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TWO NEW SPECIES OF THE GENUS
ACAROPHENAX NEWSTEAD AND DUVALL 1918
(ACARINA : PYEMOTIDAE) 1

BY

Earle A. Cross 2 and Gerald W. Krantz 3

The genus Acarophenax was erected to accommodate the single species tribolii, an egg parasite of the confused flour beetle, Tribolium confusum Duvall. In 1959, Krczal added bambergensis, nicolae, and tragardi (the latter a new name for the male of Tarsonemoides termophilus Tragârdh, 1901) to the genus. A fourth species, dermestidarum, was described by Rack in the same year.

On the basis of a recent survey of the genera of the Pyemotidae, Cross (in press) redefined Acarophenax and retained only tribolii in the genus, assigning the other species mentioned above to the new genera Paracarophenax and Adactylidium. As defined in the above-mentioned paper, Acarophenax may be separated from Paracarophenax in that it has no claws on legs II-IV. Acarophenax is readily distinguishable from Adactylidium in that leg I possesses a stout sessile claw.

No information regarding the habits of the following two forms is available, but it is probable that they too are parasites of coleopterous eggs. A. nidicolus is most closely related morphologically to A. tribolii, and it is assumed to be an associate of a nidicolous beetle. A. lacunatus differs markedly from the preceding two species in its reduced size and in the loss of setae similar to that exhibited by members of the genus Adactylidium. It has been taken only from the imagoes of the rusty grain beetle, Cryptolestes ferrugineus (Stephens).

METHODS

Format and terminology (fig. 1-2) are those of Cross (in press). Descriptions are based upon holotype specimens. The mean and standard error (in paren-

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theses) indicate variation in size found in the type series. All measurements are in microns. Remeasurements made of the various structures indicate an extrinsic error of $\pm 5 \mu$ in body length, body width, and distance between coxae III, and $\pm 2 \mu$ in all remaining measurements. Body length is considered to be the distance between the peritremes and the posterior margin of the opisthosoma. Body width is measured at the widest part of the body. Leg length is measured from the most basal projection of the trochanter to the apex of the tibiartes (leg I), or to the tip of the pretarsus (legs II-IV). Measurements of tarsi exclude claw or pulvillus. Leg width is measured across the apex of the trochanter unless the latter is suddenly constricted, in which case the measurement is made across the most distal point before the constriction. Distances between setae are measured as the distances between the centers of the areoli.

Abbreviations used in the descriptions denote the following: cx = coxa, tr = trochanter, fege = femurogenu, ti = tibia, ta = tarsus, tita = tibiartes, preta = pretarsus, T = tactile seta, S = sensory seta. Structures of importance in the following descriptions are illustrated in fig. 1.

**Key to the species of Acarophenax (females)**

1. (a). Posterior ventral plate with five pairs of setae; coxae I-IV each with a single seta; larger (length near 250 $\mu$) ........................................ 2
   (b). Posterior ventral plate with three pairs of setae; coxae I-IV lacking setae; smaller (length near 140 $\mu$) ........................................ lacunatus, n. sp.
2. (a). Dorsals III nearly equal in length to laterals III; trochanter I about one and one-third times as wide as trochanter II .......................... nidicolus, n. sp.
   (b). Dorsals III less than half as long as laterals III; trochanter I distinctly less than one and one-third times as wide as trochanter II, often subequal to it ....... tribolii Newstead and Duvall

**Acarophenax nidicolus** n. sp.

(figs. 3-5)

**Diagnosis.** Most closely related to *A. tribolii*, differing from it in the much shorter and thicker legs I, in that apodemes III are never more than three times longer than wide, in that the arcula is slightly dilated anteriorly, and in that dorsals III are about as long as the laterals, the four setae of that segment being subequally spaced. Separable from *lacunatus* in being much larger, in possessing five pairs of setae on the posterior ventral plate, in having three dorsal pairs and one anterior pair of setae on the propodosoma, in having setae on coxae I-IV, and in that segment V is present (though reduced) and bears a single pair of setae.

**Description of non-gravid female.** Length, 240 ($X = 226.525 \pm 2.843$); width, 164 ($X = 159.344 \pm 3.234$); distance between anterior sternocoxal condyles III,
FIGS. 1-2. — *A. nidicolus* female (semidiagrammatic), indicating terminology used in text.

*Fig. 1*, dorsum; *Fig. 2*, venter.

