

***Hericia sanukiensis*, a new species of Algophagidae (Astigmata) inhabiting sap flux in Japan**

NORMAN J. FASHING¹ & KIMIKO OKABE²

¹Department of Biology, College of William and Mary, Williamsburg, VA 23187-8795, USA.

²Forestry & Forest Products Research Institute, P.O.Box 16, Norin Kenkyu-danchi, Ibaraki 305-8687, JAPAN

Abstract

A new species, *Hericia sanukiensis*, is described and illustrated from adults, phoretic deutonymphs and non-phoretic deutonymphs collected from sap flux on oak trees (*Quercus acutissima* Carruth.) in Takamatsu City, Kagawa Prefecture, Japan. Deutonymphs are phoretic on the sap flux inhabiting beetle *Librodor japonicus* (Motschulsky) (Coleoptera, Nitidulidae).

Key words: Acari, Algophagidae, *Hericia*, sap flux, *Librodor japonicus*, Japan

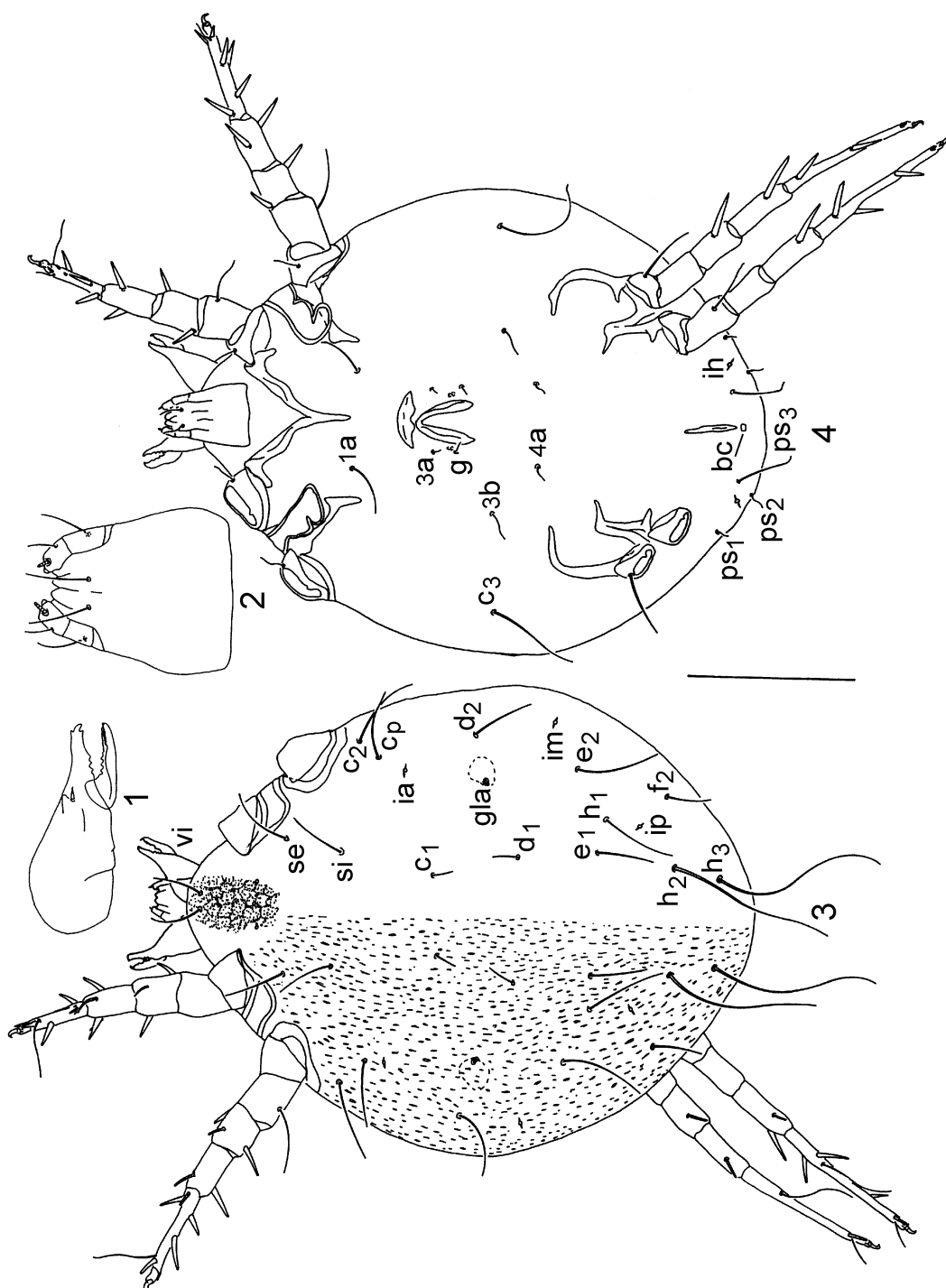
Introduction

Robin (1868) described *Glycyphagus hericius*, an inhabitant of sap flux on English elm (*Ulmus minor* Mill., formerly *U. campestris* L.) in France. Canestrini (1888) recognized the species was not in the genus *Glycyphagus* and established the genus *Hericia* to accommodate it. However Canestrini (1888) also changed the specific name from *hericius* to *robinii*, a mistake that has since been corrected and the species is now known as *H. hericia*. To date, three additional species of *Hericia* have been described: *H. georgei* Michael 1903 from the sap of an English black poplar (*Populus nigra* L.), *H. fermentationis* Vitzthum 1931 from strongly fermenting, sour, milk-white liquid in a cut-off bamboo stump in Sumatra, and *H. paradoxa* Türk and Türk 1957 from a deutonymph found in birch rot in Germany. The present paper describes a fifth species collected from sap flux on sawtooth oak (*Quercus acutissima* Carruth) (Fagaceae), in Kagawa Prefecture, Japan.

Materials and methods

Bark and wood were collected from sap flux on sawtooth oak trees (*Quercus acutissima*), brought back to the laboratory, and examined for mites under a dissecting microscope. Specimens were cleared in a mixture of Lactophenol and Nesbitt's solution and mounted in Hoyer's medium on microscope slides (Krantz 1978; Evans 1992). Measurements were taken on ten individuals of each stage and are given in micrometers (µm) in the following order: holotype, mean and range (in parentheses). Relative position of setae and other structures are as in figures. Nomenclature for idosomal setae follows Griffiths *et al.* (1990) and for leg setae Grandjean (1939).

For observation of characters under the scanning electron microscope (SEM), specimens were dehydrated in ethyl alcohol, dried using the critical point procedure, individually affixed to stubs using double-sided sticky tape, and coated with gold-palladium in a sputter coater. Microscopy was performed on an AMR 1200.



FIGURES 1–4. *Hericia sanukiensis*, sp. n., female—1. chelicera, lateral view, 2. gnathosoma, ventral view, 3. dorsum, 4. venter. Scale bar: 400 μ m (Figs. 1, 2), 200 μ m (Figs. 3, 4).

***Hericia sanukiensis* sp. nov.**

Material examined

Holotype: Male collected from sap flux on *Quercus acutissima* at Sogawa-Higashimachi, Takamatsu City, Kagawa Prefecture, Japan, 25 June 2003, by K. Hayashi. Deposited in the Natural Resources Inventory Center, National Institute for Agro-Environmental Sciences, Tsukuba, Japan (NIAES).

Paratypes: Males, females, phoretic deutonymphs and non-phoretic deutonymphs collected by K. Hayashi and T. Ichikawa from sap flux on *Quercus acutissima* at Kinbuchi Forest Park and Sogawa-Higashimachi, Takamatsu City; Kagawa Prefecture, Japan, on 28 August 2000, 4 September 2001, 25 June 2003 and 26 May 2004. Deposited in NIAES, the Natural History Museum, London, and the U. S. National Museum, Washington, D.C.

