

A journal of world insect systematics

INSECTA MUNDI

0882

A new species of *Scirtes* Illiger, 1807 (Coleoptera: Scirtidae)
from Virginia and South Carolina, U.S.A.

Charles A. Springer

1300 Cloncurry Road
Norfolk, Virginia 23505

Deborah A. Waller

Department of Biology
Old Dominion University
Norfolk, VA 23529

Date of issue: August 27, 2021

Center for Systematic Entomology, Inc., Gainesville, FL

Springer CA, Waller DA. 2021. A new species of *Scirtes* Illiger, 1807 (Coleoptera: Scirtidae) from Virginia and South Carolina, U.S.A. *Insecta Mundi* 0882: 1–9.

Published on August 27, 2021 by
Center for Systematic Entomology, Inc.
P.O. Box 141874
Gainesville, FL 32614-1874 USA
<http://centerforsystematicentomology.org/>

INSECTA MUNDI is a journal primarily devoted to insect systematics, but articles can be published on any non-marine arthropod. Topics considered for publication include systematics, taxonomy, nomenclature, checklists, faunal works, and natural history. *Insecta Mundi* will not consider works in the applied sciences (i.e. medical entomology, pest control research, etc.), and no longer publishes book reviews or editorials. *Insecta Mundi* publishes original research or discoveries in an inexpensive and timely manner, distributing them free via open access on the internet on the date of publication.

Insecta Mundi is referenced or abstracted by several sources, including the Zoological Record and CAB Abstracts. *Insecta Mundi* is published irregularly throughout the year, with completed manuscripts assigned an individual number. Manuscripts must be peer reviewed prior to submission, after which they are reviewed by the editorial board to ensure quality. One author of each submitted manuscript must be a current member of the Center for Systematic Entomology.

Guidelines and requirements for the preparation of manuscripts are available on the *Insecta Mundi* website at <http://centerforsystematicentomology.org/insectamundi/>

Chief Editor: David Plotkin, insectamundi@gmail.com
Assistant Editor: Paul E. Skelley, insectamundi@gmail.com
Layout Editor: Robert G. Forsyth
Editorial Board: Davide Dal Pos, Oliver Keller, M. J. Paulsen
Founding Editors: Ross H. Arnett, Jr., J. H. Frank, Virendra Gupta, John B. Heppner, Lionel A. Stange, Michael C. Thomas, Robert E. Woodruff
Review Editors: Listed on the *Insecta Mundi* webpage

Printed copies (ISSN 0749-6737) annually deposited in libraries

Florida Department of Agriculture and Consumer Services, Gainesville, FL, USA
The Natural History Museum, London, UK
National Museum of Natural History, Smithsonian Institution, Washington, DC, USA
Zoological Institute of Russian Academy of Sciences, Saint-Petersburg, Russia

Electronic copies (Online ISSN 1942-1354) in PDF format

Archived digitally by Portico
Florida Virtual Campus: <http://purl.fcla.edu/fcla/insectamundi>
University of Nebraska-Lincoln, Digital Commons: <http://digitalcommons.unl.edu/insectamundi/>
Goethe-Universität, Frankfurt am Main: <http://nbn-resolving.de/urn/resolver.pl?urn:nbn:de:hebis:30:3-135240>

Copyright held by the author(s). This is an open access article distributed under the terms of the Creative Commons, Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author(s) and source are credited. <http://creativecommons.org/licenses/by-nc/3.0/>

A new species of *Scirtes* Illiger, 1807 (Coleoptera: Scirtidae) from Virginia and South Carolina, U.S.A.

Charles A. Springer

1300 Cloncurry Road
Norfolk, Virginia 23505
bispinatus@cox.net

Deborah A. Waller

Department of Biology
Old Dominion University
Norfolk, VA 23529
dwaller@odu.edu

Abstract. *Scirtes goodrichi* Springer and Waller, a **new species** of *Scirtes* Illiger, 1807 (Coleoptera: Scirtidae: Scirtinae) from Virginia and South Carolina, is described and illustrated. Six species are now recognized for *Scirtes* in America north of Mexico: *S. orbiculatus* (Fabricius), *S. tibialis* Guérin-Méneville, *S. oblongus* Guérin-Méneville, *S. plagiatus* Schaeffer and *S. goliai* Epler. A taxonomic key to the six species of *Scirtes* is provided.

