A paradox indeed : description of genitalia and clarification of the subtribal classification of **Pachyonychis paradoxus** Clark and **Pachyonychus paradoxus** Melsheimer (Coleoptera: Chrysomelidae: Galerucinae: Alticini)

A paradox indeed: description of genitalia and clarification of the subtribal classification of *Pachyonychis paradoxus* Clark and *Pachyonychus paradoxus* Melsheimer (Coleoptera: Chrysomelidae: Galerucinae: Alticini)

MARTIJN VAN ROIE[1,2], SHAWN CLARK[3], ALEXANDER KONSTANTINOV[4], DAVID FURTH[5] & ADELITA M. LINZMEIER[6]

[1]Biodiversity Inventory for Conservation npo (BINCO), Walmersumstraat 44, 3380 Glabbeek, Belgium martijn.vanroie@uantwerpen.be; https://orcid.org/0000-0002-8352-4445 [2]Department of Biology, Ecosystem Management Research Group, University of Antwerp, Universiteitsplein 1, 2610 Wilrijk, Belgium [3]Monte L. Bean Life Science Museum, Brigham Young University, Provo, Utah, U.S.A. shawn_clark@byu.edu; https://orcid.org/0000-0002-5007-0280 [4]Systematic Entomology Laboratory, USDA, ARS, c/o Smithsonian Institution, National Museum of Natural History, Washington, District of Columbia, U.S.A. alex.konstantinov@usda.gov; https://orcid.org/0000-0001-6578-6735 [5]Department of Entomology, Smithsonian Institution, National Museum of Natural History, Washington, District of Columbia, U.S.A. furthd@si.edu; https://orcid.org/0000-0001-6559-1209 [6]Universidade Federal da Fronteira Sul, Rua Edmundo Gaievski, 1000, P. O. Box 253, 85770-000, Realeza, PR, Brazil. adelita.linzmeier@uffs.edu.br; https://orcid.org/0000-0002-2979-8728

Abstract

Pachyonychis paradoxus Clark, 1860 and *Pachyonychus paradoxus* Melsheimer, 1847 are two species of Alticini whose strikingly similar names have led to significant confusion in the past. Recent study of American Oedionychina Chapuis, 1875 raised doubts about the validity of the subtribal placement of *Pachyonychis* Clark. Although general characteristics put this genus in Oedionychina, other features, especially the unusual shape of the pronotum, suggested that this monotypic genus would belong in Monoplatina Chapuis, 1875 instead. To collect evidence for the validity of its current placement, we compared external and genitalic morphology of both species to other members of Monoplatina and Oedionychina. Here we present images and descriptions of female genitalia for both species and male genitalia of *Pachyonychus paradoxus* Melsheimer, to our knowledge the first of their kind, and we conclude that the evidence supports the current subtribal placement of these two genera. Lectotypes are designated for both *Pachyonychis paradoxus* Clark and *Pachyonychus paradoxus* Melsheimer.

Key words: Oedionychina, Monoplatina, flea beetle, North America

Introduction

Pachyonychis Clark, 1860 and *Pachyonychus* Melsheimer, 1847, two monotypic genera of flea beetles (Chrysomelidae: Galerucinae: Alticini), have historically been a source of significant confusion. This can be attributed to the fact that their generic names only differ by a single letter and that both species epithets, '*paradoxus'*, are identical although the authors of the species are quite different: *Pachyonychis paradoxus* Clark, 1860 and *Pachyonychus paradoxus* Melsheimer, 1847. The nomenclatural problem has been discussed by several authors, starting with Jacoby (1888), followed by Weise (1921), Heikertinger (1925) and, more recently, Mignot (1969). Other authors (Horn 1889; Schaeffer 1932) have discussed *Hamletia dimidiaticornis* Crotch, now known to be a junior synonym of *P. paradoxus* Clark since 1969 (Mignot 1969). *Pachyonychis paradoxus* Clark or *H. dimidiaticornis* Crotch have often been referred to in species lists (Brimley 1938; Fattig 1948; Arnett 1985; Peck & Thomas 1998; Clark 2000; Hall & Barney 2010). Despite nomenclatural clarification offered by Mignot (1969), confusion still exists. For instance, Staines & Staines (1998) listed "*Pachyonychus paradoxus* Clark" (with a -us ending for the genus name and with the species author given as Clark). 128 · *Zootaxa* 5227 (1) © 2023 Magnolia Press Van Roie *et al* . *Pachyonychis paradoxus* Clark is known only from the eastern United States and is extremely rare in collections (only four specimens are available for study at the USNM). Nonetheless, there are some indications of the species' ecology. Blatchley (1925) reported collecting *H. dimidiaticornis* by sweeping grass along the margin of a pond. This record is also mentioned in Riley *et al*. (2002). Kirk (1969) reported *Hamletia dimidiaticornis* collected by sweeping bog plants from the northern coastal area of the state of South Carolina, the specimens having been identified by Ed Balsbaugh. Balsbaugh & Hays (1972) surveyed Chrysomelidae of the state of Alabama, noting that Kirk had collected two specimens of *Pachyonychis,* almost certainly those referred to by Kirk earlier. Ciegler (2007) reported *Pachyonychis paradoxus* Clark from bog vegetation, most likely referring to Kirk (1969). *Pachyonychus paradoxus* Melsheimer also occurs in the eastern United States. It feeds on *Smilax* (Smilacaceae) and is comparatively common (Clark *et al*. 2004). Riley *et al*. (2002) assumed that nomenclatural confusion resulted in the report of Jolivet & Hawkeswood (1995) of *Pachyonychis* Clark from *Smilax* Despite the nomenclatural confusion, until now the classification of both genera has been generally accepted: *Pachyonychus* Melsheimer has been assigned to the subtribe Monoplatina Chapuis 1875, and *Pachyonychis* Clark to Oedionychina Chapuis, 1875 (see Riley *et al*. 2003). In Oedionychina, the distal tarsomere of the hind leg is apically enlarged, and the elytral punctation is confused. In Monoplatina, the distal tarsomere of the hind leg is also apically enlarged, but the elytral punctures are in rows, that is, striate. However, in light of upcoming revisions of American Oedionychina (Van Roie *et al*., in prep.), pictures of the type specimen of *Pachyonychis* Clark gave rise to some doubts, since the general habitus, including pronotal shape, is similar to that of some Monoplatina. In the present manuscript, we present pictures of both *Pachyonychus paradoxus* Melsheimer and *Pachyonychis paradoxus* Clark, we provide notes on their morphology, including genitalia, and we offer new evidence supporting the current placement of *Pachyonychis* Clark in Oedionychina.

