



Notes on the taxonomic identity of *Bystus hirtulus* (Kirsch) and transfer from Endomychidae to Coccinellidae (Coleoptera: Cucujoidea), with designation of a lectotype for *Alexia hirtula* Kirsch

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Abstract

During an examination of type material of the New World endomychid genus *Bystus* Guérin-Méneville (Anamorphae), the type series of *Alexia hirtula* Kirsch from Peru was found to contain a mixture of different taxa, none of which belong to the genus *Bystus*, the subfamily Anamorphae, or even the family Endomychidae. *Alexia hirtula* is transferred to *Delphastus* Casey (Coccinellidae: Microweiseinae: Serangiini), establishing the new combination, *Delphastus hirtulus* (Kirsch), and a lectotype is designated. Of the three paralectotypes, one appears to be conspecific with the lectotype, one is identified as an undescribed species of *Microscymnus* Champion (Coccinellidae: Cryptognathini), and one, a partial specimen lacking the head, pronotum, and one elytron, is identified as a species of Leiodidae in the tribe Scotocryptini, probably *Aglyptinus* Cockerell. A diagnosis and redescription of *D. hirtulus* is provided, and Gordon's (1994) key to *Delphastus* is modified to accommodate the newly transferred species. The historical classification of *D. hirtulus* is discussed along with characters justifying its revised placement.

Key words: Coleoptera, Endomychidae, Coccinellidae, Anamorphae, Microweiseinae, Cryptognathini, new combinations

Introduction

Kirsch (1876) described *Alexia hirtula* from a short series of specimens from Peru and placed it as the last entry under the family heading Coccinellidae. Throughout much of its tumultuous taxonomic history, the genus *Alexia* Stephens served as a general dumping ground for any small, hirsute coccinelloid beetle species. *Alexia* was variously classified in Erotylidae (using the vernacular name Erotylenae) (Kiesenwetter & Schaum 1849), incertae sedis (Dohrn 1856), Coccinellidae (Stein 1868; Kirsch 1876), or Endomychidae (Stein & Weise 1877; Heyden *et al.* 1883, 1906). Presently, *Alexia* is treated as a junior synonym of *Sphaerosoma* Samouelle in the monotypic family Alexiidae (Lawrence 1991; Lawrence and Newton 1995), a group known only from the Palearctic. However, long before all these changes took place, Kirsch's *A. hirtula* was shifted to other genera.

In his *Catalogus Endomychidarum*, Csiki (1901) transferred *Alexia hirtula* to the endomychid genus *Rhymbus* Gerstaecker, but expressed some uncertainty regarding its placement by preceding his entry with a “?”. In his follow-up catalog (Csiki 1910), he maintained the species within *Rhymbus*, choosing only to modify the specific epithet to agree in gender with that genus. Strohecker (1953) synonymized *Rhymbus* with *Bystus* Guérin-Méneville, never questioning the inclusion of *Bystus hirtulus* among the new combinations. Apparently Strohecker did not examine the type series of *B. hirtulus*, as they differ conspicuously from known *Bystus* species by their shiny reflective cuticular surfaces, more elongated forms, short concealed antennae, and lack of pronotal sulci.

