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A NEW SPECIES OF GAEOLAELEAPS EVANS AND TILL (ACARI: LAELAPIDAE) ON ACINOPUS SP. (COLEOPTERA: CARABIDAE) FROM IRAN

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ABSTRACT — A new mite species of the genus Gaeolaelaps, Gaeolaelaps saboorii n. sp., collected from under the elytra and on the abdomen of Acinopus sp. (Coleoptera: Carabidae) in Iran, is described and illustrated.

KEYWORDS — Acari; Laelapidae; phoretic mite; beetle; Gaeolaelaps; Iran

INTRODUCTION

The mite family Laelapidae Berlese includes hundreds of species that are free-living predators in soil, as well as many others that have varying degrees of association with other animals, both vertebrates and invertebrates (Faraji and Halliday, 2009). Most Gaeolaelaps species were reported from soil-litter habitats, some others were collected from nests of vertebrates, from arthropods (or their nests), including mygalomorph spiders, millipedes, cockroaches, termites, mole crickets, cerambycid, pas-salid, carabid beetles and ants (Bregetova, 1977; Rosario, 1981; Tenorio, 1982; Karg, 1993; Strong and Halliday, 1994; Fain et al., 1995; Beaulieu, 2009). A large numbers of Gaeolaelaps species have been described in a loosely-defined genus Hypoaspis sens. lat.

Gaeolaelaps was considered at different taxonomic levels by some authors but we herein consider it as a separate genus (Beaulieu, 2009).

In Iran, only Gaeolaelaps nolli (Karg, 1962) was previously encountered on ground beetles (Nemati and Babaeian, 2010). It is probably that this record is accidental because G. nolli is typically known from soil and litter (Karg, 1962).

A large proportion of species identified or described as Hypoaspis appear to belong to Gaeolaelaps Evans and Till, 1966, as currently defined in previous publication (Karg, 1979; Tenorio, 1982; Beaulieu, 2009).

In the present work, one new species of Gaeolaelaps is described based on adult female and male taken from Acinopus sp. of the family Carabidae from northern Iran.

MATERIALS AND METHODS

Laelapidae phoretic on beetles were collected mainly in some regions of northern Iran over a period of two years. Beetles of the family Carabidae were collected using light traps, and then placed individually in vials of 70 % ethanol. Mites...
were removed from the beetles, cleared in Nesbitt’s solution and mounted in Hoyer’s medium. The nomenclature used for the dorsal idiosomal chaetotaxy is that of Lindquist and Evans (1965), the leg chaetotaxy is that of Evans (1963a), the palp chaetotaxy is that of Evans (1963b), and names of other anatomical structures mostly follow Evans and Till (1979). We use the term “lyrifissures” to refer to slit-shaped sensilli (not true pores), and “pore” for circular or oval-shaped cuticular openings of unspecified function. Holotype and male paratype of the new species are deposited in the Acarological Collection, Department of Plant Protection, Yazd Branch, Islamic Azad University (JAZM) and in the Australian National Insect Collection, CSIRO Ecosystem Sciences, Canberra, Australia (ANIC). All measurements in the descriptions are given in micrometres (µm).

Genus 

Gaelaelaps Evans and Till

Geolaelaps Berlese, 1923: 254, nomen nudum (see Halliday and Lindquist, 2007)

Gaelaelaps Trägårdh, 1952: 66, nomen nudum.

Gaelaelaps Evans and Till, 1966: 159, correct original spelling as clarified by Halliday and Lindquist (2007).

Type species — Laelaps aculeifer Canestrini (1884), by original designation (Evans and Till, 1966).

Diagnosis — The concept of 

Gaelaelaps used here is based on that of Beaulieu (2009).

Gaelaelaps saboorii n. sp. (Figures 1 and 2)

Type material — Holotype, female, Polur, Mazandaran Province, Iran, 35°50’ N, 52°17’ E, alt. 2422 m, 10 July 2013, O. Joharchi and E. Babaeian coll., on Acinopus sp. (in JAZM). Paratypes: two females, one male, same data as holotype (in YIAU, JAZM and ANIC).

Diagnosis — Dorsal shield oval, with 39 pairs of setae, podonotal setae slightly longer than opisthonotal setae, with one or two unpaired postero-median seta, epistome triangular (projecting medially) and almost smooth with a few denticles, fixed digit with four teeth and movable digit bidentate.