Methods

Pictures of the syntype of *Pachyonychis paradoxus* Clark, deposited in the BMNH, were taken using a Sony Cyber-shot DSC-H50. Pictures of the syntype of *Pachyonychus paradoxus* Melsheimer, deposited in the MCZC, are available at https://mczbase.mcz.harvard.edu/MediaSearch.cfm?action=search&media_id=248962,248963,248964,248965,248966 (accessed on April 8, 2022). Specimens of both species were compared to those of Monoplatina and Oedionychina from collections accessible to the authors, namely the USNM and BYU collections. These comparisons included study of the dissected genitalia. Specimen

observations were made with a Zeiss Stemi SV11 Apo microscope. Habitus pictures were taken with Macropod Pro photomacrography system (Macroscopic Solutions, LLC, Tolland, CT, USA). Microscope images of male and female genitalia were taken with an Axio Zoom V16 microscope with an AxioCam HRC digital camera attached to it, as well as with an AxioCam HRC Zeiss attached to Leitz Diaplan compound microscope. Description of male and female genitalia followed Konstantinov (2011). Studied specimens are deposited in the following collections: BMNH—The Natural History Museum, London, United Kingdom. BYU—Brigham Young University, Monte L. Bean Life Science Museum, Provo, UT, USA. MCZC—Museum of Comparative Zoology, Harvard University, Cambridge, USA. USMN—National Museum of Natural History, Washington DC, USA. Specimen labels are cited verbatim, according to the format justified previously (Konstantinov 1998; Konstantinov and Lingafelter 2002; Konstantinov *et al*. 2011). Information on each name is cited in parentheses, as follows: verbatim type locality, kind of type, and location of type specimen.

Results

Pictures of the syntype of *Pachyonychis paradoxus* Clark in the BMNH are given in figure 1. It was missing the right antenna and the five apical antennomeres of the left antenna. Furthermore, it was missing all tarsomeres of Classification of *P. parado xus* Clark and *P. parado xus* Melsh *Zootaxa* 5227 (1) © 2023 Magnolia Press · 129 the left hind leg, and it was therefore missing a key character for subtribe classification (globosely swollen apical tarsomere of the hind leg). Since only one lateral side of the type specimen was visible in the photos, the nature of the right hind leg is unknown to us. Nonetheless, the clear pictures and the original description allowed for positive identification of the specimens described below. Lastly, many parts of the syntype labels were illegible, but a picture of the labels is included in figure 1.D. Since *Pachyonychis paradoxus* Clark is very rare in collections, only a few specimens were available for study. Males of *Pachyonychis paradoxus* Clark were among the available material, but their abdomens and genitalia had been removed and could not be found. Thus, only female genitalia of this species could be photographed and described.

***Pachyonychis paradoxus* Clark 1860**

(Figures 2, 3)

Pachyonychus dimidiaticornis Dejean 1836:384 (nomen nudum) *Pachyonychis paradoxus* Clark 1860:63 + Plate II Fig. 7 (type locality: North America (Pennsylvania)) *Hamletia dimidiaticornis* Crotch 1873:59 (replacement name for *Pachyonychis paradoxus* Clark 1860). Mignot 1969:100 (synonymy).

Material examined: Lectotype: 67.56; [illegible]; *Pachyonychis paradoxus* 163 Mels [pz.ac 3] Clark [illegible] *dimidiaticornis* Pensylvania Dg C 3p; *Hamletia dimidiaticornis* Crotch (1 syntype BMNH, male). Non-type material: 1 ♀: St. Simon Island, GA; 20-VII-1931, Quersfeld; Property of USNM; USNM 2037268; *Pachyonychis paradoxus* H. Clark det. A.S. Konstantinov, 2005 (USNM); 1♂: Mobile, ALA, H. P. Loding; male; *Hamletia dimidiaticornis* 15864 l.g.g. Cr.; Property of USNM (USNM); 1♂: Jacksonville Fla.; Coll Hubbard & Schwarz; *Hamletia dimidiaticornis* Cr.; Property of USNM (USNM); 1♀, dissected: Myrtle Beach, Horry Co. S. C., Apr. 22. 1919; ER Kalmbach Collector; Property of USNM; *Hamletia dimidiaticornis* Crotch det. H. F. Wickham (USNM).

Distribution: USA—Alabama, Florida, Georgia, Maryland, North Carolina, New Jersey, Pennsylvania, South Carolina. (Riley *et al.* 2003, CSM personal data). Body size: length 4.1–4.9 mm, width 2.1–2.5 mm, illustrated specimen—4.9 mm long.

