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Papers Celebrating the 80th Birthday of Professor ANDRZEJ WARCHALOWSKI

Longitarsus warchalowskianus, a new species from
Chihuahua, Mexico
(Coleoptera: Chrysomelidae: Alticinae)

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ABSTRACT. *Longitarsis warchalowskianus* is a new species to science from Chihuahua, Mexico. It contains a unique combination of dorsal coloration, punctuation and shape that differentiates it from other species. All specimens are flightless and apterous. It feeds on *Packera bellidifolia* (Asteraceae) that contains pyrrolizidine alkaloids.

Key words: entomology, taxonomy, *Longitarsus*, Mexico, Flea Beetles, new species, Asteraceae, Senecioneae, *Packera*, pyrrolizidine alkaloids, flightless, apterous.

INTRODUCTION

Longitarsus BERTHOLD is the most diverse genus of Flea Beetles (Alticinae) with about 600 described species and probably the most diverse in the entire family of Leaf Beetles (Chrysomelidae). However, the taxonomy and systematics of this large genus is very poorly known, especially outside of the Palearctic and possibly the Oriental Regions. Its distribution is worldwide, over one half are known from the Palearctic Region (GRUEV & DÖBERL 2005, DÖBERL, *in litteris* 2007). In the Afrotropical Region there are about 100 described species (BIONDI, personal communication), only 4 are described in the Australian Region (REID, personal communication), and about 100 in the Oriental Region (DÖBERL, *in litteris* 2007). In the New World (Western Hemisphere) there are only about 50 species known from the Nearctic Region; however, this fauna is very poorly known and will certainly increase significantly once it is revised there (RILEY et al. 2003); the Neotropical Region fauna is even more poorly known with about 40 described species from South America and the Caribbean (BECHYNÉ, unpublished) and

another 27 species known from Central America only (FURTH and SAVINI 1996). Most of the above sources indicate that there are actually many more to be described.

MATERIALS AND METHODS

Measurements are ranges for each sex, as follows: LB (maximum body length, from head to apex of abdomen or elytra); LE (maximum length of elytra from base near humeri to apex); WE (maximum width of elytra together at the humeri); LP (maximum distance from anterior to posterior margins of pronotum); WP (maximum width of pronotum); IOD (interocular distance, distance between dorsal inner eye margins); LAE (length of median lobe of aedeagus); LSP (length of spermatheca); LVP (length of vaginal palpi); and LTG (length of tignum). Morphological terminology generally follows KONSTANTINOV & VANDENBERG (1996). Antennal segment numbers are ocular reticle numbers at 125X magnification they indicate the relative sizes of the segments. Measurements and morphological observation were made with a Leica MZ APO dissecting microscope with a reticle of 120 lines. The digital photos were taken using a JVC KY-F70B video camera mounted on a Leica Z16 APO microscope with a Leica Motor-focus System (PC compatible) and attached to an IBM Intellistation M Pro computer on which composite images were assembled using Auto-Montage Pro Version 5.03.0018 BETA software® (Synoptics Ltd.).

Specimens were collected by sweeping the host plant using a standard 15 inch aerial net and/or with an aspirator. Live specimens were separately tested in the field to be certain that they were feeding on the host plant.

Longitarsus warchalowskianus n. sp.

ETYMOLOGY

This species is named after Dr. Andrzej WARCHALOWSKI, a long time colleague who was one of my mentors when I began to study Alticinae, especially *Longitarsus*, over 30 years ago (see resulting publications, FURTH 1980a, 1980b). It is my pleasure and an honor to be able to name this unusual new species for him on the occasion of his 80th birthday celebration.

DESCRIPTION

Color (Figs. 1, 2, 3): Head reddish-brown, antennal segments usually with segments 1-7 orange-brown and 7-11 evidently darker, maxillary palpi with apical 2 segments darker brown than basal segment, mandibles lighter orange-brown; Pronotum brown lighter in color than head, orange-brown; Scutellum same color as pronotum; Elytra dark brown, distinctly darker than pronotum or head; Venter with prothorax lighter (orange-brown), meso and metathorax darker brown, abdomen dark brown; Legs all orange-brown; Tarsi with basal 2 segments lighter (orange-brown) and apical segments and tarsi distinctly darker.



