); *ve* located slightly posterior to genital opening, *ps* near base of aedeagus (*ae*); distance *ve–ve* and *ps–ps* respectively 19–22 and 11–14. Aedeagus 18–21 long.

Idiosoma – ventral (Fig. 13). Ventral setae 5–6 long, inserted 19–22 apart; adanal lobes and *h* setae absent.

Gnathosoma. Supracoxal seta 3–4 long. Palp dorsal seta *ats* ca. 1 long, *dF* 18–20 long. Fixed cheliceral digit appears to have only 3 small median teeth in addition to larger proximal and distal ones.

Legs (Figs 12–13). Setal formulae: I 0-0-0-1-4(1); II 0-0-0-1[2]-4(1); III 0-0-0-1[2]-2; IV 0-0-0-1[1]-2. Mediodorsal tibial seta seen on a single leg in some specimens (present on leg II and III in

2 and 1 paratypes respectively, and on leg IV in 1, subsequently lost, specimen), 15–18 long. Dorsolateral tarsal setae (tc' , tc'') I–III 15–18 long, tc' IV 10–14.

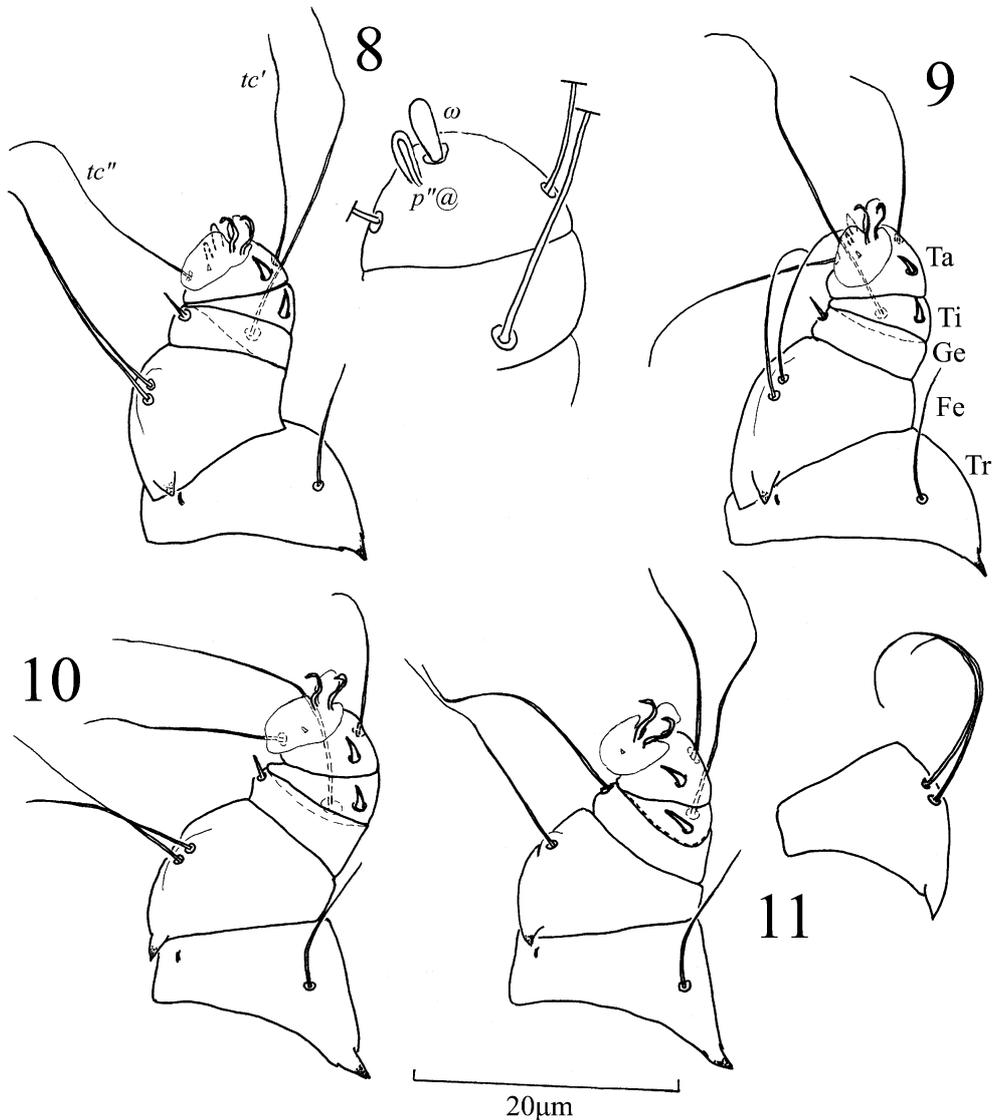
DEUTONYMPH (2 SPECIMENS MEASURED)

Total length 148–150, maximum width 135–143.