Description of female genitalia. Spermathecal pump clearly separated from receptacle, about two-thirds as long as receptacle, slightly arched, with top rounded. Apex of spermathecal pump flattened;

length about one-third of spermathecal pump. Receptacle elongate, constricted at spermathecal pump, forming clear neck; maximum width 132 · *Zootaxa* 5227 (1) © 2023 Magnolia Press Van Roie *et al* . situated at about one-third from basal part of pump, followed by slight constriction. Canal long, attached to base of receptacle, slightly widened at connection with duct, with two coils. Ramus widening near top, attached to canal via short bifurcation. Gland elongate. Posterior sclerotization of tignum broadly Y-shaped, much wider than midsection. Midsection of tignum nearly straight. Anterior sclerotization of tignum about as wide as midsection; apex blunt. Vaginal palpi shaped as conical funnels. Apex of vaginal palpus evenly rounded, facing anteromedially. Anterior sclerotization of vaginal palpus much wider than posterior sclerotization. Posterior sclerotization of vaginal palpi bearing multiple setae.

Comments. The lectotype for *Pachyonychis paradoxus Clark* is designated here to fix the identity of this species.

***Pachyonychus paradoxus* Melsheimer 1847**

(Figures 4, 5)

Pachyonychus paradoxus Melsheimer 1847:163 (type locality: Pennsylvania).

Material examined: Lectotype: ♂: *Pachyonychus paradoxus* Mels. 6y E.C. Mignot, 1964; MCZ Type 35375 (MCZ); non-type material: 2 ♀: Alex. Co.Va, VI-18-23; Ernest Shoemaker Collection; *Pachyonychus paradoxus* (Melsh.) det. A. Konstantinov 2018 (USNM); 1♀, dissected: IA Polk Co, Brown Frst Prsv, June 20, 1982, J. E. Wappes; *Pachyonychus paradoxus* Melsh, Det. E. G. Riley 82' (USNM); 2♂, 1 dissected, 3♀: USA, MD. 08.VI.95, Patoxant nat. res. road, leg. A. Konstantinov; Maryland: A. Adl Co. 6 km ESE of Laurel, 19°05'N 76°48'W, 8 June 1998; A. Konstantinov, W. E. Steiner, J. M. Swearingen, collectors; *Pachyonychus paradoxus* Melsh. det. A. Konstantinov 2018 (USNM); 7, sex unknown: Washgtn 13.6 [or 1.7, or 6.6, or 15.5] D.C.; Coll Hubbard & Schwarz (USNM); 1, sex unknown: 67 56; in Chev; *Pachyonychus paradoxus* ["see"?, illegible] Horn Melsh. (1 BMNH). Distribution: USA—Alabama, Arkansas, Dist. of Columbia, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Maryland, Missouri, North Carolina, New Jersey, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, Virginia, West Virginia. (Riley *et al.* 2003, CSM personal data). Body size: length 2.8–4.4 mm, width 1.3–2.1 mm, illustrated specimen—3.4 mm long.

Description of male genitalia. Aedeagus, in ventral view, with apical third rhombus-shaped; maximum width situated at about one distal fifth of aedeagus. Aedeagus, in lateral view, slightly curved; maximum width at about half length. Apical denticle of aedeagus rounded with slight tip in ventral view, nearly straight in lateral view. Ventral longitudinal groove present; ventral surface lateral to groove smooth. Basal opening oval.

Description of female genitalia. Spermathecal pump arched, evenly rounded, about two-thirds as long as receptacle, slightly narrowing towards apex; apex of spermathecal pump evenly rounded. Receptacle ovoid, with maximum width situated near base. Canal attached slightly above base of receptacle, long, widened near ramus, with one coil. Ramus rounded. Posterior sclerotization of tignum broadly Y-shaped, much wider than midsection, bearing moderately long setae. Middle part of tignum nearly straight. Anterior sclerotization of tignum rounded. Vaginal palpi elongate, anteriorly fused for half their length. Apex of vaginal palpi slightly rounded, facing anteriorly. Posterior sclerotization of vaginal palpi bearing multiple setae.

Comments. The MCZC syntype has a lectotype label attached by Mignot, but the lectotype was not designated (Mignot 1969). The lectotype for *Pachyonychus paradoxus* Melsheimer is here designated to fix the identity of this species.

Discussion

This paper is the first to describe and illustrate the female genitalia of *Pachyonychis paradoxus* and the male and female genitalia of *Pachyonychus paradoxus*. Despite the rather unusual habitus of *Pachyonychis paradoxus* Clark compared to other members of Oedionychina (e.g., the elongate face and more complex lateral sides of the pronotum, Figure 2), any reasons to doubt its placement there are now lifted. Oedionychina have unusual, funnel shaped, vaginal palpi and diagnostic spermathecae (Figure 3), which (to our knowledge) do not occur in other flea beetles. The shapes of the spermatheca, vaginal palpi and tignum of *Pachyonychis paradoxus* correspond well with the general genital morphology of Oedionychina (see e.g., Konstantinov *et al*. 2022). This is especially true regarding the funnel-shaped vaginal palpi with the anteromedially projected posterior sclerotization. In contrast, *Pachyonychus paradoxus* corresponds well with general monoplatine morphology, including the simpler spermatheca and elongate, partly fused vaginal palpi (see Konstantinov & Konstantinova 2011). Additionally, the apical sternite is more pointed, a character shared with several Monoplatina. This study provides more conclusive evidence for the original placement of *Pachyonychis paradoxus* Clark in the subtribe Oedionychina, rather than in Monoplatina. The authors also hope that, by providing figures and descriptions, this manuscript will lead to more identifications of this rare species, which in turn may help in discovering more aspects of its ecology and distribution.