Key words. Aquatic beetles, taxonomic key, marsh beetles, Scirtinae.

ZooBank registration. urn:lsid:zoobank.org:pub:5E18383A-4237-44CD-8BC2-86829DDBBA9D

Introduction

The family Scirtidae Fleming, 1821 (=Cyphonidae Stephens, 1830; Elodidae Shuckard, 1840; Helodidae Agassiz, 1846; Dascillidae Horn, 1880), commonly known as marsh beetles, is found worldwide in open aquatic habitats and diverse lentic microhabitats. The family is represented by three subfamilies worldwide: Scirtinae, comprising over 69 genera and 1800 species, is most diverse in the tropics and temperate areas of the Southern Hemisphere, but species are found in every zoogeographic area (Ruta et al. 2018); Nipponocyphoninae, represented by a monotypic genus from Japan (Lawrence and Yoshitomi 2007); and Stenocyphoninae with one species in Chile (Lawrence and Yoshitomi 2007) and one in New Zealand (Ruta et al. 2011). The aquatic or semiaquatic larvae of Scirtinae have up to 125 antennomeres in full grown larvae, which is unique in holometabolous insects; larvae of Nipponocyphoninae and Stenocyphoninae are unknown.

Adult Scirtinae in America north of Mexico are characterized by a broad, somewhat flattened oval shape, length 1.4–8.6 mm; strongly deflexed head, frontoclypeal suture absent, ventrolateral subgenal carinae that line up against the outer edges of the procoxae at rest; mandibles unidentate; antennae with 11 antennomeres, filiform, serrate, or biappendiculate antennae; short transverse pronotum, sometimes partly covering head, reduced prosternum; metatibiae with long unequal spurs, tarsi 5-5-5, metatarsomere I long and slender, tarsomere IV bilobed, larger than III and densely setose below, claws simple; scutellar shield moderate size, triangular; abdomen with five visible sternites, the 1st sternite not divided by the hind coxae.

The genus *Scirtes* Illiger, 1807 includes 350 species worldwide (Libonatti 2017), with only five described species recognized for America north of Mexico (Epler 2012): *S. orbiculatus* (Fabricius, 1801), *S. tibialis* Guérin-Méneville, 1843, *S. oblongus* Guérin-Méneville, 1861, *S. plagiatus* Schaeffer, 1906, and *S. goliai* Epler, 2012. Diagnostic characters of *Scirtes* for the USA include antennae filiform or weakly serrate, antennomere I not unusually enlarged; mandibles symmetrical, with or without inner (medial) denticles; labium with palpomere III arising subapically from inner margin of II; prosternum reduced to a ventrally directed lamellate process narrowly separating procoxae; metacoxae meeting along full length of median line (contiguous along entire inner margin) forming a subquadrate plate which is not on same plane (more ventral) as intercoxal process of abdomen (more dorsal); base of metatrochanter partially hidden by posteroventral margin of metacoxa; metafemora

greatly enlarged, saltatorial; male genitalia highly variable and complex, species specific; female prehensors species specific (when present).

As part of a faunistic study of water beetles from southeast Virginia, the authors collected 17 specimens of a *Scirtes* from a UV light trap in Norfolk, Virginia, that could not be identified with available keys (Tetrault 1967; Ciegler 2003; Epler 2010), and other resources. Upon dissection the specimens exhibited distinct male genitalia and female prehensors unlike those dissected from the five known species of *Scirtes*. Examination of seven South Carolina specimens borrowed from Clemson University and Janet Ciegler's personal collection confirms that this undescribed species is also located in that state. This new species is described in this communication.

Materials and Methods

Specimens examined. A total of 784 specimens of *Scirtes* from eight museums or private collections were examined and identified as follows; *Scirtes goodrichi* n. sp. 24 (dissected 12 males, 12 females), *S. goliai* 19 (dissected 4 males, 1 female), *S. oblongus* 26 (dissected 2 males, 1 female), *S. orbiculatus* 280 (dissected 9 males, 5 females), *S. plagiatus* 20, (dissected 7 males, 5 females), *S. tibialis* 415 (dissected 10 males, 13 females). Specimens examined for study are deposited in the following institutions and private collections.