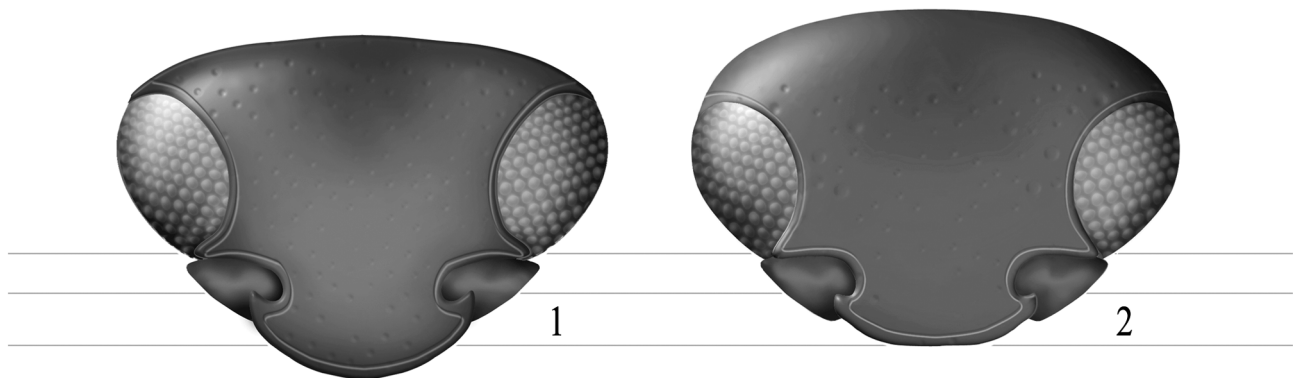
While preparing a taxonomic revision of the genus *Bystus* (Shockley 2009), the first author (FWS) had the opportunity to borrow and examine Kirsch's type series of *Alexia hirtula* from the Museum für Tierkunde, Staatliche Naturhistorische Sammlungen Dresden (SMTD). The series consists of four minute, highly polished beetles all

from the same locality, and presenting, at first glance, a fairly consistent appearance in terms of size, color, convexity, and general body outline (Figs. 3, 5-6, 8). After examining one of the intact specimens, it became clear from the differences noted above, as well as the lack of a frontoclypeal suture, that it was not representative of *Bystus* or even of the family Endomychidae, but belonged instead to the related family Coccinellidae. Dissection of a female syntype revealed the distinctive orbicular shaped nodular chamber of the spermathecal capsule, which exemplifies members of the lady beetle subfamily Microweiseinae (=Sticholotidinae in part, sens. Sasaji). In order to further resolve the identity of Kirsch's type series, consultation was sought with the second author (NJV) during a visit to the Smithsonian's National Museum of Natural History (NMNH) in Washington, D.C. The results of this collaborative effort are reported below.

Systematics

The syntype series of *Alexia hirtula* was found to contain two different genera and species of Coccinellidae, and one species of Leiodidae. *Alexia hirtula* is transferred from its most recent placement in the genus *Bystus* (Endomychidae: Anamorphinae) to *Delphastus* (Coccinellidae: Microweiseinae: Serangiini), and a lectotype is formally designated (below) to prevent future ambiguity in the application of the species name. *Delphastus hirtulus*, **new combination**, is diagnosed and redescribed, and Gordon's (1994) key to *Delphastus* is modified to accommodate the newly transferred species.

Delphastus Casey is the only member of the tribe Serangiini (Microweiseinae) that is native to the Western Hemisphere. Serangiines are distinguished by their minute size, lobed prosternum concealing mouthparts, and antennal club composed of a single elongate antennomere. Casey (1899) erected *Delphastus* for four North American species, one of which he described as new. Champion (1913), Nunenmacher (1937), and Chapin (1940) extended the known range into the Caribbean, Mexico, Central America, and South America, but added only four new species. Gordon's (1970b) review of the genus treated 12 species (five newly described), and in his subsequent revision (Gordon 1994), he more than doubled the number of species, bringing the total to 27.



FIGURES 1–2. Heads of *Delphastus* species (diagrammatic view with setae omitted and head tilted so that line of sight is perpendicular to tangent plane at center of capsule). 1, *D. anthracinus*, male. 2, *D. hirtulus*, male.

The newly transferred species agrees with Gordon's (1977, 1994) generic concept, and falls within his *collaris* group (Gordon 1994) (consisting of 11 species in addition to this one), characterized by distinctly punctate elytra with erect hairlike setae sparsely distributed over most of the surface. Within the *collaris* group, Gordon (1994) distinguishes two subgroups, which differ in the length of the clypeus and convexity of the head capsule (Figs. 1–2). According to this system, *D. hirtulus* falls within the subgroup corresponding to the first six species of the *collaris* group (Gordon 1994: 81–89), distinguished by a “convex” (vs. flat) head and a “short” (vs. long) clypeus. Because of possible confusion in the application of Gordon's convexity character, the following interpretation/clarification is offered:

Head convex: head slightly opisthognathus in repose (Fig. 4), in lateral view appearing evenly arcuate.