Acknowledgements

We thank Max Barclay and Keita Matsumoto (BMNH), who provided us with additional pictures of the syntype of *Pachyonychis paradoxus* Clark. Special thanks are extended to Jan Mertens for layout of the figure plates. Taina Litwak (SEL, Washington DC) drew the habitus of *Pachyonychis paradoxus* and mentored SEL scientific illustration interns. Liz Sisk (Washington DC, SEL scientific illustration internship program, 2018) drew the habitus of *Pachyonychus paradoxus*. AML thanks the Ernst Mayr Travel Grants program (Museum of Comparative Zoology) to fund the type's study in BMNH and Max Barclay and Sharon Shute for their help. Merlijn Jocqué (BINCO npo) is thanked for his review of the manuscript before submission. Lastly, we thank Chris Reid (Australian Museum), Maurizio Biondi (Università degli Studi dell'Aquila) and an anonymous reviewer for their valuable contributions. Mention of trade names or commercial products in this publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the USDA; the USDA is an equal opportunity provider and employer.

References

Arnett, R.H. (1985) *American Insects, a Handbook of the Insects of America North of Mexico.* Van Nostrand Reinhold Company, New York, New York, 850 pp.

Balsbaugh, E.U. & Hays, K.L. (1972) *The leaf beetles of Alabama (Coleoptera: Chrysomelidae). Alabama Agricultural Experiment Station Bulletin*. Auburn University, Auburn, Alabama, 223 pp.

Blatchley, W.S. (1925) Notes on the distribution and habits of some Florida Coleoptera with descriptions of new species. *The Canadian Entomologist*, 57 (7), 160–168. https://doi.org/10.4039/Ent57160-7

Brimley, C.S. (1938) *The Insects of North Carolina.* North Carolina Department of Agriculture, Division of Entomology, Raleigh, 560 pp.

Ciegler, J.C. (2007) *Leaf and Seed Beetles of South Carolina (Coleoptera: Chrysomelidae and Orsodacnidae). Biota of South Carolina. Vol. 5.* Clemson University, Clemson, 246 pp.

Clark, H. (1860) *Monograph of Halticidae in the collection of the British Museum. Physapodes and Aedipodes. Part I.* Taylor and Francis, London, 301 pp. https://doi.org/10.5962/bhl.title.26898

Clark, S.M. (2000) An annotated list of the leaf beetles of West Virginia (Coleoptera: Orsodacnidae, Megalopodidae, Chrysomelidae exclusive of Bruchinae). *Occasional Publications of the West Virginia Department of Agriculture*, 1, 1–93.

Clark, S.M., LeDoux, D.G., Seeno, T.N., Riley, E.G., Gilbert, A.J. & Sullivan, J.M. (2004) Host plants of leaf beetle species occurring in the United States and Canada (Coleoptera: Megalopodidae, Orsodacnidae, Chrysomelidae, excluding Bruchinae). *Coleopterists Society, Special Publication*, 2, 1–476. https://doi.org/10.1603/0013-8746(2005)098[0243:HPOLBS]2.0.CO;2

Crotch, G.R. (1873) Materials for the study of the Phytophaga of the United States. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 25, 19–83.

Dejean, P.F.M.A. (1836) Catalogue de la collection de coléoptères de M. le Comte Dejean. *Mequignon-Marvis père et fils, Paris*, 5, 361–443. https://doi.org/10.5962/t.173109

Fattig, P.W. (1948) The Chrysomelidae or leaf beetles of Georgia. *Emory University Museum Bulletin*, 6, 1–47.

Hall, S. L. & Barney, R.J. (2010) A quantitative method for assigning abundance classifications to leaf beetles (Coleoptera: Chrysomelidae) in Kentucky. *Natural Areas Journal*, 30 (1), 95–105. https://doi.org/10.3375/043.030.0110

Heikertinger, F. (1925) Die Haticinengenera der Palaearktis und Nearktis. Bestimmungstabellen. (Monographie der palearktischen Halticinen: Systematischer Teil. Zweites Stück. *Koleopterologische-Rundschau*, 11 (3/4), 49–70. [Continuation of Heikertinger 1924: 25–48.]

Horn, G. H. (1889) A synopsis of the Halticini of Boreal America. *Transactions of the American Entomological Society*, 16, 163–320. https://doi.org/10.2307/25076525

Jacoby, M. (1888) Notes on Some North American Species of Halticinæ (Group Monoplati). *Transactions of the American Entomological Society and Proceedings of theEntomological Section of the Academy of Natural Sciences*, 15 (4), 302– 304. https://doi.org/10.2307/25076510

Jolivet, P. & Hawkeswood, T.J. (1995) *Host-plants of Chrysomelidae of the World, an Essay about the Relationships between the Leaf-beetles and their Food-plants.* Backhuys Publishers, Leiden, 281 pp. Kirk, V. M. (1969) A list of beetles of South Carolina, part 1—northern coastal plain. *South Carolina Agricultural Experiment Station, Technical Bulletin*, 1033, 1–124.

Konstantinov A.S. (1998) *Revision of the palearctic species of Aphthona Chevrolat and cladistic classification of the Aphthonini (Coleoptera: Chrysomelidae: Alticinae).* Memoirs on Entomology, International, Associated Publishers, Florida, 429 pp.

Konstantinov, A., Baselga, A., Grebennikov, V., Prena, J. & Lingafelter, S. (2011) *Revision of the Palearctic Chaetocnema Species (Coleoptera: Chrysomelidae: Galerucinae: Alticini)*. Pensoft, Sofia, 363 pp.

Konstantinov, A. & Konstantinova, A. (2011) New genus and species of flea beetles (Coleoptera, Chrysomelidae, Galerucinae, Alticini) from Puerto Rico, with comments on flea beetle diversity in the West Indies and a key to the West Indian Monoplatini genera. *ZooKeys*, 155, 61–87. https://doi.org/10.3897/zookeys.155.2124

Konstantinov, A.S. & Lingafelter, S.W. (2002) *Revision of the Oriental species of Aphthona Chevrolat (Coleoptera: Chrysomelidae).* Miscellaneous Publication of the Entomological Society of Washington, Washington, 349 pp.