A I-IV, apodemes I-IV; AAS, anterior antennal seta; AMA, anterior median apodeme; ARC, arcula; ASMS, anterior submarginal seta; ATR, atrium; AVP, anterior ventral plate; AX I-II, axillary setae I-II; CX I and IV, coxae I and IV; DPP, dorsal propodosomal plate; DS I-II, dorsal setae I-II; EPS, external presternal seta; HSG I, IV, and V, hysterosomal segments I, IV, and V; IPS, internal presternal seta; IPOS, internal poststernal seta; LS III-IV, lateral setae III-IV; OVS, opisthosomal ventral seta; PDS, propodosomal dorsal setae; PER, peritreme; PVP, posterior ventral plate; S 4, solenidium 4; TA IV, tarsus IV; TI IV, tibia IV; VTS II, ventral setae II; VT I, ventrite I.
101 \((X = 98.150 \pm 0.980)\); integument without numerous distinct subparallel striae (irregular striae due to mounting technique sometimes present); dorsal setae distinctly spiculate, setose, ventral setae thinner, flagellate, nude or nearly so.

*Gnathosoma.* One pair of short, stout palpal setae present anteriorly; one pair of palpal solenidia posteromesad of these (distinctly visible only on holotype).

*Propodosoma. Dorsum.* A pair of anterior submarginal setae present, arising in front of a line drawn between anterior sternocoxal condyles of legs I, these directed forward, 9 \((X = 9.975 \pm 0.493)\) apart; three pairs of propodosomal dorsals present, the anteriormost (probably the stigmatals) small, sometimes indistinct, arising near the atria; both posterior pairs of propodosomal dorsals much larger than anterior pair, transversely and sublinearly arranged, distance between the internals, 31.9 \((X = 34.633 \pm 0.731)\); arcula well defined, short, subrectangular, slightly wider than long, dilated weakly anteriorly; length of arcula, 27.4 \((X = 26.505 \pm 0.777)\); distance between centers of peritremes, 28.5 \((X = 28.660 \pm 0.464)\).

*Venter.* One pair of setae flanking gnathosoma, these well removed from apodemes I; anterior median apodeme indistinct (or distinct medially and nearly complete); apodemes I weakly developed; apodemes II distinct, weakly procurred, incomplete medially, making angle of about 45° with longitudinal axis of body; posterior marginal apodemes broadly arcuate, indistinct (or distinct and complete); setae of ventrites II distinctly laterad of those of ventrites I.

*Hysterosoma. Dorsum.* Dorsals I 55.9 \((X = 57.285 \pm 0.806)\) apart, arising behind line drawn between laterals I; dorsals II 66.1 \((X = 66.120 \pm 1.160)\) apart; setae of segment III similar in length and thickness, laterals III 60.4 \(^1\) \((X = 58.949 \pm 1.280)\) apart; dorsals III arising in front of line drawn between laterals III, 33.1 \(^1\) \((X = 31.920 \pm 1.219)\) apart; setae of segment IV distinctly shorter than those of other segments, subequal, laterals IV 45.6 \((X = 48.530 \pm 1.219)\) apart, dorsals IV 19.3 \((X = 20.235 \pm 0.216)\) apart; segment V reduced, bearing one pair of setae, these finer than those of segment IV, 21.7 \((X = 20.714 \pm 0.581)\) apart. *Venter.* Anterior portion of posterior ventral plate lacking longitudinal striations; posterior margin of same plate entire, emarginate, weakly lobate medially; apodemes III very short, not more than three times longer than wide; apodemes IV distinct, nearly linear, furcate laterally, their mesal margins incomplete, bending anteriorly; posterior median apodeme indistinct; posterior ventral plate with five pairs of setae; internal pre sternals arising slightly anterior to first axillaries; opisthosomal ventrals arising well behind posterior margin of posterior ventral plate, 19.4 \((X = 15.823 \pm 0.798)\) apart.

*Legs. Length.* Leg I, 60.4 \((X = 63.840 \pm 0.963)\); leg II, 82.1 \((X = 80.085 \pm 0.835)\); leg III, 87.8 \((X = 85.363 \pm 0.610)\); leg IV, 92.3 \((X = 91.063 \pm 0.758)\). *Width.* Leg I, 19.4 \((X = 20.018 \pm 0.245)\); leg II, 14.8 \((X = 14.603 \pm 0.312)\);

1. These measurements were taken from paratype No. 2, inasmuch as they were not clear on the holotype specimen.
leg III, 13.7 ($X = 13.543 \pm 0.032$); leg IV, 13.7 ($X = 13.110 \pm 0.375$). Segment lengths. Tita I, 30.8 ($X = 31.635 \pm 0.527$); ta III, 36.4 ($X = 35.625 \pm 0.682$); tr IV, 26.2 ($X = 25.513 \pm 0.265$); ta IV, 46.7 ($X = 43.035 \pm 0.646$); preta IV, 19.4 ($X = 18.377 \pm 0.374$). Setation. Leg I: cx 1T, tr 3T, fege 4T, tita 14S + 6T.