Description of the Female (Figures 1, 2A and 2B)

Dorsal idiosoma — Dorsal shield oval shaped, 610 – 618 long, 394 – 396 wide at level of r3 (n = 3), margin with a narrow strip of un sclerotised integument by posteriorly rounded, not covering most of the idiosoma, leaving a curved strip of unprotected skin (30 – 34) posterior to setae Z5; shield with reticulate pattern on the whole surface except anteromedial region (Figure 1A). Shield with 39 pairs of setae, 22 pairs of podonotal setae on shield, plus r6 on lateral soft cuticle, and 17 pairs of opisthonotal setae on shield, including two pairs of Zx setae between J and Z setae; all setae smooth and moderate in length (Figure 1B), podonotal setae slightly longer than opisthonotal setae, j1, z1 (25 – 27), j2 (37 – 40), J3-5, z4, s3-5 (62 – 64), j6, z5 (50 – 52), J1-4 (45 – 52), J5 (37 – 39), S2, S4 (60 – 62), Z5, Z4, Zx (50 – 54). Opisthonotal region also with one or two unpaired supernumerary seta Jx (48 – 50) in each specimen. Shield with 16 pairs of pore-like structures, apparently including three pairs of gland pores (labelled g in Figure 1A) and 13 pairs of poroids; lyrifissures near the base of JI large and slit-like, others smaller and ovoid to circular. Seven pairs setae in R series on the lateral soft skin which surrounding shield.

Ventral idiosoma — (Figure 1C). Tritosternum with paired pilose laciniae (74 – 77), columnar base 27 – 29 x 17 – 18 wide; pre sternal area with transverse lightly sclerotised pre sternal lines. Sternal shield (length 124 – 128) narrowest between coxae II (114 – 118), widest between coxa II-III (174 – 188), with straight anterior margin and posterior margin with a strong semicircular dent, bears three pairs of smooth pointed setae (st1 45 – 52, st2 47 – 50, st3 47 – 52), never reaching to base of next posterior seta, and two pairs of lyrifissures, one pair adjacent to setae st1, the other between st2 and st3, anterolateral surface of sternal shield with polygonal ornamentation and posteromedian region smooth. Metasternal platelets absent, metasternal setae st4 (42 – 45) and metasternal pores located on soft integument. Endopodal plates II/III completely fused to sternal shield, endopodal plates III/IV elongate, narrow, curved. Genital shield tongue-shaped, slightly
FIGURE 1: *Gaeolaelaps saboorii* n. sp., female: A - Dorsal shield; B - Detail of a dorsal seta; C - Ventral idiosoma; D - Variety of shape of genital shield; E - Epistome; F - Variety of shape of epistome; G - Hypostome; H - Chelicera; I - Insemination structures.
Figure 2: Gaioelaellaps saboorii n. sp., female: A - Leg II, dorsal aspect; B - Leg IV, dorsal aspect; male: C - Ventral shield; D - Chelicera; E - Femur II, dorsal aspect.
protruding laterally at the level posterior to setae st5, length 222 – 252, maximum width 114 – 118, posterior margin rounded or slightly pointed (Figures 1C – D), surface reticulate, with several weak transverse and longitudinal markings and a pair of simple setae st5. Shield flanked by a pair of minute narrow platelets; paragenital pores located on soft cuticle lateral to shield between seta st5 and minute narrow platelet. Anal shield rounded anteriorly and triangular posteriorly, length 92 – 94, width 87 – 89, anterior half with lineate ornamentation, para-anal setae (27) shorter than unpaired post-anal seta (37 – 40), cribrum small, anal pores flank anal shield. Opisthogastric with one pair of sub-triangular metapodal plates (25 – 27 long × 10 – 12 wide) and nine pairs of smooth setae (37 – 45). Peritrematal shield free, peritreme extending from coxa IV to near posterior level of coxa I, level with seta z2 on dorsum, with large protrusion on outer margin and a pair of pores opposite coxae II-III, post-stigmatal section of peritrematal shield conspicuous and narrow, with two pairs of post-stigmatal pores.

Gnathosoma — (Figures 1E – H). Epistome triangular (with a median projection), irregularly denticle laterally or almost smooth with a few denticles (Figures 1E – F). Hypostomal groove with six transverse rows of denticles, each row with about 6-10 small teeth. Hypostome with four pairs of setae, internal posterior hypostomal setae h3 longest (50 – 52), h1 (32 – 35), h2 (20 – 22), palpcoxal h4 (30 – 32) (Figure 1G). Corniculi robust and horn-like, reaching mid-level of palp femur. Chaetotaxy of palps: trochanter 2, femur 5, genu 6, tibia 12, tarsus 15, genu with a distinct dorso-distal triangular condyle, all setae smooth and needle-like, palp tarsal apotele two-tined. Fixed digit of chelicera with four teeth: an offset small tooth and two adjoining large teeth at the level of a short, setiform pilus dentilis and a proximal tooth, dorsal seta short, thick and prostrate, movable digit bidentate, arthrodial membrane with a rounded flap and normal filaments (Figure 1H).