Konstantinov, A.S., Van Roie, M., Furth, D., Clark, S.M. & Riley, E. (2022) Flea beetles of the West Indies: Subtribe Oedionychina Chapuis 1875, key to genera, new combinations, synonymy, checklist, and description of new genera and species (Coleoptera, Chrysomelidae, Galerucinae, Alticini). *Journal of Insect Biodiversity*, 33, 1–56. https://doi.org/10.12976/jib/2022.33.1.1

Melsheimer, F.E. (1847) Descriptions of new species of Coleoptera of the United States. *Proceedings of the Academy of Sciences, Philadelphia*, 3, 158–181.

Mignot, E.C. (1969) *Pachyonychis* Clark and *Pachyonychus* Melsheimer: nomenclatural confusion. *The Coleopterists' Bulletin*, 23 (4), 99–100.

Peck, S.B. & Thomas, M.C. (1998) A distributional checklist of the beetles (Coleoptera) of Florida. *Arthropods of Florida and Neighboring Land Areas*, 16, 1–180. https://doi.org/10.2307/3495846

Riley, E.G., Clark, S.M., Flowers, R.W. & Gilbert, A.J. (2002) Chrysomelidae Latreille 1802. *In*: Arnett, R.H, Thomas, M.C., Skelley, P.E. & Frank, E.H. (Eds.), *American Beetles. Volume 2. Polyphaga: Scarabaeoidea through Curculionoidea.* CRC Press, Boca Raton, Florida, pp. 617–691.

Riley, E.G., Clark, S.M. & Seeno, T.N. (2003) *Catalog of the Leaf Beetles of America North of Mexico (Coleoptera: Megalopodidae, Orsodacnidae and Chrysomelidae, excluding Bruchinae).* The Coleopterists Society, Sacramento, 290 pp.

Schaeffer, C. (1932) Notes on some Halticinae with descriptions of new species (Col. Chrysomelidae). *Bulletin of the Brooklyn Entomological Society*, 27, 239–245. https://doi.org/10.4039/Ent64236b-10

Staines, C.L. & Staines, S.L. (1998) The leaf beetles (Insecta: Coleoptera: Chrysomelidae): potential indicator species assemblages for natural area monitoring. *In*: Therres, G.D. (Ed.), *Conservation of Biological Diversity: A Key to the Restoration of the Chesapeake Bay Ecosystem and Beyond.* Maryland Department of Natural Resources, Annapolis, Maryland, pp. 233–244.

Weise, J. (1921) Wissenschaftliche Ergebnisse der schwedischen entomologischen Reise des Herrn Dr. A. Roman in Amazonas 1914–1915. 6. Chrysomelidae. *Arkiv för Zoologi*, 14 (1), 1–205.