1-2. *L. warchalowskianus*: 1 – dorsal view of elytra, pronotum, head, and hind legs, 2 – lateral view

Head (Fig. 3): vertex surface smooth or slightly alutaceous, except 2 course setiferous punctures along frontal suture (orbital line) near dorso-mesal ocular margin and a third very fine setiferous puncture dorso-mesad to the first two punctures (not visible in fig. 3). Antennal (frontal) calli usually faint, only faintly delimited above, but laterally well-delimited by frontal suture (orbital line), normally oval to subtriangular in shape, tapering dorso-laterally, sometimes very faint and appearing smaller and rounded (not visible in Fig. 3); antennomeres 1 and 11 subequal and longest, antennomere 2 distinctly swollen, very slightly longer than 3 or 6 (shortest) that are subequal with each other, 5 longer than 4, 7-10 (all subequal), 7/8-11 somewhat swollen; eyes vertically oval, mesally flattened; frontal carina broad/wide; transverse carina broad, these two carinae together forming a somewhat broad triangular elevation (not visible in Fig. 3). Maxillary palpi with segment 2 distinctly swollen. Labrum with 6 setiferous punctures, 2 lateral, 2 submesal, and 2 lateral to these.

Pronotum (Figs. 1, 2): finely, sparsely punctured with inter-puncture surface smooth or micro-alutaceous. Shape rather strongly convexed and rounded downwards at the sides. Lateral margins evenly rounded, somewhat broader anteriorly; antero-lateral angles somewhat thickened and angulate (not visible in Figs. 1, 2).

Elytra (Fig. 1): very dense, medium-sized punctures, subrugose. Shape strongly rounded downwards laterally, distinctly tapered apically, apex truncate with sparse, fine setae around apical margin. Humeri rounded, no apparent humeral angles (no vestiges of hind wings = apterous). Epipleura facing subventrally, wide in basal 1/3 then strongly tapered apically. Scutellum semicircular in shape.

Legs: metatibiae with stout row of spines along apical 1/3 of dorsal, outer edge, apical spine prominent. First segment of fore and middle tarsi of males distinctly swollen.



3. *L. warchalowskianus*: frontal view of head

Venter: procoxal cavities open behind; males with distinct median, longitudinal sulcus in apical sternite.

Genitalia: Male aedeagus (Figs. 4, 5, 6). Female spermatheca (Fig. 7): pump more than half the length of receptacle, apically with distinct appendix, ductus very short and without coils; vaginal palpi (Fig. 8) bifid and bicolored, dark at base and in apical one third, subapically and apically with a series of setae.

Measurements: Male: LB = 1.42-1.82mm; LE = 1.00-1.28mm; WE (at humeri) = 0.60-0.68mm; LP = 0.40-0.50mm; WP = 0.56-0.66mm; IOD = 0.30-0.38mm. Antennal segments = 14-8-6-7-9-6-8-8-8-14 [ocular reticle numbers at 125X magnification]; LAED = 0.60mm (Figs. 4, 5, 6). Female: LB = 1.70-2.08mm; LE = 1.18-1.54mm; WE = 0.64-0.86mm; LP = 0.46-0.54mm; WP = 0.60-0.76mm; IOD = 0.34-0.40mm; LSP = 0.11mm (Fig. 7); LVP = 0.35mm (Fig. 8); LTG = 0.62mm (Fig. 9). Antennal segments = 15-8-6-8-10-6-9-9-9-16.



4-9. *L. warchalowskianus*: 4 – male aedeagus: ventral view, 5 – male aedeagus: dorsal view, 6 – male aedeagus: lateral view, 7 – female spermatheca: lateral view, 8 – female vaginal palpi, 9 – female tignum

Host Plant: *Packera bellidifolia* (KURTH) W. A. WEBER & A. LOÛE (Asteraceae).

COMPARISONS

This new species has been compared to the species known from Mexico (13 species, FURTH 2006), Central America (18 species, FURTH & SAVINI 1996) and southwestern USA (15 species, RILEY et al. 2003), as well as to *L. bethae* SAVINI and ESCALONA (SAVINI & ESCALONA 2005). These comparisons were primarily made using reliably determined material at the U. S. National Museum of Natural History (USNM), author photos from the Bowditch (M. Jacoby) Collection or MCZ Type Database photos at Harvard University, from the original descriptions or from detailed notes taken by the author when examining types and other specimens at various museums.