Description

Female (Figs. 1–8, 9, 11, 13)

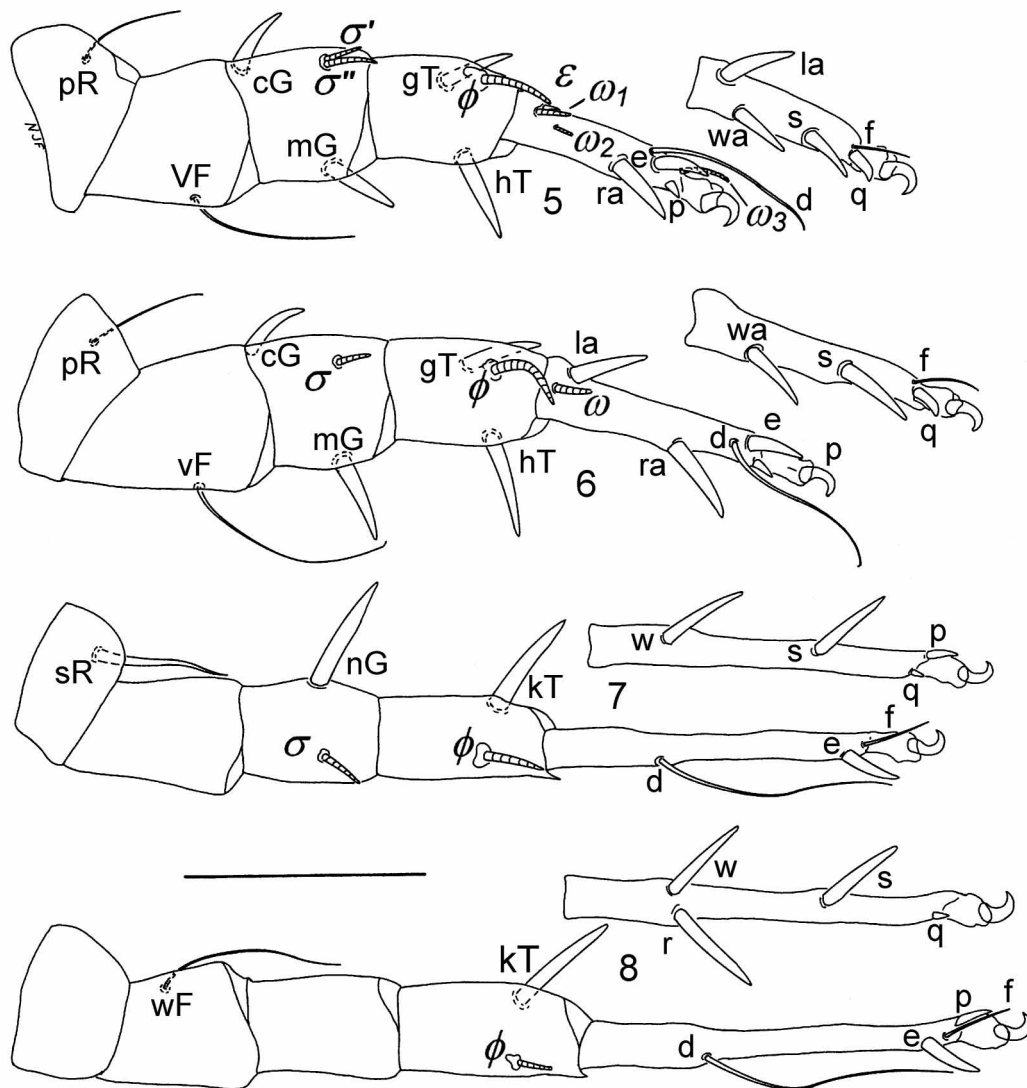
Body broadly ovoid; length 738 (650–830); width just posterior to coxae II 482 (420–560). Gnathosoma with chelate chelicerae (Fig. 1) with digits thin and with few well developed teeth, cheliceral seta short and spine-like; subcapitulum (Fig. 2) bearing a pair of filiform subcapitular setae ventrally. Each palpal tibia bears a filiform dorsal seta, and each palpal tarsus a filiform dorsal seta, a subapical solenidion, and a basal rounded eupathidium; ventral palpal seta absent.

Dorsum (Fig. 3)—Cuticle lightly sclerotised, bearing striations (Fig. 11). Prodorsal sclerite with a reticulate pattern (Fig. 13), over twice as long as wide, extending to a level between trochanters I and II. A pair of small unsclerotised areas representing the vestigial alveoli of setae *ve* occur on lateral margins of prodorsal sclerite. Grandjean's organs and supracoxal setae absent. Axillary organs originate dorsally between legs I and II, extending laterally between legs and ventrally onto coxae. Opisthonotal gland openings (*gla*) located between setae *d*₁ and *d*₂. Cupules located as follows: *ia* slightly posterior seta *cp*, *im* on lateral margin and slightly anterior seta *e*₂, and *ip* between setae *h*₁ and *h*₂. Dorsum bearing 14 pairs of filiform setae: *vi* 94 (88–112); *si* 108 (92–118); *se* 128 (112–138); *c*₁ 26 (20–35); *c*₂ 106 (98–112); *cp* 129 (112–142); *d*₁ 37 (30–45); *d*₂ 111 (105–118); *e*₁ 85 (70–100); *e*₂ 138 (125–145); *f*₂ 88 (75–108); *h*₁ 126 (110–150); *h*₂ 188 (175–200) and *h*₃ 208 (198–220).

Venter (Fig. 4)—Cuticle lightly sclerotised. Anterior coxal apodemes I directed posteromedially, joining at midline to form a Y-shaped sternum. Anterior coxal apodemes II directed posteromedially; anterior coxal apodemes III and IV directed anteriomedially; posterior apodemes III directed anteriomedially and joining anterior apodemes IV. Epigynial apodeme small, located anterior to oviparous. Genital papillae vestigial. Cupule *ih* between seta *ps*₁ and *ps*₃. Anus ventroterminal. Bursa copulatrix (*ba*) a short tube slightly posterior anus. Venter bearing 9 pairs of filiform setae: *c*₃ 129 (120–142); *la* 61 (50–82); *3a* 16 (12–18); *3b* 39 (32–48); *4a* 29 (25–32); *g* 8 (3–12); *ps*₁ 16 (8–22) and *ps*₂ 21 (15–32). and *ps*₃ 100 (75–112).

Legs (Figs. 5–8)—Legs heavily sclerotised; lengths (measured from base of femur to tip of tarsus); mean, followed by range and mean percentage of idiosomal length in parentheses: I 286 (258–315, 39%); II 322 (291–349, 44%); III 370 (343–406, 50%); IV 388 (357–428, 53%). Tarsal lengths: I 85 (70–132); II 106 (91–113); III 150 (136–166); IV 166 (153–185). Trochanteral setation 1-1-1-0; setae *pR* I–II thin, filiform, *sR* III thick, robustly filiform. Femoral setation 1-1-0-1; setae *vF* I–II and *wF* IV thin, filiform. Genua setation 2-2-1-0; setae *cG* and *mG* I–II and *nG* III stout spines. Tibial setation 2-2-1-1; setae *hT* and *gT* I–II and *kT* III–IV stout spines. Tarsal setation 9-9-7-8; tarsae I and II with setae *la*, *wa*, *ra*, *s* and *e* stout spines, proral setae (*p* and *q*) short spines, seta *d* long, filiform, and seta *f* short, filiform; tarsus III setae *w*, *s* and *e* stout spines, proral setae (*p* and

q) short spines, seta *d* long, filiform, and seta *f* short, filiform; tarsus IV similar to tarsus III but with the addition of seta *r*, a stout spine. Solenidia (I to IV): tarsi 3-1-0-0, tibiae 1-1-1-1, genua 2-1-1-0; solenidia σ of genua I–II originating 1/3 of way from apical end and approximately midway on genua III; solenidion σ' 2/3 length of σ'' , tibiae I–IV with solenidion ϕ originating approximately 1/3 of way from apical end; tarsus I with solenidion ω_1 originating near segment base, solenidion ω_2 approximately 1/4 of way from basal end, and ω_3 apical. Tarsus II with ω originating near segment base. Tarsus I with spinelike famulus ϵ adjacent to solenidion ω_1 . Pretarsi with membranous ambulacra and slender, curved claws; condylophores absent.