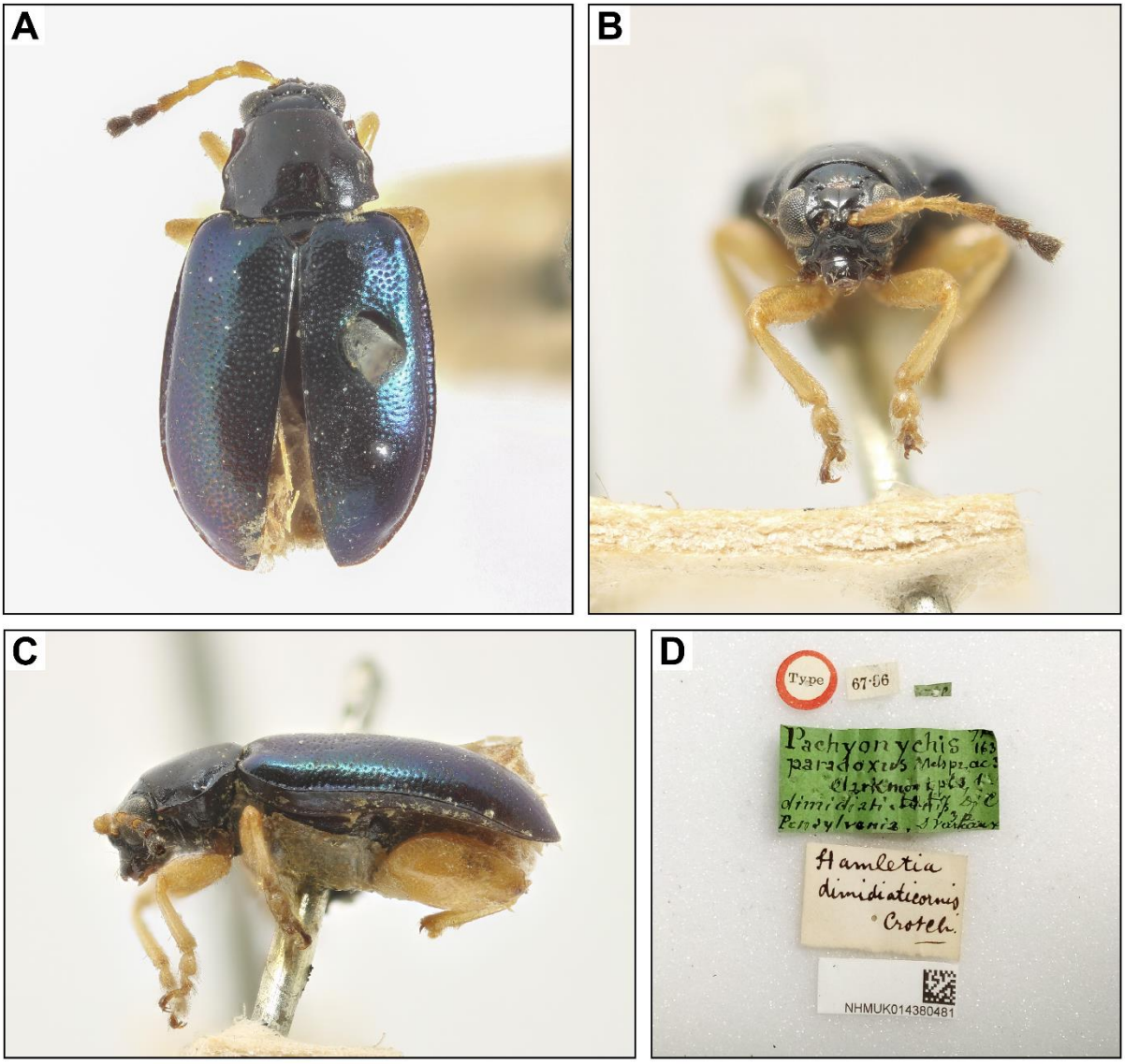

FIGURE 1. Lectotype of *Pachyonychis paradoxus* Clark 1860. A: Dorsal view; B: Frontal view; C: Lateral view; D: Labels.

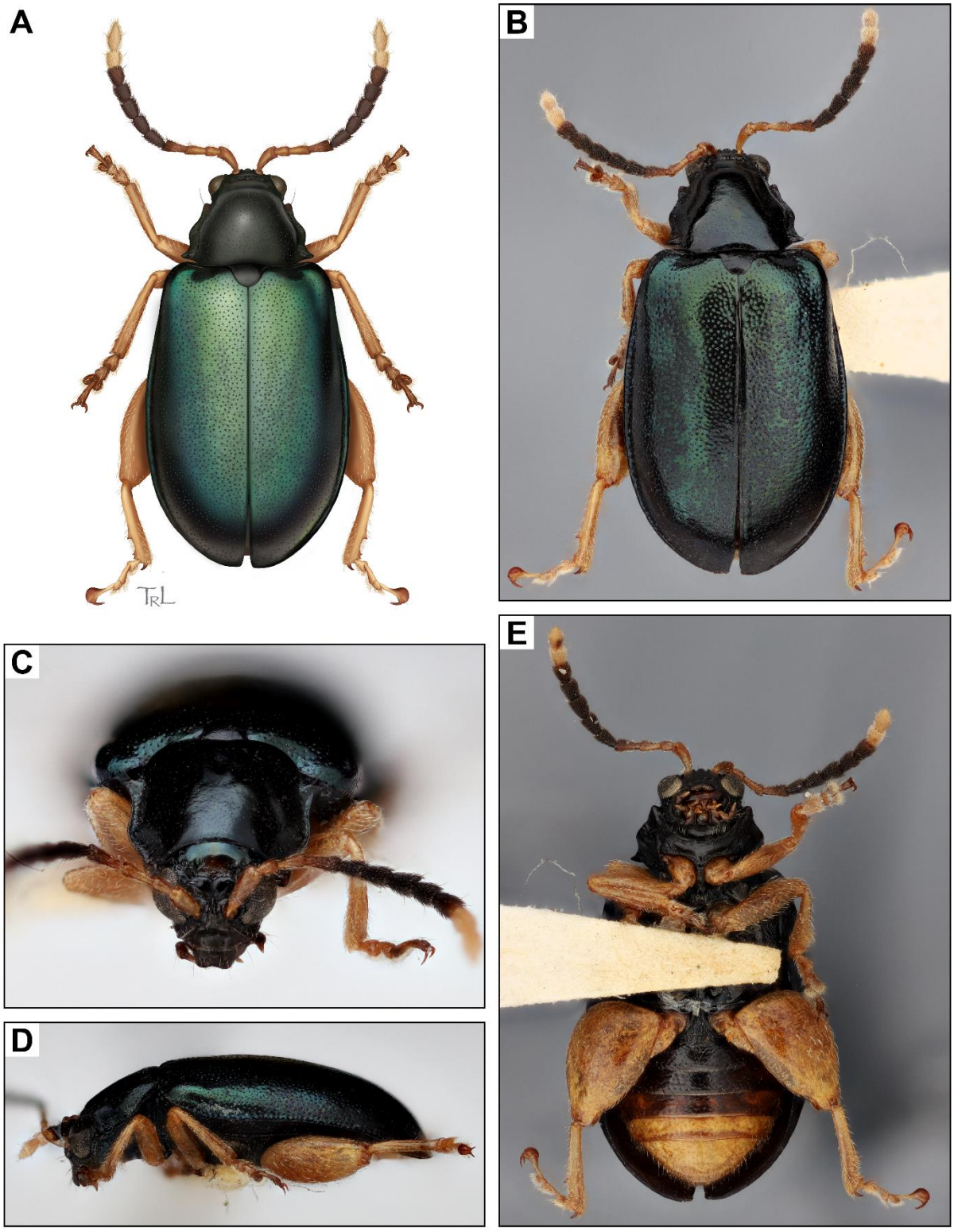

FIGURE 2. Habitus of *Pachyonychis paradoxus* Clark 1860. A: drawing of dorsal view (by Taina Litwak); B: Dorsal view; C: Frontal view; D: Lateral view; E: Ventral view.