Head flat: head more vertical in repose, in lateral view somewhat flattened in area between antennal insertion and clypeal apex.

The key to *Delphastus* species (Gordon 1994) can be modified to include *D. hirtulus* beginning at couplet 7 as follows.

- 7(2) Pubescence on elytron short, hairs $\frac{1}{2}$ or less length of lateral pronotal margin (Gordon 1994: Fig. 4) 8
 Pubescence on elytron long, hairs at least $\frac{3}{4}$ or more length of lateral pronotal margin (Gordon 1994: Fig. 9) 7b
 7b(7) Elytron with patch of dense decumbent pubescence on lateral margin just above depression on epipleuron for reception of
 metafemur and continued posteriorly to area above hind margin of 4th abdominal ventrite (Fig. 4)
 *Delphastus hirtulus* (Kirsch), new combination.
 Elytron without patch of dense decumbent pubescence 10

***Delphastus hirtulus* (Kirsch), new combination**

Figs. 2–5, 9

Alexia hirtula Kirsch, 1876 : 132. (in part)

Rhymbus hirtula (Kirsch): Csiki, 1901: 42. (in part)

Rhymbus hirtulus (Kirsch): Csiki, 1910: 53. (in part)

Bystus hirtulus (Kirsch): Strohecker, 1953: 22. (in part)

Type material. Lectotype (here designated to ensure nomenclatural stability): “Poznzn [*sic*, apparent misspelling of Pozuzu, a river in Peru] Coll Kirsch [green label] / Typus [red label] / Staatl. Museum für Tierkunde, Dresden / Lectotype *Alexia hirtula* Kirsch, 1876, des. F.W. Shockley & N.J. Vandenberg, 2010 [red label]” (male). Paralectotypes: 3, all with identical labels, “Pozuzu Coll. Kirsch [green labels] / Staatl. Museum für Tierkunde, Dresden / Paralectotype *Alexia hirtula* Kirsch, 1876 [yellow labels].” Additional labels have been added to differentiate among the 3 paralectotypes: 1, a disarticulated, cleared specimen, returned in genitalia vial on original pin, “#1 / *Delphastus hirtulus* (Kirsch), 1876, det. F.W. Shockley & N.J. Vandenberg, 2010” (female); 1, an intact point-mounted specimen, “#2 / *Microscymnus* n.sp., det. F.W. Shockley & N.J. Vandenberg, 2010” (male); and 1, a partial point-mounted specimen lacking head, thorax and one elytron, “#3 / Scotocryptini (Leiodidae), probably *Aglyptinus* sp., det. F.W. Shockley & N.J. Vandenberg, 2010” (sex not determined) (SMTD).

Diagnosis. *Delphastus hirtulus* can be distinguished from its congeners by the combination of a short clypeus (Fig. 2) and distinctly punctate elytra bearing long erect hairlike setae sparsely distributed over the dorsal surfaces (Fig. 9), and the presence of a dense patch of short, decumbent setae on the lateral margin of the elytra beginning just above the epipleural fovea for reception of the metafemoral apex (Fig. 4). *Delphastus anthracinus* Gordon resembles this species in dorsal color pattern, vestiture, and general body form, but can be easily distinguished by the elongate clypeus which lends a nearly triangular shape to the head (Fig. 1). *Delphastus hirtulus* can be distinguished from other “micrococcinellidae” of the New World by the traits mentioned above together with the generic characteristics of an expanded prosternum concealing the mouthparts, angulate tibiae, trimerous tarsi, and antennal club composed of a single elongate segment.