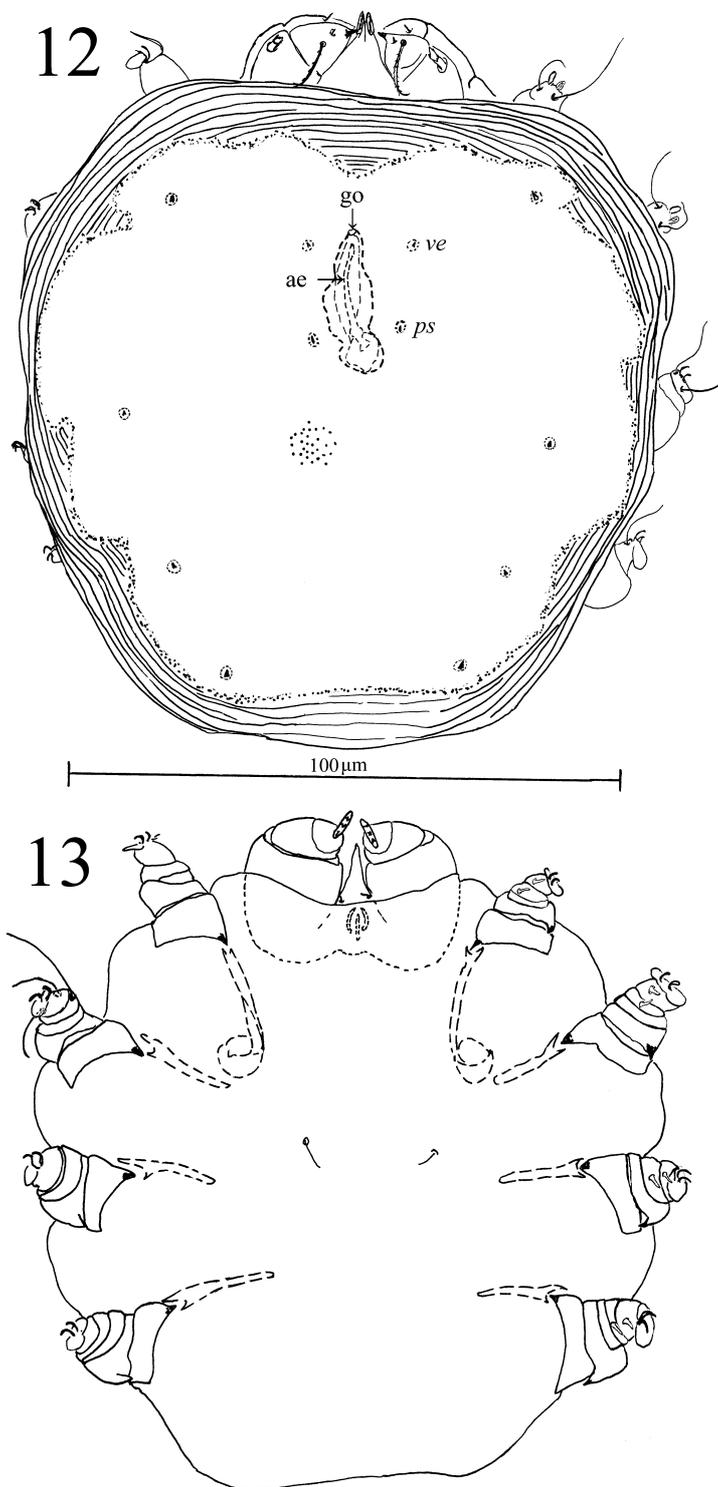
Idiosoma (Fig. 14). Lacks setae.

Gnathosoma (Fig. 15). Setae like those of adults in shape.