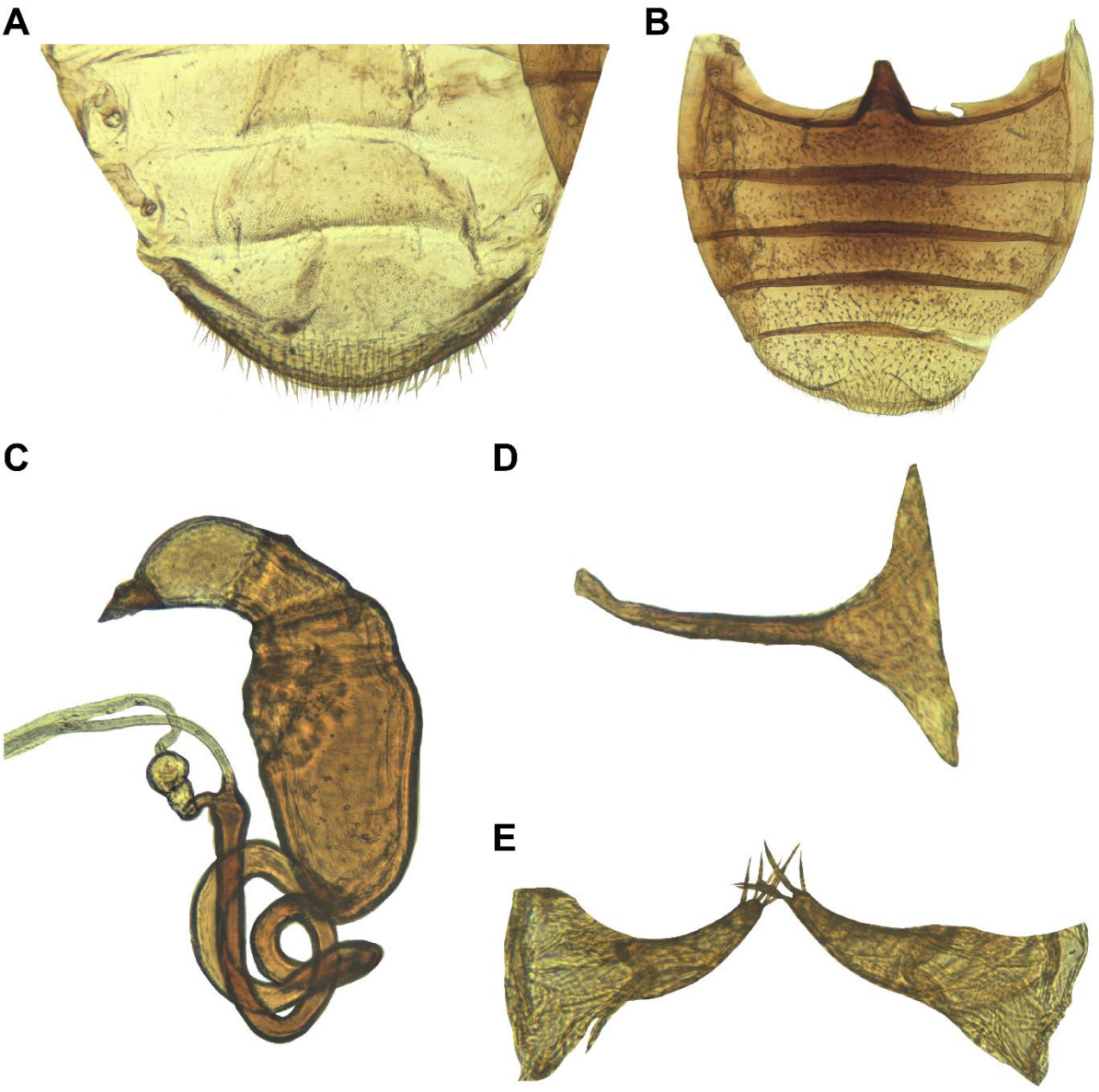

FIGURE 3. Abdomen and female genitalia of *Pachyonychis paradoxus* Clark 1860. A: Apical tergites; B: Sternites; C: Spermatheca; D: Tignum; E: Vaginal palpi.