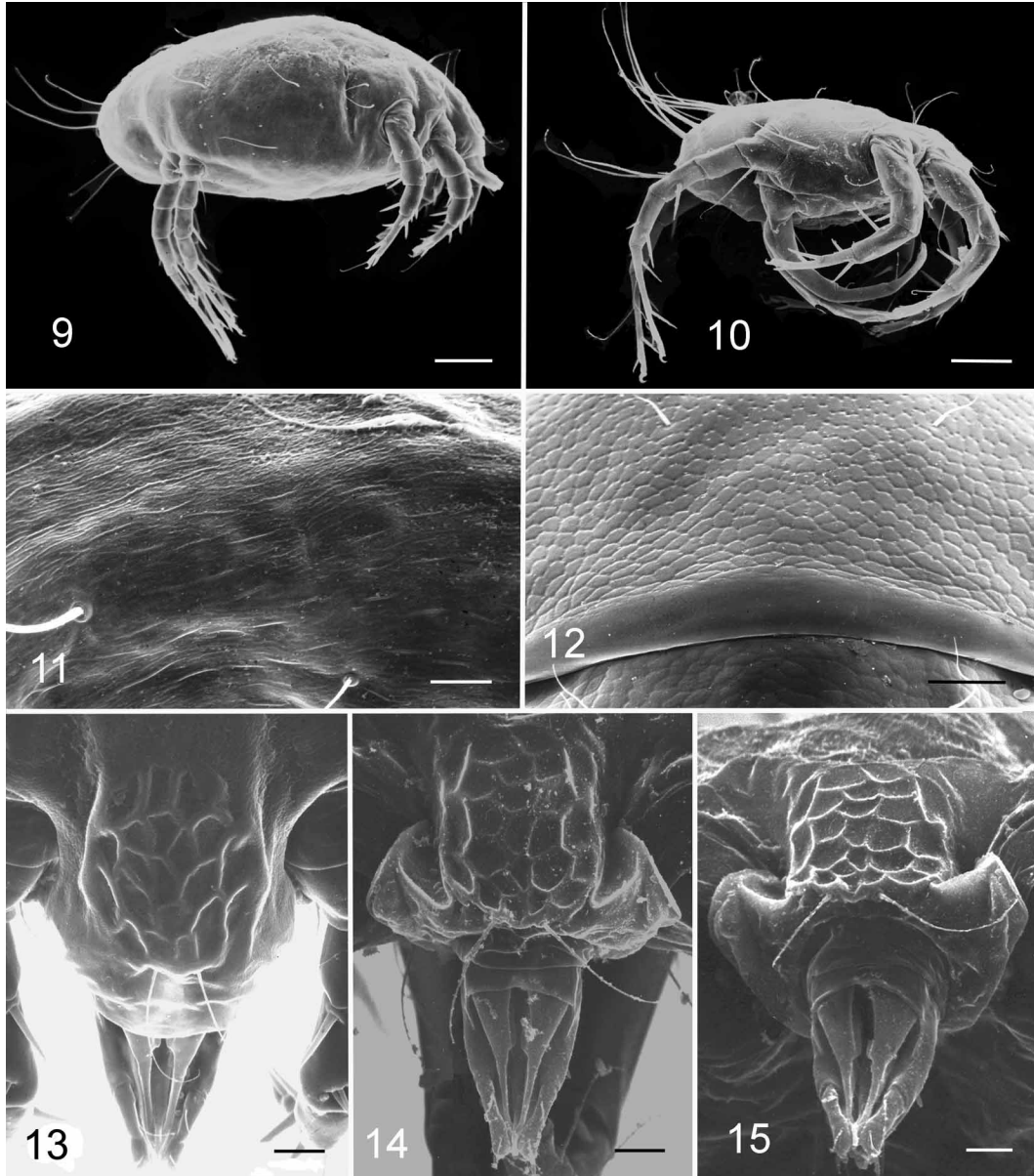


FIGURES 5–8. *Hericia sanukiensis*, sp. n. female—5. leg I, 6. leg II, 7. leg III, 8. leg IV. Scale bar = 100 μ m

Male (Figs. 10, 14–21)

Body broadly oval, but tapering more both anteriorly and posteriorly than female; shallow cleft at posterior margin; length 640, 633 (540–710); width just posterior to coxae II 500, 503 (430–580).

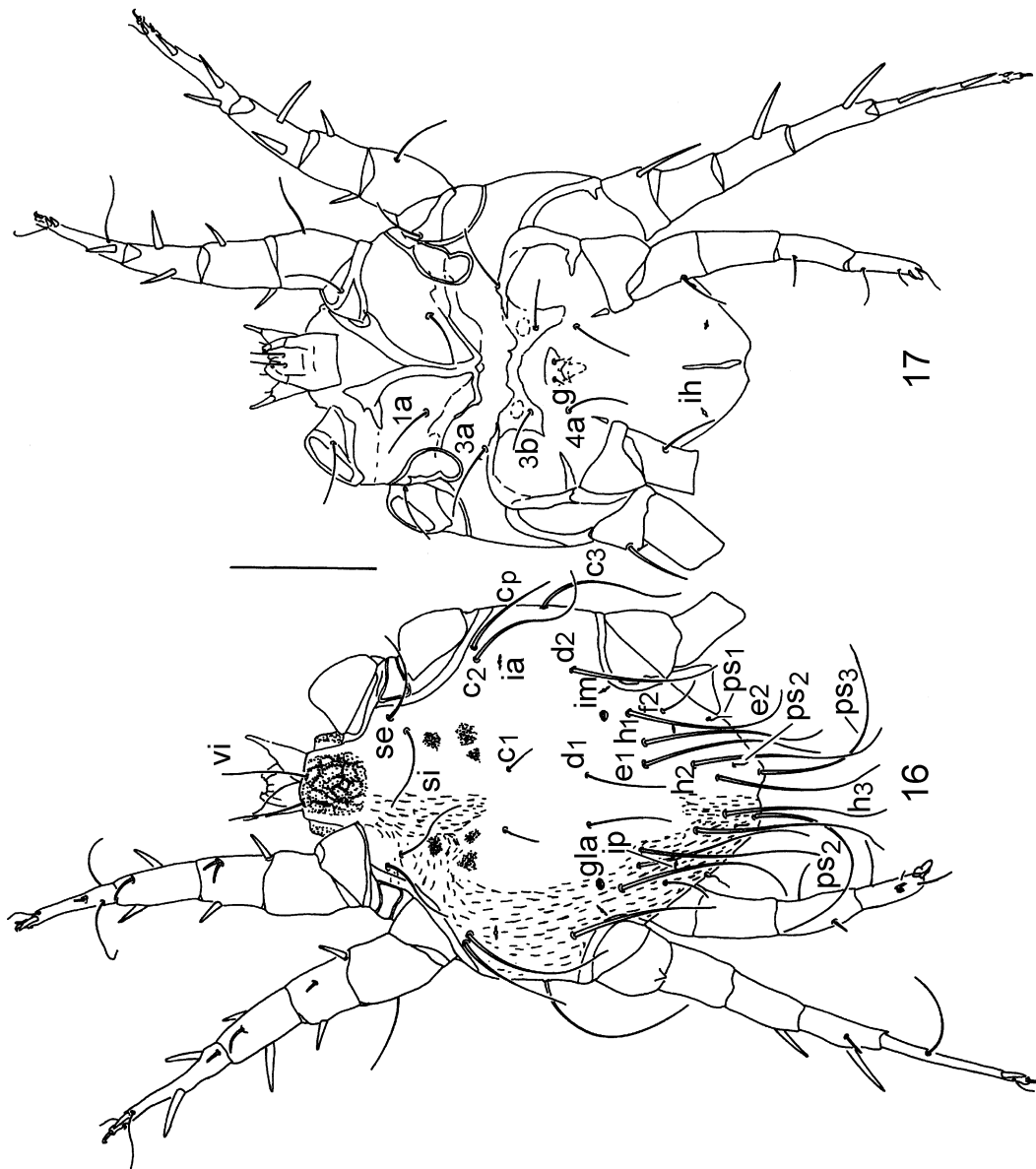
Axillary organs and gnathosoma similar in appearance to female, but gnathosoma and chelicerae smaller relative to idiosomal size.