Insemination structures — (Figure 1I). Laelapid-type sperm access system, tubulus long, wider at the solenostoma level of coxa III and entering sacculus via a pair of circular openings. Sacculus an irregular, the proximal ends of the tubulus slightly swollen at junction with ramus.

Legs — (Figures 2A – B). Legs II and III short (470 – 476, 496 – 500), I and IV longer (618 – 628, 668 – 684) (excluding pretarsus). Chaetotaxy normal for free-living Laelapidae: Leg I: coxa 0-0/1, 0/1-0, trochanter 1-0/2, 1/1-1 (pt thick), femur 2-2/1, 3/3-2 (al1 and dorsal setae thick), genu 2-3/2, 3/1-2 (dorsal setae thick), tibia 2-3/2, 3/1-2 (lateral setae longer). Leg II (Figure 2A): coxa 0-0/1, 0/1-0, trochanter 1-0/1, 0/2-1, femur 2-3/1, 2/2-1 (al2 tiny thickened, ad1, pd2 thickened, av, pd1, pv1 and pv2 slightly thickened), genu 2-3/1, 2/1-2 (av and pv slightly thickened), tibia 2-2/1, 2/1-2 (av and pv slightly thickened). Leg III: coxa 0-0/1, 0/1-0, trochanter 1-0/2, 0/1-1, femur 1-2/1, 1/0-1 (ad1 and ad2 thick, ventral seta longer), genu 2-2/1, 2/1-1, tibia: 2-1/1, 2/1-1 (lateral and ventral setae thick). Leg IV (Figure 2B): coxa 0-0/1, 0/0-0, trochanter 1-1/1, 0/1-1 (ad slightly thickened), femur 1-2/1, 1/0-1 (ad1 and ad2 thickened, av slightly thickened), genu 2-2/1, 3/0-1 (av slightly thickened), tibia 2-1/1, 3/1-2 (av and pv slightly thickened). Tarsi I-IV with 18 setae (3-3/2, 3/2-3 + mw, md). All pretarsi with well developed paired claws and rounded pulvilli and a long thin stalk.

Description of the Male (Figures 2C, D, E)

Dorsal idiosoma — Dorsal shield 478 long, 314 wide at its broadest point (n = 1), ornamentation and chaetotaxy as female.

Ventral idiosoma — (Figure 2C). Sternal, genital, endopodal, ventral and anal shields fused into a holoventral shield, reticulated throughout, bearing st1-5, five pairs of opisthogastric setae; four pairs of poroids and a pair of gland pores (gv3) lateral of para-anal setae, gland pore (gv2) just behind coxa IV obscure; post-anal seta almost twice longer than para-anal setae; cribrum a narrow strip of spicules.

Gnathosoma — Triangular epistome and subcapitular characters similar to female. Fixed digit with one blunt tooth, large distal hook and slender pilus dentilis. Movable digit of chelicera with one large tooth, spermatodactyl longer than movable digit, slightly tapered and with blunt tip, fringed hyaline
arthrodial process at its base (Figure 2D). Palpi with normal setation and similar to those of female.

Legs — Chaetotaxy as female, femur II (ad1, pd1, pd2 thickened) as (Figure 2E).

Etymology — This species is named in honour of Prof. Alireza Saboori (Department of Plant Protection, University of Tehran, Iran), who devoted many years to teaching Acarology and training Acarologists in Iran.

Notes — This species is similar to G. blattae (Strong and Halliday, 1994) and G. concavus (Faraji and Halliday, 2009) in general appearance. The new species can be readily distinguished from them by following characters: peritreme shorter and extending to near the posterior level of coxa I only (longer and extending beyond anterior margin of coxa I in G. blattae), fixed digit in the female with four teeth (9-10 in G. blattae and 11 in G. concavus) and in the male with one blunt tooth large distal hook and slender pilus dentilis (as same as G. blattae and G. concavus), epistome triangular, projecting medially and almost smooth with a few denticles (rounded and denticulate in G. blattae and G. concavus), deutosternal groove with 6-10 denticles per row (12-17 in G. blattae and 16-20 in G. concavus), a smaller genital shield (more extensive and almost reaching anal shield in G. blattae and G. concavus), spermatodactyle longer, with narrower tip and bending apically as in Figure 2D (spermatodactyle shorter, with expanded tip and curved towards digit in G. blattae and G. concavus), femur II with av and pe1 slightly thickened (spine-like in G. blattae and G. concavus).