The color combination of the black elytra, contrasting lighter orange-brown pronotum/scutellum, and the darker brown head together with characters of the elytra such as greatly reduced humeri (apterous), truncate apex, and dense punctation is distinctive from southwestern Nearctic and Central American *Longitarsus*. These external morphological characters, in combination with the genitalia, especially the spermatheca and vaginal palpi, and the host plant is a unique combination of characters. Only *L. haroldi* JACOBY (Mexico), *L. ovipennis* JACOBY (Mexico), *L. angusticollis* JACOBY (Panama), *L. berryi* BECHYNÉ and BECHYNÉ (El Salvador), *L. scurrilis* BECHYNÉ and BECHYNÉ (El Salvador), and *L. mancus* LECONTE (USA: California) have reduced humeri and somewhat truncate elytral apices, but their coloration and elytral/pronotal punctation are very different. Only *L. bicolor* HORN (USA: New Mexico and Mexico) has a color contrast between the elytra and pronotum, but it is yellowish elytra and darker brown pronotum. The only known species feeding on *Senecio* are *L. repandus* LECONTE, *L. berryi* (Compositae), *L. bicolor*, *L. ganglbaueri* HEIKERTINGER (introduced from Europe), *L. jacobaeae* (WATERHOUSE) (introduced from Europe), and *L. vanus* HORN, but these all differ from the new species in coloration and pronotal/elytral punctation and shape.

I have examined the Mexican *Longitarsus* in many museum collections, including the USNM, the California Academy of Sciences, the University of California at Berkeley, the University of California at Davis, and the California Department of Food and Agriculture, and I have not found any other specimens of this new species.

MATERIAL EXAMINED

Holotype (male): MEXICO: Chihuahua: Huachochi, Municipio Sisoguichi; 27°49.563N, 107°29.701W; 12 July 2006. 2150m; leg. David G. Furth; sweeping *Packera bellidifolia*, deposited Instituto de Biología, Universidad Nacional Autónoma de México.

Paratypes: same as Holotype - 20 males and 29 females. MEXICO: Chihuahua: Bocoyna-Sisoguichi Rd.; 27E50.710N, 107E34.544W; 12 July 2006. 2150m; leg. David G. Furth; sweeping *Packera bellidifolia* - 24 males and 22 females. MEXICO: Chihuahua: San Juanito-Basaseachi Rd.; 27E58.700N, 107E39.698W; 13 July 2006. 2280m; leg. David G. Furth; sweeping *Packera bellidifolia* - 39 males and 18 females.

Paratypes deposited at the USNM and various other institutions. Note: Subsequent to submission of this manuscript, new fieldwork discovered this new species on its host in the same localities on 4 August 2007.

DISCUSSION

While this is the description of only one new species, it is singularly distinctive morphologically as well as interesting biologically, especially because of its food plant, *Packera bellidifolia* (Asteraceae: Senecioneae) formerly in the genus *Senecio*, that contains significant amounts of pyrrolizidine alkaloids (PAs) (BATCHELDER 2001). Details of the chemistry of this plant species are given by PÉREZ-CASTORENA et al. (2001) and these chemicals are reviewed in detail in ROBBINS (1977). *Longitarsus* is known to take up PAs for use as a chemical defense against predators (HABERER and DOBLER 1999; DOBLER et al. 2000; NABERHAUS et al. 2004; NABERHAUS et al. 2005). *Packera* is considered to have arisen in Mexico and is most closely related to Afrotropical taxa (BAIN & GOLDEN 2000). PAs are assumed to function as plant defense compounds against herbivory, but some insects, including leaf beetles, are able to sequester these PAs for their own defense (HARTMANN et al. 1997). Yet there is documented ethnobotanical use of *P. bellidifolia* in Mexico for gastrointestinal disorders, kidney and bladder trouble, and with olive oil for boils, tumors and infections (BATCHELDER 2001, HEINRICH et al. 1998).

This new species is apterous, i.e., no vestiges of the hind wings, and thus flightless. It has been pointed out that *Longitarsus*, more than any other Alticinae genus, may have a high percentage of species with wing polymorphism and that this phenomenon may vary within a species and even between populations (FURTH 1980b). There are various theories as to the causal effects for this wing polymorphism, but some indicate that it is affected by an ecologically stable habitat, or isolated habitats, e.g., islands, mountain tops, etc., but often in the case of an herbivore this could be an abundance of the food plant. It is also known that such variable wing morphs can evolve relatively quickly and that brachypterous females are more fecund (see FURTH 1980b for examples). The host plant (*Packera bellidifolia*) was quite common in the populations that I sampled in Chihuahua; therefore, *L. warchalowskianus* has ecologically stable populations relative to its host plant, at least locally. Further sampling over a wider area would be useful to shed more light on the wing polymorphism of this species. In general fully apterous species are rare (FURTH 1980b). I have not examined enough populational samples in the Sierra Tarahumara of Chihuahua and surrounding states to determine if this species has populations with a variety of wing morphs, e.g., flightless morphs (micropterous, brachypterous) or even flying morphs (macropterous), but given my discoveries in Israel (FURTH 1980b) this may be possible.

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