FIGURES 9–15. *Hericia sanukiensis*, sp. n.,—9. Female, lateral view. 10. Male, lateral view; 11. Cuticular sculpturing on dorsum, female. 12. Cuticular sculpturing on dorsum, deutonymph. 13. Dorsal view, propodosomal shield, female. 14. Dorsal view, propodosomal shield, male. 15. Frontal view, propodosomal shield, male. Scale bar = 100µm (Figs. 9–10), 20µm. (Figs. 11–15).

Dorsum (Fig. 16)—Dorsum lightly sclerotized and with cuticular ornamentation on perimeter; three small patches of irregular cuticle forming a triangle on each side between setae *si* and *c₁*. Prodorsal sclerite with a reticulate pattern (Fig. 14), extending to level of trochanters I; anterior of prodorsum expanded and flared (Figs. 14, 15). Opisthonotal gland openings (*gla*) located anterior

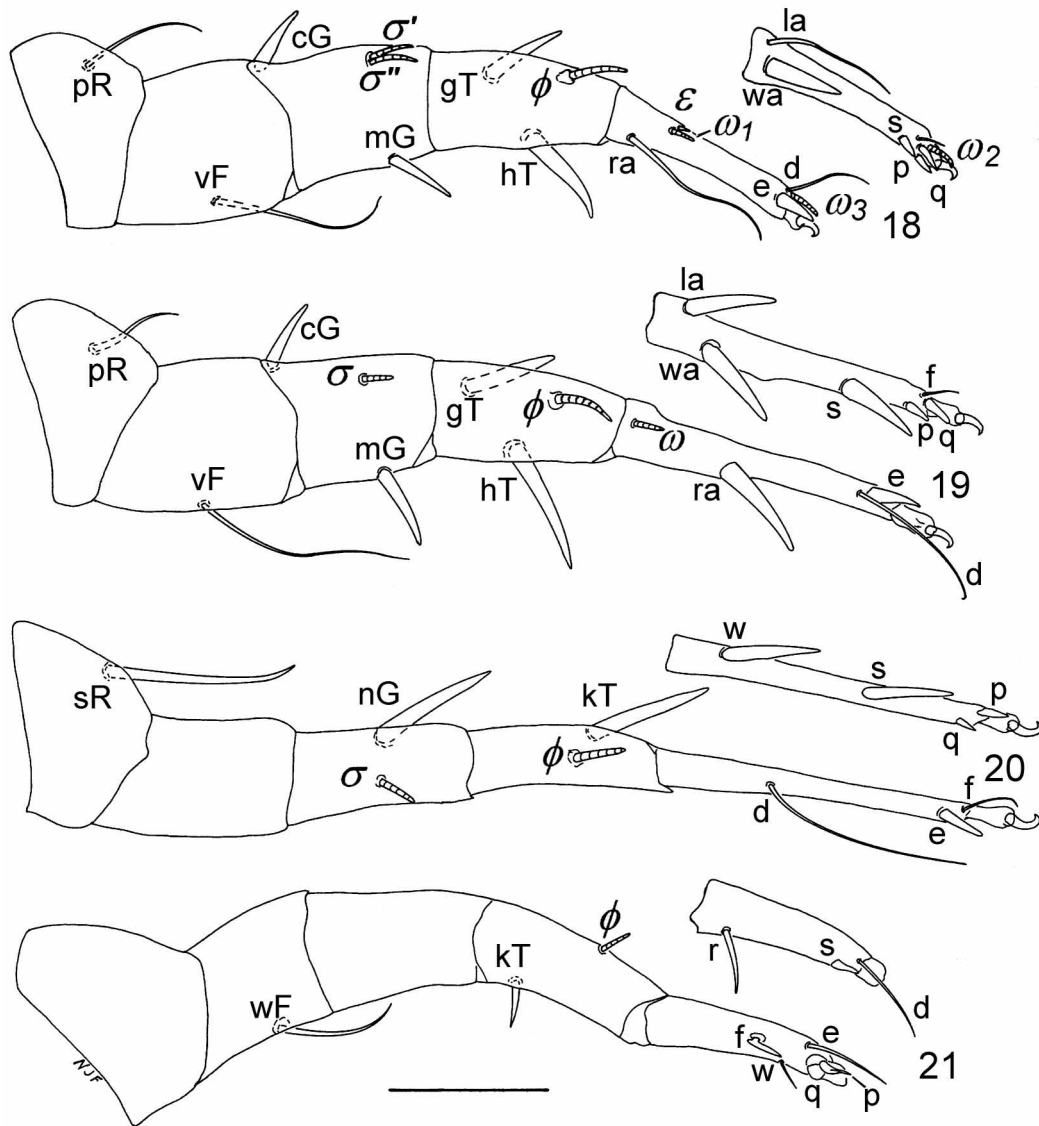
to seta e_2 . Cupules located as follows: ia slightly posterior seta c_2 , im between setae d_2 and h_1 , and ip between setae f_2 and h_2 . Dorsum bearing 18 pairs of filiform setae: vi 108, 111 (88–138); si 122, 128 (108–155); se 125, 138 (122–162); c_1 58, 58 (45–88); c_2 200, 220 (185–275); c_3 235, 246 (218–272); cp 178, 205 (178–245); d_1 135, 164 (130–198); d_2 192, 214 (192–268); e_1 250, 229 (188–270); e_2 258, 236 (198–275); f_2 92, 137 (92–188); h_1 233, 243 (215–275); h_2 290, 271 (242–290); h_3 265, 274 (262–302); ps_1 25, 34 (25–58); ps_2 15, 19 (15–28) and ps_3 288, 290 (238–325).



FIGURES 16–17. *Hericia sanukiensis*, sp. n., male—16. dorsum, 17. venter. Scale bar: 200 μ m.

Venter (Fig. 17)—Cuticle lightly sclerotised. Anterior coxal apodemes I and II directed posteromedially; apodemes I joining at midline to form a Y-shaped sternum that extends posteriorly and joins with apodemes II. Coxae IV located ventrad and mesiad coxae III, with the result that legs IV are positioned below legs III. Anterior coxal apodemes III directed anteriomedially and joining

medially to form a bridge. Anterior apodemes IV directed anteriomedially and joining anterior apodemes III. Aedeagus located between coxal fields IV. A narrow sclerite containing setae *g* just anterior to aedeagus. Cupule *ih* on idiosomal margin laterad and midway anus. Anus ventroterminal. Venter bearing five pairs of filiform setae: *la* 82, 86 (68–125); *3a* 102, 97 (70–120); *4a* 70, 74 (55–100); *3b* 52, 46 (30–58) and *g* 18, 21 (18–32).