Remarks — Most Gaeroelaelaps species described to date were collected from soil-litter habitats, whereas several ones were collected in association with arthropods. Most species that have been placed in Hypoaspis actually belong to Gaeroelaelaps. Most species that have been collected from Hypoaspis are not parasites of beetles at all, but harmless feeders on exudates from the beetles' body (Costa, 1971), or predators that feed on other small invertebrates in the microhabitats created by the beetles (Joharchi and Halliday, 2011).

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REFERENCES

Beaulieu F. 2009 — Review of the mite genus Gaeroelaelaps Evans & Till (Acari: Laelapidae), and description of a new species from North America, G. gillespiei n. sp. — Zootaxa, 2158: 33-49.

Bregetova N.G. 1977 — Family Laelaptidae Berlesia, 1884 — In: Gilyarov M.S., Bregetova N.G. (Eds). A Key to the Soil-Inhabiting Mites of the Mesostigmata [In Russian]. Leningrad: Nauka. p. 483-554.

Costa M. 1971 — Mites of the genus Hypoaspis Canestrini, 1884 s. str. and related forms (Acari: Mesostigmata) associated with beetles — Bull. Br. Mus. (Nat. Hist.), Zool., 21 (4): 69-98.

Evans G.O. 1963a — Observations on the chaetotaxy of the legs in the free-living Camasaus (Acari: Mesostigmata) — Bull. Br. Mus. (Nat. Hist.), Zool., 10: 277-303.

Evans G.O. 1963b — Some observations on the chaetotaxy of the pedipalps in the Mesostigmata (Acari) — Ann. Mag. Nat. Hist. (Ser. 13), 6: 513-527.

Evans G.O., Till W.M. 1979 — Mesostigmatic mites of Britain and Ireland (Chelicera: Acari- Parasitiformes). An introduction to their external morphology and classification — Trans. Zool. Soc. Lond., 35: 139-270. doi:10.1111/j.1096-3642.1979.tb00059.x

Fain A., Noti M.I., Dufrêne M. 1995 — Observation on the mites (Acari) associated with Carabidae (Coleoptera) in Belgium. I. Annotated list of the species — Internat. J. Acarol., 21(2): 107-122. doi:10.1080/01647959508684051

Faraji F., Halliday B. 2009 — Five new species of mites (Acari: Laelapidae) associated with large Australian...
cockroaches (Blattodea: Blaberidae) — Internat. J. Acarol., 35(3): 245-264. doi:10.1080/01647950903059445

Halliday R.B., Lindquist E.E. 2007 — Nomenclatural notes on the names Caecolaelaps and Geolaelaps (Acari: Laelapidae) — Zootaxa, 1621: 65-67.

Joharchi O., Halliday B. 2011 — New species and new records of mites of the family Laelapidae (Acari: Mesostigmata) associated with Coleoptera in Iran — Zootaxa, 2883: 23-38.

Karg W. 1962 — Zur Systematik und Postembryonalen Entwicklung der Gamasiden (Acarina, Parasitiformes) landwirtschaftlich genutzter Boden — Mitt. Zool. Mus. Berl., 38: 23-119.

Karg W. 1979 — Die Gattung Hypoaspis Canestrini 1884 (Acarina, Parasitiformes) — Zool. Jahrb. Syst., 106: 65-104.

Karg W. 1993 — Acari (Acarina), Milben, Parasitiformes (Anactinochaeta). Cohors Gamasina Leach: Raubmilben — Tierwelt Deutschlands, 59 Teil — Gustav Fischer Verlag. Jena, Stuttgart, New York. pp. 523.

Lindquist E.E., Evans G.O. 1965 — Taxonomic concepts in the Ascidiae, with a modified setal nomenclature for the idiosoma of the Gamasina (Acarina: Mesostigmata) — Mem. Ent. Soc. Can., 47: 1-64. doi:10.4039/entm9747fv

Nemati A., Babaiean E. 2010 — Mites associated with insects in Chaharmahal-Bakhtiari, Khuzestan and Bushehr provinces — In: Manzari Sh. (Eds): Proceedings of the 19th Iranian Plant Protection Congress, Iranian Research Institute of Plant Protection, Tehran, Vol. I., p. 364.

Rosario R.M.T. 1981 — Philippine Hypoaspidinae (Acarina: Mesostigmata: Laelapidae) — Philipp. Entomol., 5: 23-82.

Strong K., Halliday R.B. 1994 — Three new species of Hypoaspis Canestrini (Acarina: Laelapidae) associated with large Australian cockroaches — J. Aust. Entomol., 33: 87-96. doi:10.1111/j.1440-6055.1994.tb00927.x

Tenorio J.M. 1982 — Hypoaspidinae (Acari: Gamasida: Laelapidae) of the Hawaiian Islands — Pacific Insects, 24: 259-274.

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