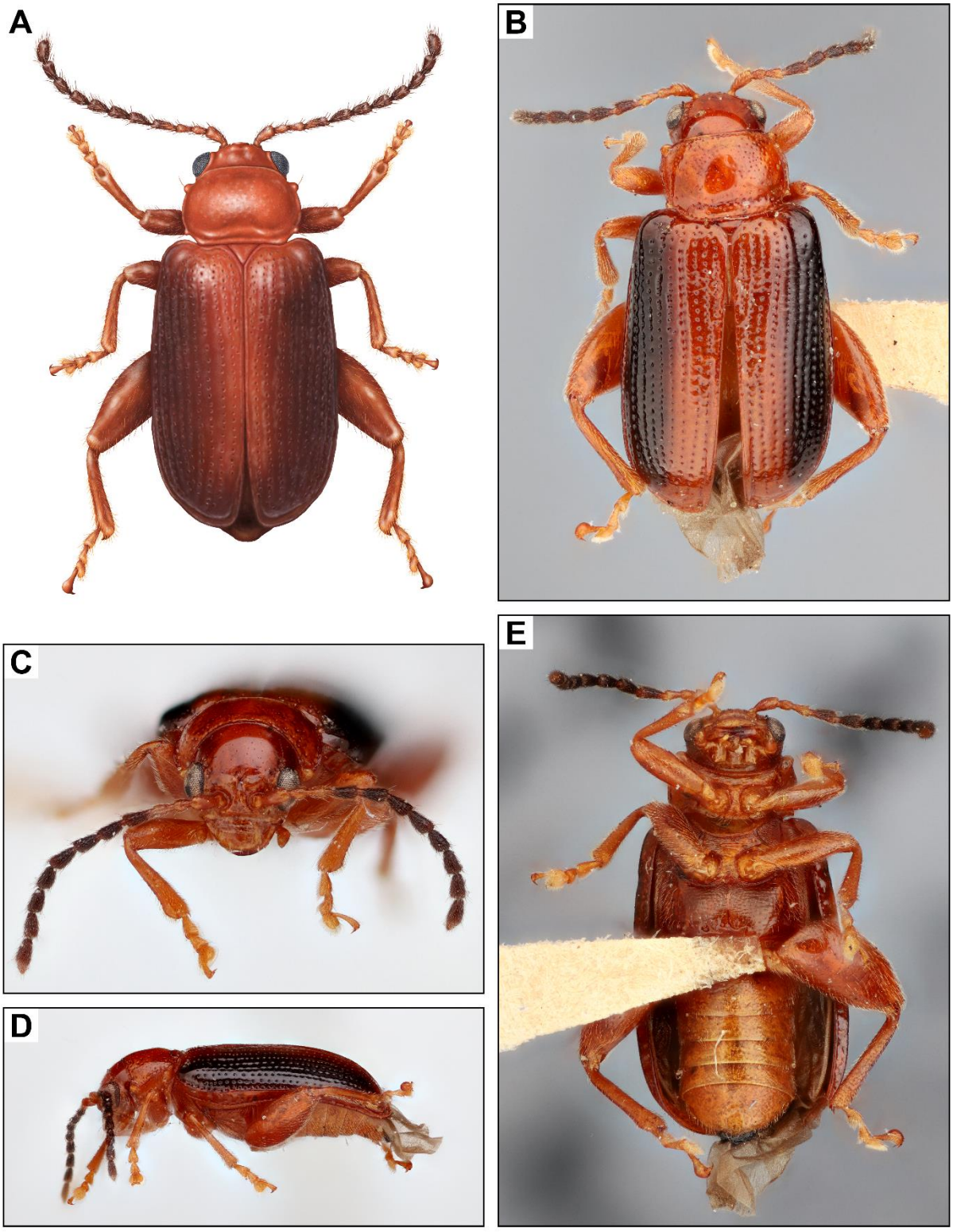

FIGURE 4. Habitus of *Pachyonychus paradoxus* Melsheimer 1847. A: drawing of dorsal view (by Liz Sisk); B: Dorsal view; C: Frontal view; D: Lateral view; E: Ventral view.

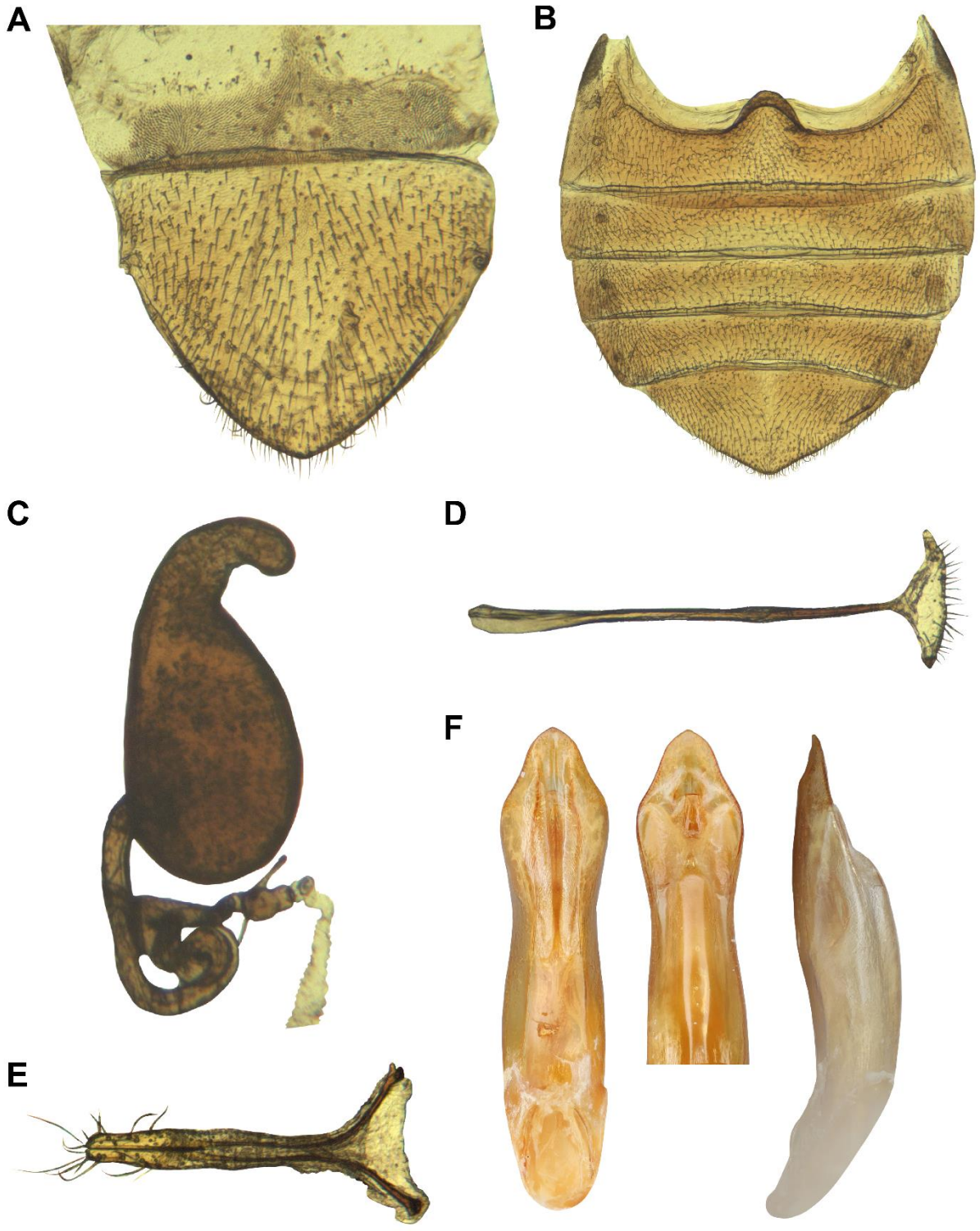

FIGURE 5. Abdomen and genitalia of *Pachyonychus paradoxus* Melsheimer 1847. A: Apical tergites; B: Sternites; C: Spermatheca; D: Tignum; E: Vaginal palpi; F: Aedeagus (ventral, dorsal, and lateral views).