- CASC Charles A. Springer Collection, Norfolk, VA
- CUAC Clemson University, Clemson, SC (Michael L. Ferro)
- FSCA Florida State Collection of Arthropods, Gainesville, FL (Paul E. Skelley, Kyle E. Schnepf)
- JCC Janet Ciegler Collection, Clemson University, Clemson, SC
- NMNH National Museum of Natural History, Washington, DC (Floyd W. Shockley)
- OSUC The Ohio State University, Columbus, OH (Luciana Musetti)
- PERC Purdue Entomological Research Collection, Purdue University, West Lafayette, IN (Eugenio Nearn, Aaron Smith)
- UNSM University of Nebraska State Museum, Lincoln, NE (M.J. Paulsen, Brett Ratcliffe)

Dissections. The specimen, usually fastened to a paper "point," was removed from its pin and gently heated in 70% isopropyl alcohol for 5–8 minutes. This treatment dissolved or loosened the adhesive between the specimen and point and also hydrated the specimen for proper relaxation prior to dissection. The entire abdomen was then removed, placed in room temperature 10% NaOH for the desired amount of clearing and digestion, then rinsed in water. The genitalia were then transferred to glycerin, dissected with forceps and "minuten" needles, and examined microscopically. After its abdomen was removed, the specimen was remounted on a point and returned to the pin with its labels attached. Other parts of relaxed male and female specimens were dissected and treated similarly for microscopical examination. These specimens were used in the preparation of the drawings of specific structures. Dissected parts were either glued to the specimen point or stored in a genitalia vial pinned to its specimen. An ocular micrometer in one of the 20X oculars was used to measure the size of various structures.

Light trap at type locality. The type locality light trap, attached to a pine tree, housed a Phillips F15T8/BLB, 18-inch UV fluorescent bulb with an emission peak of 368 nm. A similar UV fluorescent light was attached directly to the opposite side of the tree from the trap. These two lights operated continuously, day and night, from 2011 through 2017, and from 2019 to present. From 2012 through 2017 a 40W UV fluorescent light was attached to the tree between the two 15W lights and operated continuously for a total of 70 watts of UV output. Specimens were collected for study and alcohol changed every morning and often in the evening.

Species concept. This study applies the phylogenetic species concept *sensu* Wheeler and Platnick (2000), defining species "as the smallest aggregation of (sexual) populations or (asexual) lineages diagnosable by a unique combination of character states."

Results

Scirtes goodrichi Springer and Waller, new species

Diagnosis. *Scirtes goodrichi* (Fig. 1) is distinguished from the five other species of *Scirtes* in our area by the following combination of characters that define this species: head width over 2.31 times head length; antennomere II arises from apex of I; clypeus with anterolateral angles not recurved; head, pronotum and proepisternum dark, without white, tan or orange markings; length of elytra 4.10–5.58 times mid-elytral height; elytra never vittate but usually with orange-brown sutural stripe; lateral margin of elytra slightly explanate, width of turned-out rim less than width of protibia; shape of prosternal process, male genitalia, tergite VIII (except *S. orbiculatus*) and female prehensor also species specific.

Scirtes goodrichi without elytral stripe resemble the general habitus of *S. tibialis* but can be distinguished externally by the clypeal anterolateral margins not recurved, head width over 2.31 times head length; long overlapping mandibular teeth, and shape of prosternal process. Internally, *S. goodrichi* differ markedly from *S. tibialis* by the male genitalia, male tergites VIII and IX and female prehensor (Fig. 2). If a completely dark or melanistic phase of *S. orbiculatus* is found, yet unknown to the authors, differences in elytral convexity, body length to width ratio and shape of prosternal lateral aspect will separate them from *S. goodrichi* externally, differences in male genitalia, male tergite IX, and female prehensor will separate them internally. *Scirtes goodrichi* is most closely related to *S. orbiculatus* based on similarities of the clypeus, head width to head length ratio, mandibular tooth size, elytral stripe, male genitalia, male tergite VIII, and female prehensor.