Redescription. Lectotype (male). Length 1.5 mm, width 1.0 mm. Form ovoid, slightly elongate, broadest in basal half, tapered posteriorly (Figs. 3–5). Color on dorsal surfaces deep reddish brown, nearly black, paler reddish brown near anterior and lateral margins of pronotum; head orange-brown; venter dark reddish brown except lighter brown on abdominal ventrites II–V, especially near external margins; appendages yellow brown. Dorsal surfaces polished, shiny, distinctly punctate, with sparse pubescence consisting of long erect to suberect yellowish hairlike setae; dense patch of shorter decumbent hairlike setae near lateral margin of elytron in apical 2/3. Head (Fig. 2) transverse, oval, tapered toward clypeus, evenly convex in lateral view (Fig. 4), weakly opisthognathous in repose, with intermixed fine and coarse punctures mostly concentrated in band between eyes (Fig. 2), with few decumbent hairs present (specimen apparently abraded); clypeus short, shallowly arcuate, projecting beyond ventral cusp of emargination for antennal insertions by about 1/4 distance separating ventral cusps. Pronotum with unevenly scattered, intermixed fine and coarse punctures; punctures separated by less than one to several puncture diameters; with scattered decumbent to erect hairlike setae. Elytron with disc evenly punctate; punctures fine, separated by 3–5 times their diameter; some punctures bearing long, erect, hairlike seta $\frac{3}{4}$ or more length of lateral pronotal margin, estimated number of setae 65, of which only about a dozen remain due to abrasion (see setal map Fig 9 and description based on paralectotype, below), remaining punctures each bearing microseta scarcely projecting beyond rim of puncture; dense elongate pubescent patch of more than 20 short decumbent setae near lateral margin

beginning just above epipleural fovea for reception of metafemoral apex, continued posteriorly to area above hind margin of 4th abdominal ventrite (Fig. 4); lateral margin of elytron slightly undulate, with weakly raised lateral bead; epipleuron with depression for reception of mid-, hind femora. Prosternum convex with anterior margin arcuate, with few very fine scattered punctures. Meso-, metasternum obscured by glue and paper point. Abdomen with intercoxal process of ventrite I with few fine scattered punctures; ventrites II–IV finely rugostriate; ventrite V with narrow rugostriate band near base, remainder polished with moderately coarse scattered setiferous punctures separated by 3–5 times their diameter; each seta about ¼ to 1/3 length of segment along midline. Meso-, metatibiae with median cusplike angulation on outer margin of ventral face.