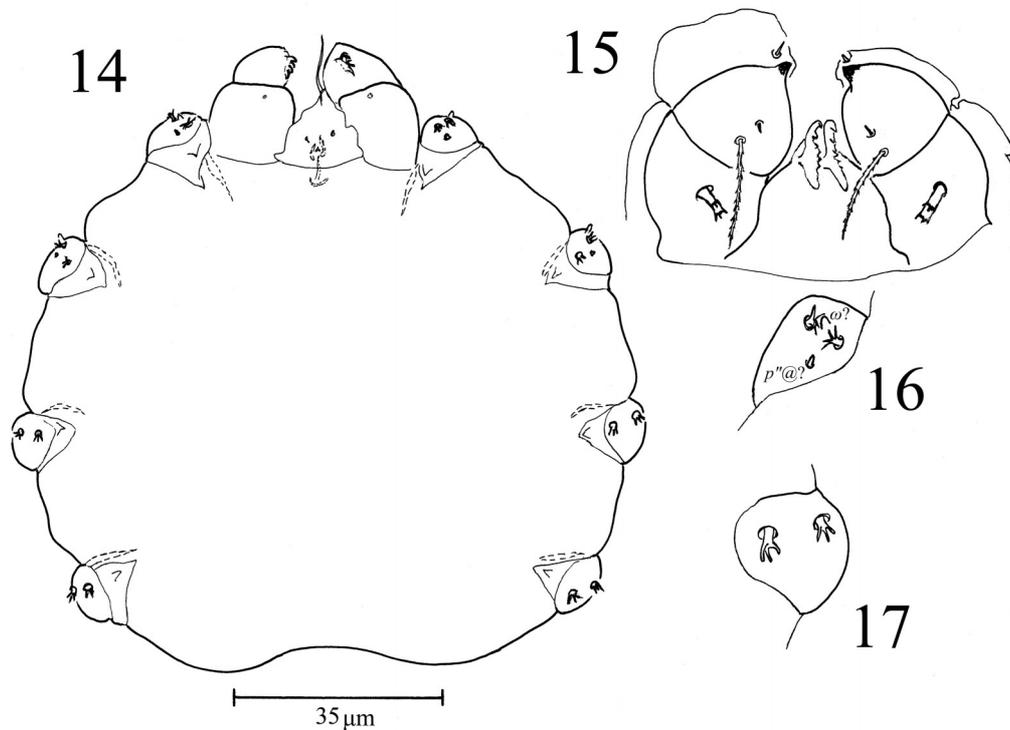
Legs (Figs 16–17). Two-segmented; dorsal setae absent; ventrally, basal segment with proximal spur, distal segment with 2 trifold claws, I and II also with two structures here hypothesized as being homologous to solenidion ω (distal) and enveloped seta $p''@$ (proximal).



FIGURES 8–11. *Psorergatoides nyctali* sp. nov. (female), legs I–IV, ventral view. 8, I, with detail of dorsal view of tarsus; 9, II; 10, III; 11, IV, with detail of femur of opposite leg.



FIGURES 12–13. *Psorergatoides nyctali* sp. nov. (male). 12, dorsal view; 13, ventral view. ae=aedeagus, go=genital opening.



FIGURES 14–17. *Psorergatoides nyctali* **sp. nov.** (deutonymph). 14, ventral view; 15, gnathosoma, dorsal view; 16, leg I, ventral view; 17, leg III, ventral view.

PROTONYMPH (7 SPECIMENS MEASURED)

Total length 107(100–115), maximum width 113(103–120). Otherwise, as for deutonymph.

Etymology

The species name is derived from that of the host genus.

Remarks

Psorergatoides nyctali **sp. nov.** possesses a number of attributes that are unique to the family Psorergatidae and to the genus *Psorergatoides*. This is the first psorergatid described that, in either sex, lacks leg trochanteral and femoral setae, and in which the mediodorsal tibial seta is only rarely present. Some members of *Psorergates* Tyrrell and *Psorobia* Fain have two setae on femur IV, but this character state is not seen in any other member of *Psorergatoides*. The absence of genual setae is an unusual occurrence within the family, having been recorded in one species of *Psorobia* and six of *Psorergatoides*. Of these, only three of the latter (*P. emballonurae* Fain, *P. hipposideros* Fain and *P. lonchorhina*) lack genual setae in the male, but not in the female. Based on Giesen's (1990) phylogeny, *P. nyctali* **sp. nov.** is most closely related to *P. australiensis* Giesen, Lukoschus & Fain, *P. kerivoulae*, *P. nycteris* Fain and *P. tadaridae* Giesen, Lukoschus & Nadchatram, which are the only other members of the genus to have two setae (rather than one) on femora I–III in the female. Furthermore, *h* setae are absent in the male of at least three of these four (*P. nycteris* males are

unknown), genual seta IV is much longer than that of I–III in *P. australiensis*, *P. kerivoulae* and *P. tadaridae*, while *P. australiensis* and *P. kerivoulae* were collected from hosts belonging to the family Vespertilionidae (respectively from four species in two genera and six species in three genera (Giesen 1990)) and have *h* setae that are over 75µm in length. In addition to the unique character states described above, *P. nyctali* **sp. nov.** differs from these four species in possessing a tapering, rather than bifid, ventral tarsal spine.

No interspecific differences have been identified in *Psorergatoides* immatures, and protonymphs and deutonymphs are distinguished only according to their size (Giesen, 1990). The two structures on tarsi I and II of nymphal *P. nyctali* **sp. nov.**, here proposed as solenidion ω and enveloped seta *p''@*, have been illustrated for other species (e.g., Lukoschus *et al.* 1973, Lukoschus *et al.* 1979), but both are referred to as solenidia.

Psorergatoides species are evidently highly host specific. Only one of the previously described 17 parasitize more than one bat family, while 13 have been found on a single host genus, three on two genera and one on three. It is likely, therefore, that *P. nyctali* **sp. nov.** will be confined to the Vespertilionidae and possibly to *Nyctalus*. As reported for other members of the genus (Giesen 1990), *P. nyctali* **sp. nov.** individuals each lies in an impression in the epidermis (Fig. 2), and adults and immatures occur together in several layers.

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