Description of holotype. *Body.* Elongate oval, elytra slightly convex, head and pronotum deflexed in normal relaxed position, length from anterior margin of pronotum to apex of elytra 2.75 mm, width across both elytra 1.69 mm, length 1.62 times width. Head width across both eyes 0.83 mm, pronotum width across posterior margin 1.28 mm, pronotum 1.54 times wider than head, elytra 1.32 times wider than pronotum. Maximum lengths: head from anterior margin of clypeus to base of eyes 0.35 mm; pronotum 0.51 mm; elytra 2.38 mm; total maximum length 3.24 mm; total length 1.92 times width. *Coloration.* Entire dorsum shiny, dark brown except for an orange-brown longitudinal stripe on the middle $\frac{1}{3}$ of the elytral suture, not extending outward over disc, width of stripe subequal to one dorsal eye width on each elytron, color and width of stripe decrease anteriorly and posteriorly. Prosternum, mesosternum, metasternum, all coxae and femora brown; abdominal sternum with irregular areas of dark and light brown. Proepisterna and elytral epipleura light brown. All palps, tibiae and tarsi light brown to stramineous. Antennomere I brown, II–VIII light brown, IX–XI fuscous. *Punctuation.* Setigerous punctures on head, pronotum and scutellar shield very fine, subequal in size to one eye facet diameter; head punctures separated by one to three puncture diameters; punctures on pronotum and scutellum separated by 3–5 puncture diameters, areas between punctures smooth, shiny. Elytral punctures larger, equal in size to 3 eye facet diameters, separated by one-half to one puncture diameter, producing a coarser surface than on head and pronotum. *Vestiture.* Most setae on dorsum pale yellow and semi-erect; setae on head directed forward, setae on pronotum and scutellar shield directed backward, all above setae subequal in length to width of prothoracic tarsomere I; setae on elytra directed backwards, longer, subequal in length to width of metathoracic tarsomere I. Setae on venter and appendages shorter than on head, pale yellow and recumbent. *Head.* Deflexed, inserted into prothorax to base of eyes, wider than long, width across eyes 0.83 mm, length from anterior margin of clypeus to posterior margin of eyes 0.35 mm, width 2.38 times length. Dorsal interocular distance 0.51 mm, dorsal eye width 0.16 mm, dorsal interocular distance 3.2 times one dorsal eye width. Eyes dark grey in middle with argenteous rim two to three eye facets wide. Subocular carina well developed under entire eye, carina height equals two to three eye facet diameters. Clypeus with lateral margins straight and directed anteriorly, anterolateral angles rounded, anterior margin slightly emarginate, width 14 times longer than depth. Antennae filiform, 1.24 mm long, 1.49 times width of head across eyes, and 0.45 times body length. Antennomere II attached to apex of I, antennomeres I to III decrease in size, III is the smallest overall, IV to X subequal, XI longest. *Pronotum.* Slightly deflexed, trapezoidal, very transverse, 0.51 mm long at midline, anterior margin 0.86 mm wide, posterior margin 1.28 mm, posterior margin width 2.5 times length; anterior margin broadly emarginate, lateral margin slightly convex, angles backward at about 114 degrees, posterior margin sinuate, pronotal width 1.54 times head width. *Thorax.* Length of prosternal process equal to but does not exceed apices of procoxae; metathoracic femur enlarged, saltatorial,

length 1.84 times width, compared to mesothoracic femur length 2.58 times width; metatibial long spur 2.6 times longer than short spur; metatibial long spur 1.0 times metatarsomeres II–V combined length. Metatarsomere I length 1.3 times metatarsomeres II–V combined length. *Elytra*. Length 2.38 mm, width across both elytra 1.69 mm, length 1.41 times width; elytral width 2.03 times head width; elytral width 1.32 times pronotal width; elytral height at middle 0.56 mm; length 4.25 times longer than height (convexity); lateral margin slightly explanate, greatest width of turned-out rim on anterior $\frac{1}{3}$ equals width of antennomere IV, reduced posteriorly; elytral epipleuron width subequal to one dorsal eye width on anterior $\frac{1}{3}$, reduced posteriorly. *Scutellar shield*. Triangular, width 0.32 mm, length 0.22 mm, width 1.43 times length. *Abdomen*. Fifth visible abdominal sternite emarginate, 0.24 mm wide, 0.04 mm deep, width 6.0 times depth. *Female prehensor*. The female prehensor (bursal sclerite) (Fig. 2) has two pairs of processes directed anteriorly, one pair directed posteriorly and a single tooth at the dorsal midline directed anteriorly. Prehensor width 0.40 mm, width across both elytra 1.69 mm, elytral width 4.23 times prehensor width.