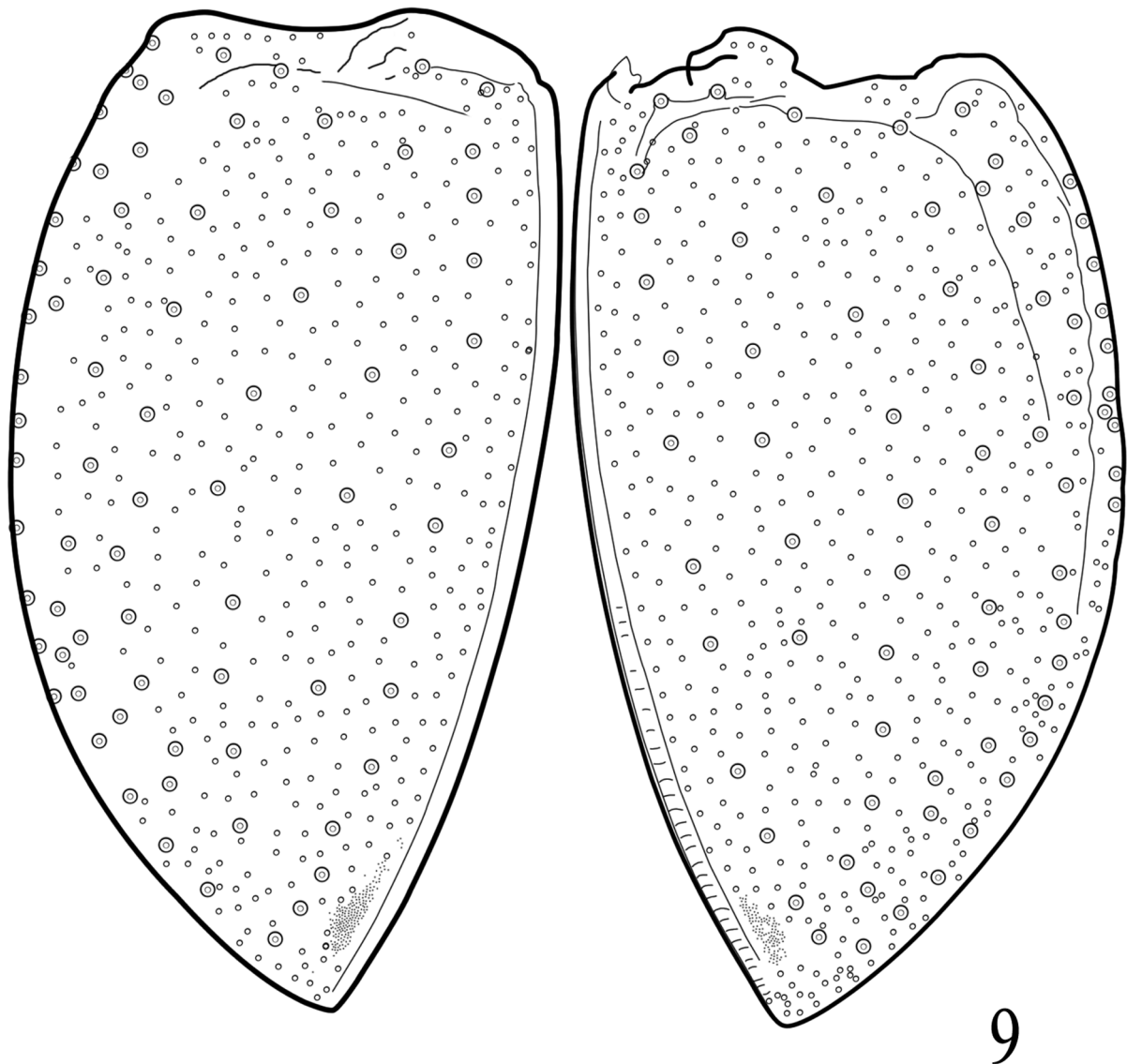


FIGURES 3–8. Digital images of *A. hirtula* type series. 3–5, Lectotype, male, whole body. 3, Frontal view (many setae abraded). 4, Left lateral view (note submarginal patch of decumbent setae in apical half). 5, Dorsal view (many setae abraded). 6–8, Paralectotype #2 (= *Microscymmus*, undescribed species). 6, Frontal view. 7, Dorsal view, detail showing impressed parasutural striae forming parentetical grooves. 8, Dorsal view of whole body.

Paralectotype #1 (female). Similar to male except head, pronotum entirely dark reddish brown, nearly black. Dissection and clearing provided the following information not observable in the point-mounted, undissected lectotype. Elytron with approximately 65 punctures each bearing long erect hairlike seta $\frac{3}{4}$ or more length of lateral pronotal margin (count based on scattered remaining setae and setal bases of broken setae, Fig. 9), forming about 7 striae: 4 uniseriate discal striae, 2–3 somewhat confused marginal/submarginal striae; lateral patch of short decumbent setae not seen (apparently abraded). Mesosternum with shallow intermediate-sized punctures. Metasternum with coarse to intermediate-sized punctures separated by less than to 5 times their diameter; punctures more deeply impressed in median half of sclerite, nearly obsolete laterally. Details of female genitalia not clearly observed in dissection.

Original Latin description (Kirsch 1876): “*Subhemisphaerica, nigra, capite prothoracisque lateribus saepe rufescentibus, hujus angulis posticis subrectis, scutello triangulari; elytris levissime parce punctatis, pilis longis*

erectis sparse obsitis pedibus flavis. Long. 1½, lat. 1 Mill.” (English translation: Subhemispherical, black; head and prothorax with sides often reddish, its [the prothorax] hind angles nearly straight [=right angled]; scutellum triangular, elytra very sparsely punctate, everywhere sparsely covered with long erect hairs; legs yellow. Length 1 ½, width 1 mm.)