Figs. 3-5. — *A. nidicolus*, female holotype.
Fig. 3, dorsum; Fig. 4, venter; Fig 5, tibiotarsus I, ventral aspect.
Leg II: cx rT, tr 3T, fege 3T, ti 4T, ta 5T + 1S. Leg III: cx rT, tr 2T, fege 2T, ti 4T, ta 5T. Leg IV: cx rT, tr 2T, fege 1T, ti 4T, ta 4T.

Claw I stout, with prominent median tooth; thumb stout, suberect, bi- or tridentate apically; mediolateral sclerotization internal; one large marginal, anterior solenidium (probably no. 4) present anterior to mediolateral sclerotization, a second, ventral, slender, clavate solenidium arising near proximal margin of same sclerotization, its areolus nearly contiguous with that of a distinctly lanceolate seta whose apex does not or only slightly surpasses that of solenidium 4; tibia II with one stout seta whose apex reaches about halfway to tip of tarsus (excluding pretarsus) and which is at least twice as wide at the base as any other seta of the segment; tarsi II and III each with a single, short, apical spine.

Distribution. Known only from the type locality and situation.

Type material. Female holotype and seven female paratypes with the following data: Cachè la Poudre River (5000'), 2 1/2 miles E. Ft. Collins, Colorado, March 1, 1958, R. C. Funk, from debris in nest of Colaptes cafer Gmelin (Piciformes). Collector's number CC 2 W.

Type repositories. Holotype and two paratypes (Nos. 1-2) in the U. S. National Museum, Washington, D. C. Two paratypes (Nos. 5 & 7) in the Snow Entomological Museum, The University of Kansas, Lawrence. One paratype (No. 3) in the acarina collection, Oregon State University, Corvallis. One paratype (No. 4) in the Zoological Institute, University of Erlangen, Erlangen, DBR. One paratype (No. 6) in the British Museum (Natural History), London.

Acarophenax lacunatus n. sp. (figs. 6-8)

Diagnosis. Separable from *A. tribolii* and *A. nidicolus* by its small size, in lacking coxal setae, in that the posterior ventral plate has only three pairs of setae, in possessing but two setae on trochanter I, in having only solenidium 4 on tibiotarsus I well defined, in the shape of the propodosomal arcula, and in that segment V is vestigial and lacks setae.

Description of non-gravid female. Length, 138 (X = 126.360 ± 2.158); width, 86 (X = 78.260 ± 3.307); distance between anterior sternocoxal condyles III, 44 (X = 44.200 ± 1.569). Dorsal integument, particularly of propodosoma and first hysterosomal segment, with numerous subparallel, longitudinal striae, these also pronounced on segments II and III and along the anterior portion of the posterior ventral plate; all body setae fine, nude, flagellate, those of propodosoma and first three hysterosomal segments subequal, distinctly longer than those of segment IV.

Gnathosoma. One pair of palpal setae prominent anteriorly, clavate palpal solenidia indistinct.
Propodosoma. Dorsum. Anterior submarginal setae lacking; anterior margin of dorsal plate indistinct; two pairs of median dorsal setae, distance between internals 21.6 (X = 20.748 ± 0.723). Venter. Arcula well defined, clearly longer than wide, length, 29.6 (X = 28.842 ± 0.630), width (between centers of peritremes) 19.4

Figs. 6-8. — A. lacunatus, female holotype.
Fig. 6, dorsum; Fig. 7, venter; Fig. 8, tibiotarsus I, ventral aspect.
(\(X = 19.494 \pm 0.446\)). Two pairs of setae flanking gnathosoma, the anteriormost very fine (often indistinct), the posterior pair arising immediately anterior to apodemes I; anterior median apodeme incomplete in anterior third (or weak throughout); apodemes I prominent, not complete medially; apodemes II distinct, broadly procurred, making angle of about 60° with longitudinal axis of body; posterior marginal apodemes distinct except medially, sinuate; setae of ventrites II well mesad of ventrals I, equal to them in size.