FIGURES 18–21. *Hericia sanukiensis*, sp. n., male—18. leg I, 19. leg II, 20. leg III, 21. leg IV. Scale bar = 100 μ m.

Legs (Figs. 18–21)—Leg lengths, measured from base of femur to tip of tarsus (holotype, mean followed by range and mean percentage of idiosomal length): I 485, 469 (381–551, 74%); II 528, 513 (415–611, 81%); III 542, 544 (475–632, 86%) and IV 440, 438 (387–492, 70%). Tarsal lengths: I 134, 120 (91–140); II 177, 173 (128–202); III 189, 193 (166–217) and IV 104, 105 (91–112). Legs

of male more robust than those of female, and with total lengths as well as tarsal lengths significantly longer. In addition, leg IV with tibia and tarsus broader and flatter, tarsus concave ventrally, ambulatorium reduced to a fleshy pad, and claw absent or vestigial. Although setae and solenidia of legs II and III are similar to those of female, they differ on legs I and IV. Tarsus I with setae *la* and *ra* filiform rather than spines, and solenidion $\omega 2$ located apically near seta *f*. Tarsus IV with setae *f*, *q* and *s* broadly expanded to form thin, membrane-like flaps, setae *e* and *w* filiform rather than spines, and seta *d* apical rather than basal.

Phoretic deutonymph (Figs. 12, 24–29)

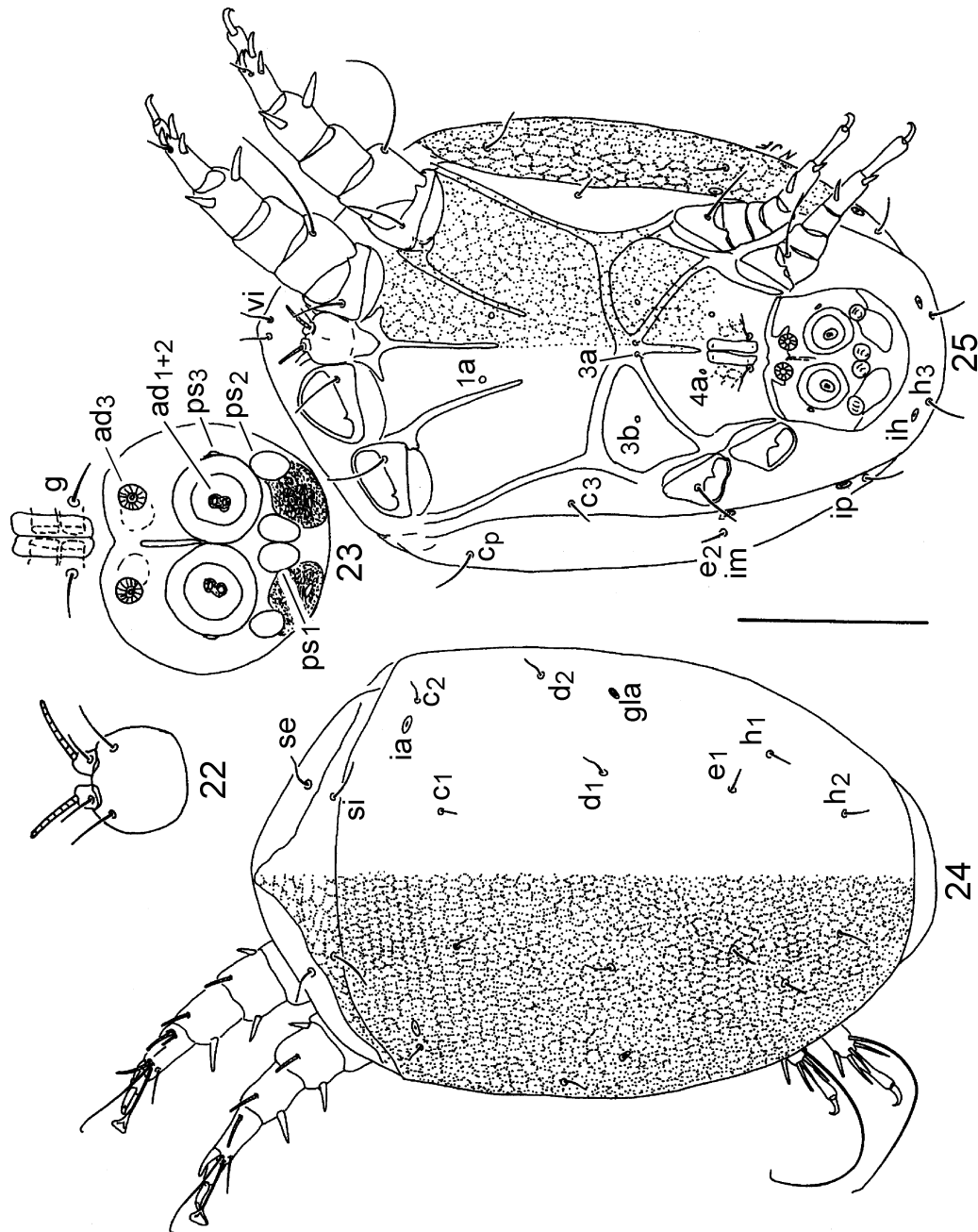
Body shape variable, elliptical to broadly ovoid; length 338 (282–365); width at sejugal furrow 250 (205–278). Gnathosoma with well developed subcapitulum and palps (Fig. 22); subcapitulum somewhat rounded in shape, bearing a pair of filiform subcapitular setae ventrally. Palpal remnants reduced, each bearing a palpal solenidion apically and a filiform palpal seta laterally.

Dorsum (Fig. 24)—Dorsum largely covered by reticulate-sculptured (Fig. 12) propodosomal and hysterosomal sclerites that are separated by a well developed sejugal furrow. Apex of propodosomal sclerite with a pair of unsclerotised areas representing vestigial alveoli of setae *ve*. Propodosoma with three pairs of filiform setae: *vi* 16 (14–18) at apex; *si* 16 (14–18) located on sclerite and *se* 17 (13–20) located anterior to sclerite. Hysterosomal sclerite wraps around lateral margin of idiosoma, joining ventral sclerite, and bearing 10 pairs of hairlike setae: *c*₁ 10 (7–13); *c*₂ 11 (10–12); *cp* 27 (20–31); *dl* 9 (6–11); *d*₂ 11 (8–17); *e*₁ 9 (7–10); *e*₂ 33 (18–43); *f*₂ 31 (21–38); *h*₁ 8 (6–10) and *h*₂ 10 (7–15). Opisthosomal gland openings located laterally between setae *d*₂ and *e*₂. Cupules *ia* mesiad and slightly anterior setae *c*₂, cupules *im* mesiad setae *e*₂ and cupules *ip* slightly anterior to setae *f*₂.