⊙ = puncture bearing erect hairlike seta

○ = puncture bearing microseta

FIGURE 9. *Delphastus hirtulus*, setal map of elytra based on dissected cleared paralectotype #1. Dorsolateral view of left and right elytra.

Discussion

It is clear that Kirsch had multiple representatives before him when he composed his original species description, particularly where he mentions variation in the color of the head and prothorax. In his Latin version (reproduced and translated in the paragraph above) he indicates that the sides of the head and prothorax are often reddish, while in his German version he elaborates further, stating that these areas are “dunkleroth” (=dark red), or more rarely completely black.

Kirsch did not specifically designate a single representative type specimen in the original species description, though he indicated his preference by the addition of a red “Typus” label. This specimen corresponds to our lectotype (above). The lectotype and paralectotype #1 appear to be conspecific, and are entirely consistent with Kirsch’s description. However, paralectotypes #2 and #3 are not conspecific with the lectotype. According to Article 72.4.2 of the Code of Zoological Nomenclature, misidentified members of the original syntype series remain associated with the lectotype (as paralectotypes) despite not being conspecific (ICZN 1999).

Paralectotype #2 (male) agrees in most respects with Kirsch’s original description, except that the dorsal surface is apparently glabrous. This individual represents an undescribed lady beetle species belonging to the genus *Microscymnus* Champion. We believe that Kirsch studied this specimen when preparing his description, but was deceived by the superficial similarities in coloration and external morphology within the series. He may have attributed the lack of elytral setae to an artifact caused by abrasion rather than a natural character state.

Although *Delphastus* and *Microscymnus* are not particularly closely related, once they were classified together in the subfamily Sticholotidinae (Gordon 1970a, 1977). Each genus is characterized by a highly compact body form, which probably evolved as protection against ants and other natural enemies. In particular, these lady beetles show a parallel development of the legs, with highly flanged and flattened femora that accommodate the retracted tibiae and tarsi “jackknife fashion” and fit into deep pits on the epipleura and venter. Although members of both taxa can retract their mouthparts and antennae, *Delphastus* can withdraw them completely inside a hollow region formed by the expanded prosternum, while *Microscymnus* tucks the palps tightly against the underside of the head and folds the antennae into foveae in the pronotal hypomera. In the type series, most of these morphological differences are obscured by the point mounts and glue, but a frontal view clearly shows a difference in the shape of the anterior pronotal margin, which is nearly linear in *Delphastus* (Fig. 3), and deeply trapezoidally emarginate, embracing the sides of the head in *Microscymnus* (Fig. 6). In dorsal view, one can see deeply impressed parasutural striae in the undescribed *Microscymnus* (Figs. 7, 8) which are lacking in *Delphastus* (Fig. 5). *Microscymnus* currently is placed in the tribe Cryptognathini (Gordon 1977) and is known from only three described species, although a number of undescribed species are present in the USNM collection.

Paralectotype #3 (sex not determined) is badly damaged, lacking the head, pronotum, and one elytron. Furthermore, much of the undersurface is obscured by glue and the paper point. As with paralectotype #2, the specimen agrees with the original type description in every discernible aspect except for the lack of conspicuous dorsal setae. It even has the flattened femora and basally foveate elytral epipleura consistent with *Delphastus* and *Microscymnus*. However the spiny tibiae, tubular tarsomeres, lamellately-keeled mesosternum, and other visible details of the ventral surface are evidence it is not a coccinellid. After eliminating other possible affiliations through specimen comparisons (Phalacridae, Alexiidae, Hydrophilidae, etc.), we conclude that it is a round fungus beetle (Leiodidae) in the subfamily Leiodinae. Using available keys to the North and Central American fauna (Peck 2000, Peck & Newton 2001) and additional comparison, we were able to further identify the specimen as a member of the tribe Scotocryptini, probably *Aglyptinus*.

Acknowledgments

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