**Hysterosoma. Dorsum.** All setae of dorsum distinct, flagellate, their exact lengths not measurable but subequal; dorsals I arising behind line drawn between laterals I, about 16-22 long, 35.3 (\(X = 39.216 \pm 0.691\)) apart; dorsals II 47.9 (\(X = 47.424 \pm 0.270\)) apart; dorsals III 20.5 (\(X = 19.152 \pm 0.340\)) apart; segment IV terminal and caplike, its setae appearing marginal but often displaced ventrad according to position of specimen on slide (fig. 7); dorsals IV 8.0 (\(X = 7.866 \pm 0.153\)) apart, laterals IV 22.8 (\(X = 22.002 \pm 0.247\)) apart. **Venter.** Anterior portion of posterior ventral plate distinctly longitudinally striate; posterior margin of same plate entire, broadly emarginate; apodemes III vestigial, apodemes IV distinct, furcate laterally, incomplete medially, weakly sigmoid; posterior marginal apodeme reduced, visible only between apodemes IV; posterior ventral plate with three pairs of setae, one pair of presternals and both pairs of poststernals lacking; all setae of posterior ventral plate flagellate, nude, subequal in length, about 14 long; opisthosomal ventrals arising close behind margin of posterior ventral plate, 11.4 (\(X = 11.628 \pm 0.295\)) apart.

**Legs. Length.** Leg I, 37.6 (\(X = 39.558 \pm 0.510\)); leg II, 42.2 (\(X = 45.486 \pm 0.696\)); leg III, 45.6 (\(X = 46.056 \pm 0.344\)); leg IV, 46.7 (\(X = 46.398 \pm 0.721\)). **Width.** Leg I, 8.0 (\(X = 8.099 \pm 0.216\)); leg II, 7.4 (\(X = 7.752 \pm 0.187\)); leg III, 6.8 (\(X = 6.156 \pm 0.242\)); leg IV, 6.8 (\(X = 6.726 \pm 0.108\)). **Segment lengths.** Tita I, 18.2 (\(X = 19.038 \pm 0.239\)); ta III, 17.1 (\(X = 16.530 \pm 0.406\)); tr IV, 15.9 (\(X = 15.732 \pm 0.216\)); preta IV, 6.8 (\(X = 6.726 \pm 0.153\)). **Setation.** Leg I: cx 0, tr 2T, fege 4T, tita 13T + 5S. Leg II: cx 0, tr 3T, fege 1T, ti 4T, ta 6T + 1S (appearing as 5T + 1S). Leg III: cx 0, tr 2T, fege 1T, ti 4T, ta 5T (appearing as 4T). Leg IV: cx 0, tr 1T, fege 1T, ti 4T, ta 4T (appearing as 3T).

Claw I small, with prominent inner tooth; thumblike structure present, recurved mesally and lacking teeth; mediolateral sensory spot distinct, internal; one clavate solenidium present on tibiotarsus I (probably No. 4); dorsolateral seta immediately below sensory spot flattened, bladelike proximally but appearing seta-like apically, this seta extending beyond solenidium 4; spiniform setae lacking on legs II or III; solenidium of tarsus II strobiloid, arising barely from basal third of segment.

**Distribution.** Known only from type locality and host.

**Type material.** Female holotype and ten female paratypes with the following data: Pullman, Washington, April 15, 1959, D. W. Turf, from laboratory culture of Cryptolestes ferrugineus (Cucujidae). **Type repositories.** Holotype and four paratypes (Nos. 1-4) in the U. S. National Museum. Two paratypes (Nos. 5 & 8)
in the Snow Entomological Museum, The University of Kansas. Two paratypes (Nos. 6 & 7) in the acarina collection, Oregon State University. One paratype (No. 9) in the Zoological Institute, University of Erlangen. One paratype (No. 10) in the British Museum (Natural History).

LITERATURE CITED


Résumé

Le genre Acarophenax a été créé pour une seule espèce, tribolii, parasite d’un œuf de Tribolium confusum Duvall. En 1959 Krčzal ajoute dans ce genre trois espèces, bambergensis, nicolae et tragardhi. Une quatrième espèce est décrite, cette même année, par Rack. Cross (sous presse) retient seulement tribolii dans ce genre et classe les autres espèces dans Paracarophenax et Adactylidium.

A. nidicolus n. sp., très voisin de tribolii, a été trouvé parmi les débris d’un nid de Colaptes cafer Gmelin (Piciformes) à Caché la Poudre River (environ 4 km. E. de Ft. Collins), Colorado, et A. lacunatus n. sp. provient d’un élevage en laboratoire de Cryptolestes ferrugineus (Cucujidae) à Pullman, Washington.

ZUSAMMENFASSUNG