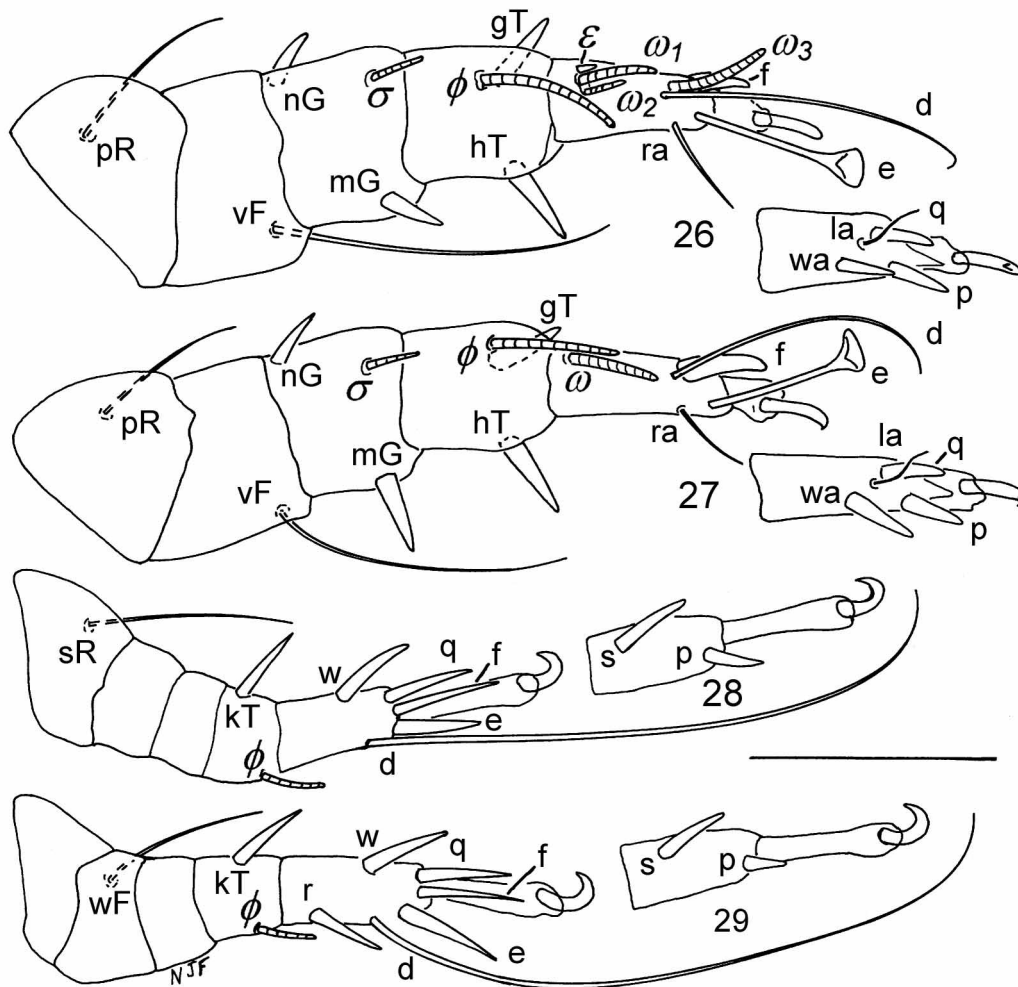
Venter (Fig. 25)—Anterior apodemes of coxal fields I fused to form Y-shaped sternum; anterior apodemes of coxal fields II curved posteriorly and medially. Posterior apodemes of coxal fields II join anterior apodemes III. Anterior apodemes of coxal fields III fused with each other and with anterior apodemes of coxal fields IV; posterior apodemes III fused with anterior apodemes IV and also with base of anterior apodemes III, coxal fields III completely enclosed. Posterior medial apodeme well developed, extending from anterior apodemes IV to genital opening. Setae *c*₃ filiform, 17 (14–21), positioned between legs II and III. Setae *h*₃ 18 (15–20), positioned on posterior margin of idiosoma. Setae of coxal fields I (*1a*), III (*3b*) and IV (*4a*) absent, their positions represented by vestigial alveoli. Setae *3a* usually absent, their position represented by vestigial alveoli at junction of apodemes IV and median apodeme (occasionally present as short, filiform setae). Genital opening between coxae IV; setae *g* 11 (9–13) filiform, flanking genital opening. Genital papillae short, two segmented, rounded apically. Cupules *ih* slightly anterior setae *h*₃. Attachment organ well developed (Fig. 23). Anterior suckers (*ad*₃) with spokes radiating from center. Median suckers larger, consisting of a marginal ring surrounding an inner core containing paired vestigial alveoli (*ad*₁₊₂). Pair of small refractile spots (vestigial alveoli of *ps*₃) anteriolateral to median suckers. Setae *ps*₂ conoidal and situated posteriolateral to median suckers; Setae *ps*₁ conoidal and situated contiguously, posterior to median suckers. Anus located between anterior and median suckers.

Legs (Figs. 26–29)—Legs heavily sclerotised, elongate, all segments free. Trochanteral setation 1-1-1-0; setae *pR* I–II and *sR* III thin, filiform. Femoral setation 1-1-0-1; setae *vF* I–II and *wF* IV thin, filiform. Genua setation 2-2-0-0; setae *cG* and *mG* I–II stout spines. Tibial setation 2-2-1-1; setae *hT* and *gT* I–II and *kT* III–IV stout spines. Tarsal setation 8-8-7-8; tarsae I and II with setae *f*, *wa*, *q* and *p* stout spines, setae *la* and *ra* filiform, seta *e* elongate, foliate apically, and seta *d* long, filiform. Tarsus III with setae *w*, *s*, *q*, *f* and *e* elongate spines, seta *p* short spine and seta *d* filiform and very long. Tarsus IV similar to tarsus III, but with the addition of seta *r*, an elongate spine. Solenidia (I–IV): tarsus 3-1-0-0, tibiae 1-1-1-1 and genua 1-1-0-0. Spinellike famulus ϵ on tarsus I.

Pretarsi of legs I–II consist of short, membranous ambulacra whereas those of legs III–IV consist of elongate membranous ambulacra, all with hooked empodial claws; condylophores not observed.



FIGURES 22–25. *Hericia sanukiensis*, sp. n., phoretic deutonymph—22. Gnathosoma, dorsal view, 23. Attachment organ, 24. Dorsum, 25. Venter. Scale bar: 200 μ m (Figs. 22–23), 100 μ m (Figs. 24, 25).



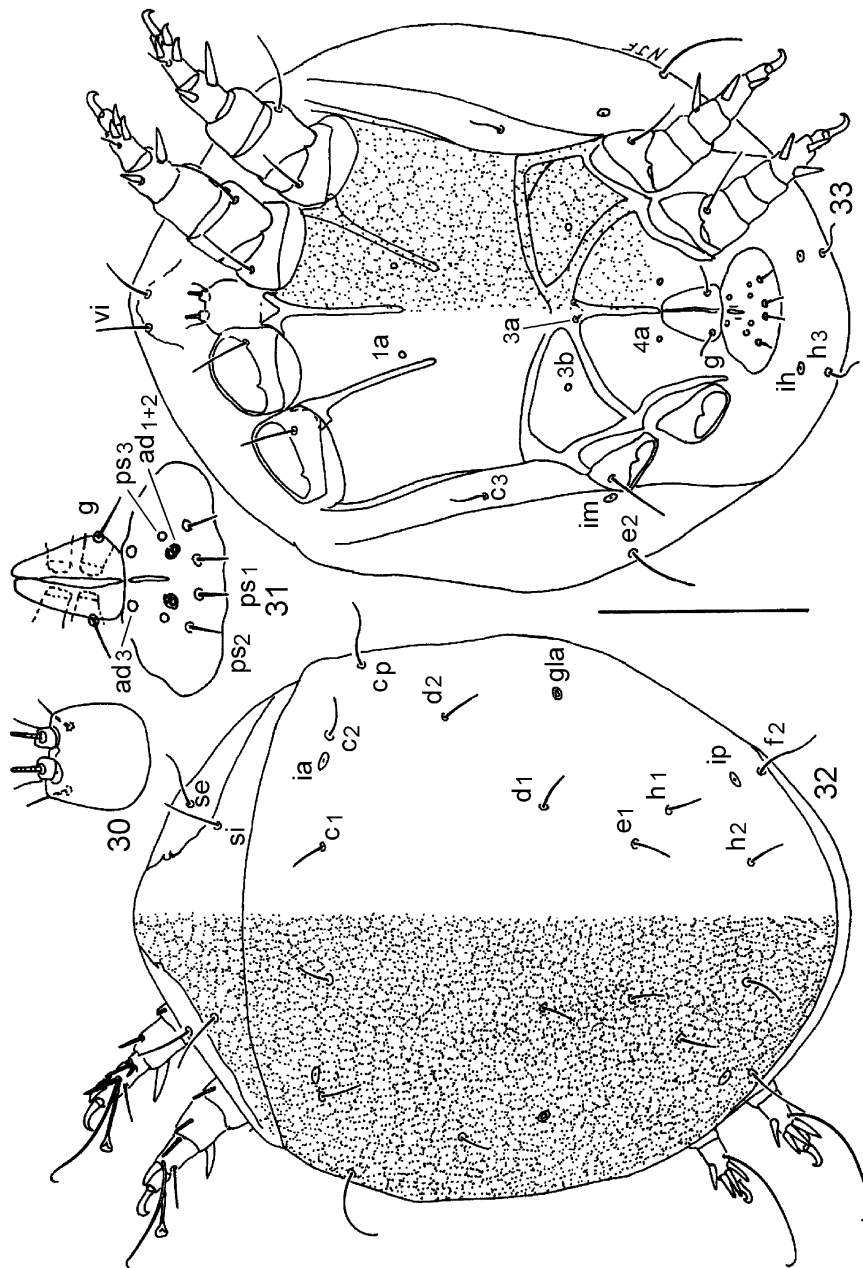
FIGURES 26–29. *Hericia sanukiensis*, sp. n., phoretic deutonymph—26. leg I, 27. leg II, 28. leg III, 29. leg IV. Scale bar = 50 μ m.

Non-phoretic deutonymph (Figs. 30–37)

Body broadly ovoid; length 354 (318–392); width at sejugal furrow 262 (220–280). Not significantly different in length ($p = 0.192$, $df = 18$; $t = 1.357$) or width ($p = 0.211$, $df = 18$, $t = 1.296$) to phoretic deutonymph. Gnathosoma (Fig. 30) similar to phoretic deutonymph, except palps and palpal solenidia shorter.

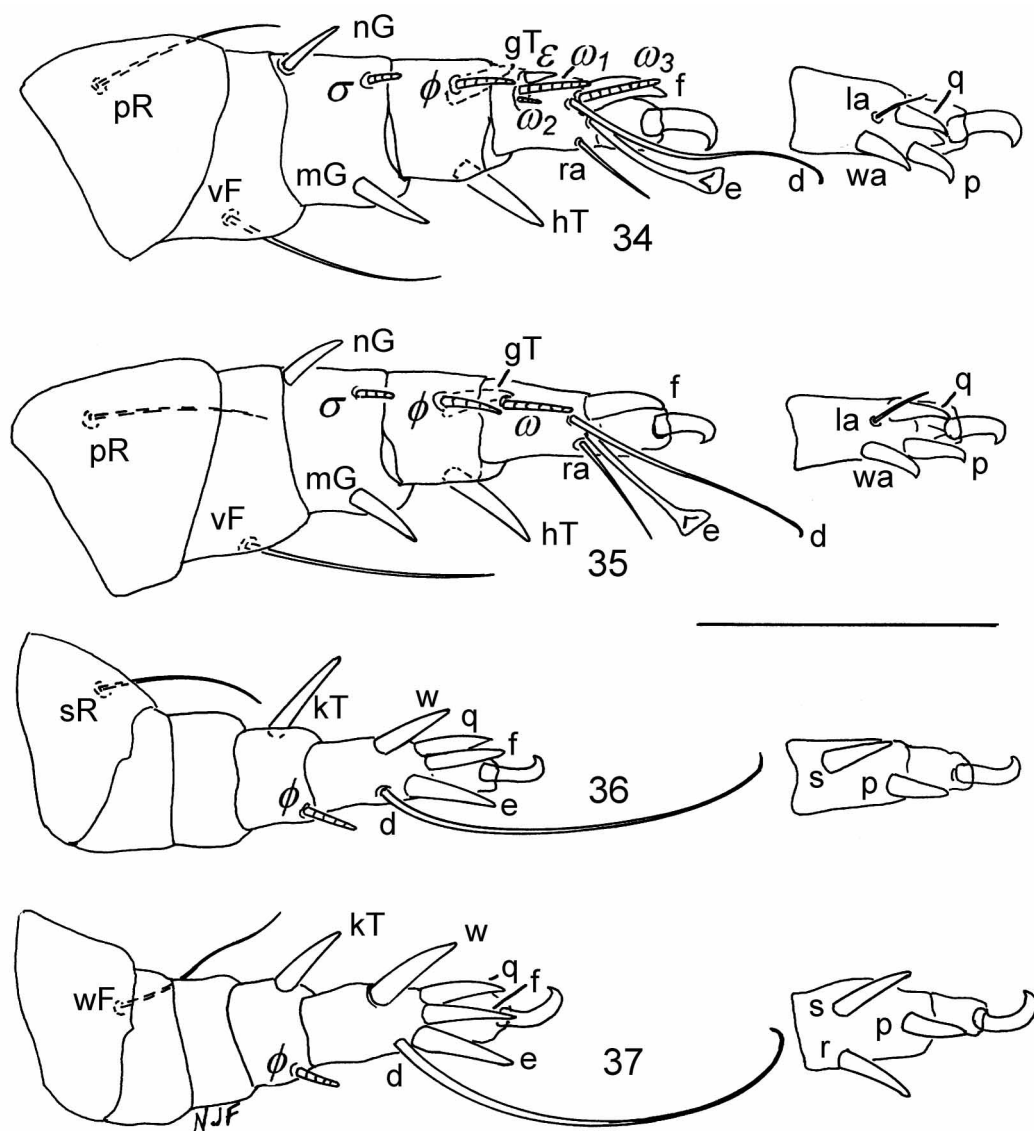
Dorsum (Fig. 32)—Similar in cuticular sculpturing, gland and cupule placement, and setation to phoretic deutonymph. Setal lengths: vi 18 (13–21); si 28 (20–33); se 21 (13–26); c_1 9 (5–14); c_2 14 (10–17); cp 32 (23–43); $d1$ 9 (5–12); d_2 11 (5–16); e_1 8 (4–13); e_2 38 (32–45); f_2 36 (28–50); h_1 9 (4–15); h_2 12 (5–15) and h_3 16 (10–18).

Venter (Fig. 33)—Idiosoma similar in appearance to phoretic deutonymph. Setal lengths: c_3 16 (10–21); g 9 (8–10). Attachment organ greatly modified and devoid of suckers; no longer functional as a sucker plate (Fig. 31). Anterior suckers (ad_3) reduced to vestigial alveoli, and median suckers reduced to the paired vestigial alveoli of setae ad_{1+2} . Setae ps_2 and ps_1 filiform rather than conoidal.



FIGURES 30–33. *Hericia sanukiensis*, sp. n., non-phoretic deutonymph—30. Gnathosoma, dorsal view, 31. Attachment organ, 32. Dorsum, 33. Venter. Scale bar: 200 μ m (Figs. 30–31), 100 μ m (Figs. 32, 33).

Legs (Fig. 34–37)—Chaetotaxy and soleniotaxy similar to that of phoretic deutonymph, however legs shorter. In addition, pretarsae of legs III–IV short rather than elongate.



FIGURES 34–37. *Hericia sanukiensis*, sp. n., phoretic deutonymph—34. leg I, 35. leg II, 36 leg III, 37. leg IV. Scale bar = 50 μ m.

Etymology

The species is named after the locality where the types were collected. Sanuki is the old name for Kagawa Prefecture, and people there still love the old name.

Remarks

The most straightforward character to separate *H. sanukiensis* from *H. hericia* and *H. fermentationis* occurs in males. *Hericia sanukiensis* males have three small patches of irregular cuticle forming a triangle on each side between setae *si* and *c₁*, whereas *H. hericia* and *H. fermentationis* males have greater than nine on each side irregularly distributed between setae *si* and

*e*₁. Türk and Türk (1957) described *H. paradoxa* from a single deutonymph but were uncertain as to taxonomic placement since the sucker plate was reduced and the pretarsi short. Fashing (1991) demonstrated that species of *Hericia* have two types of deutonymphs, one phoretic and one non-phoretic. The non-phoretic morph has lost most of the attributes associated with dispersal, and the specimen used to describe *H. paradoxa* is obviously a non-phoretic morph. Unfortunately Türk and Türk's description is poor, the type unavailable, and the non-phoretic deutonymphs of European *Hericia* are not described and associated with adults. *Hericia sanukiensis* appears to be most closely related to *H. georgei* (Michael), and the possibility exists that future research will find *H. sanukiensis* to be a junior synonym of *H. georgei*. Published morphological descriptions as well as illustrations of *H. georgei* are poor and incomplete, and cannot be used to separate *H. sanukinensis* from *H. georgei*.

Michael (1903) described *H. georgei* from specimens collected by C. F. George under the bark of a black poplar tree where sap flux was oozing from a wound made by *Cossus cossus* L. (Lepidoptera: Cossidae). The description is poor and incomplete due to what Michael referred to as poorly preserved specimens which were poorly mounted in the wrong slide mounting medium. Repeated searches in England for additional specimens of *H. georgei* by Michael as well as others were fruitless, and the four slide-mounted specimens used by Michael for his description are no longer in existence. Vitzthum (1931), based on Michael's description, considered *H. georgei* to be a junior synonym of *H. hericia*. Although he later examined specimens of *H. georgei* from Stockholm, Sweden, he did not recognize them as such and deposited them in his private collection as *H. fermentationis*, a species he had previously described from Sumatra (Türk and Türk 1953). Türk and Türk (1953), as part of their revision of middle European "tyroglyphid" mites, examined Vitzthum's material but also failed to recognize the specimens of *H. georgei* as being different from *H. fermentationis*. Samšiňák (1972) examined the Vitzthum collection (currently housed in Zoologische Sammlung des Bayerischen Staates, Munich) and established a neotype male for *H. georgei* (ZSBS V 3075). Although Samšiňák titled his paper "Redescription of *H. georgei* Michael, 1903 (Acarina, Tyroglyphidae) phoretic on Lepidoptera", in reality the paper briefly lists five deutonymphal characters and three male characters that can be used to distinguish between *H. georgei* and *H. fermentationis*. Samšiňák provides the average idiosomal lengths of *H. georgei* deutonymphs and males as 380 µm and 580 µm respectively, but does not provide a range for the specimens examined. Although average idiosomal lengths for phoretic deutonymphs of *H. sanukiensis* are smaller (338 µm) and those for males larger (633 µm), the range of measurements in both cases (282–365 and 540–710 respectively) encompass Samšiňák's means for *H. georgei*. Attempts to borrow the Vitzthum material (including neotype V 3075) from Zoologische Sammlung des Bayerischen Staates, Munich, were not successful. The neotype as well as other specimens were borrowed on August 8, 2000, and repeated requests by the museum for their return have been unanswered by the borrower.

Without specimens of *H. georgei* for comparison, the most compelling reason to treat *H. sanukiensis* as a new species is biological rather than morphological; deutonymphs of the two species disperse on quite different insect hosts. Deutonymphs of *H. georgei* are phoretic on lepidopterans, and have been collected from all six *Catocala* moth species native to Finland (Samšiňák 1972). A constant infestation rate was found regardless of locality, with 7 to 15% of the moths harboring mites. Deutonymphs were also collected from the following butterflies and moths in Finland: *Nymphalis antiopa* L., *Polygonia c-album* L., *Vanessa atalanta* L., *Apatele psi* L., *Europis occulta* L., and *Scoliopteryx libatrix* L. (Samšiňák (1972). *Catocala* species collected from the district of Leningrad displayed similar infestation rates, and *H. georgei* deutonymphs were also recovered from *Catocala* species in France and southern Russia (Samšiňák 1972). In contrast, an examination of 250 *Cataocla* specimens from Japan revealed no mites (Samšiňák 1972), and Japanese researchers

studying the biology of *H. sanukiensis* are certain that deutonymphs have never been collected from *Cossus cossus orientalis* Gaede (T. Ichikawa, Y. Yasui and K. Hayashi, pers. comm.). To date deutonymphs of *H. sanukiensis* have been collected only from the sap flux inhabiting beetle *Librodor japonicus* (Motschulsky) (Coleoptera, Nitidulidae).

If future research does synonymize *H. sanukiensis*, the present paper will then serve as a much needed redescription of *H. georgei*.

Acknowledgements

We would like to express our gratitude to Dr. Gisela Fashing for her translations of German publications, and to Dr. Stefan Friedrich, Zoologische Sammlung des Bayrischen Staates, Munich, for his attempts to recall the Vitzthum specimens of *H. georgei*. We also thank Drs. T. Ichikawa and Y. Yasui, and Mr. K. Hayashi of Kagawa University for providing the specimens on which this description is based, and for providing information concerning the biology of *H. sanukiensis*.

References

- Canestrini, G. (1888) *Prospetto Acarofauna Italiana*. Padova 3.
- Evans, G. O. (1992) *Principles of Acarology*. Wallingford, CAB International. 576 pp
- Fashing, N.J. (1991) Deutonymphal dimorphism in the genus *Hericia* (Astigmata: Algophagidae). In: Dusabek, F. & Bukva, V. (eds.) *Modern Acarology Vol. 2*. Prague, Academia and The Hague, SPB Academic Publishing bv. pp. 287–291.
- Grandjean, F. (1939) La chaetotaxie des pattes chez les Acaridiae. *Bulletin de la Société Zoologique de France* 64, 50–60.
- Griffiths, D. A., Atyeo, W. T., Norton, R. A. & Lynch, C. A. (1990) The idiosomal chaetotaxy of astigmatid mites. *Journal of Zoology (London)* 220, 1–32.
- Krantz, G. W. (1978) *A Manual of Acarology, Second Edition*. Corvallis, Oregon, Oregon State University Book Stores. 509 pp.
- Michael, A.D. (1903) *British Tyroglyphidae, Volume II*. London, Ray Society, London. 183 pp.
- Robin, M.C. (1868) Sur une espèce nouvelle de Sarcoptides du genre Glyciphage. *Journal of Anatomy and Physiology (Paris)*, 5, 603–625.
- Samšiňák, K. (1972) Redescription of *Hericia georgei* Michael, 1903 (Acarina, Tyroglyphidae) phoretic on Lepidoptera. *Annales Zoologici Fennici*, 9, 65–69.
- Türk, E. & Türk, F. (1957) Systematik und Ökologie der Tyroglyphiden Mitteleuropas. In: Stammer, H. (ed.) *Beiträge zur Systematik und. Ökologie. Mitteleuropäischer. Acarina* 1(1). Leipzig, Akademische Verlagsgesellschaft Geest & Portig K.-G. pp. 3–231.
- Vitzthum, H. (1931) Terrestrische Acarinen (unter Ausschluß der Oribatiden und Ixodiden) der Deutschen Limnologischen Sunda-Expedition. *Archiv fuer Hydrobiologie. Supplementband* 9, 59–134.

Accepted by Zhi-Qiang Zhang: 30 Nov. 2006

Published on 20 Dec. 2006