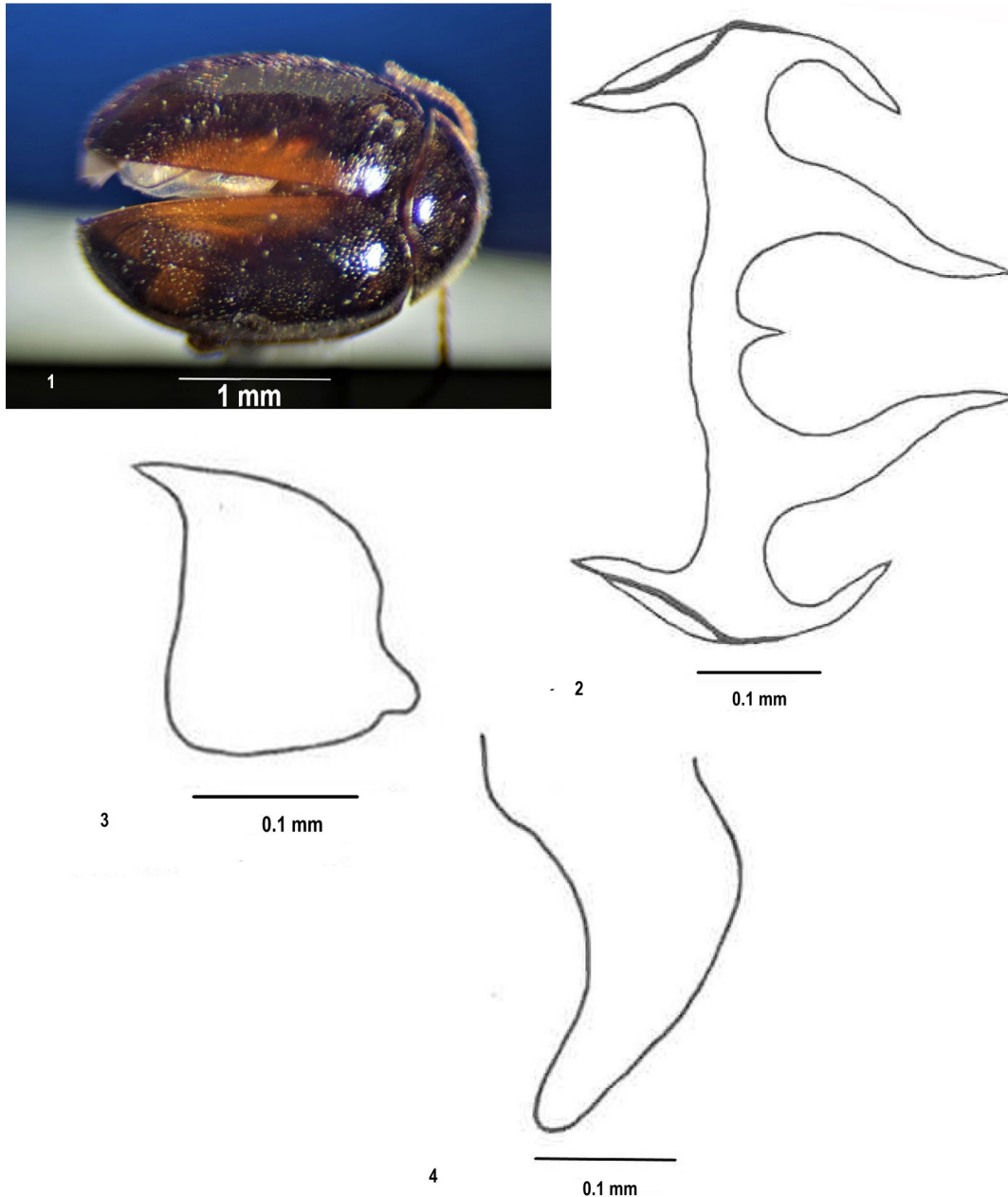
Type material. A total of 24 specimens was examined, 17 from the type locality, 9 males and 8 females, all dissected. The 7 specimens from South Carolina included 3 males and 4 females, all dissected. HOLOTYPE. Female: labeled, “VA:Norfolk 19-V-2017 C.A. Springer”/“UV Light”/red label “HOLOTYPE *Scirtes goodrichi* Springer & Waller”. Deposited in National Museum of Natural History, Washington, DC. TYPE LOCALITY. 1300 Cloncurry Road, Norfolk, Virginia 23505 (36.91361111 °N, 76.31416667 °W). Elevation: 3.0 m. ALLOTYPE. Male: labeled “VA: Norfolk 3-VIII-2020 C.A. Springer”/“UV Light”/blue label “ALLOTYPE *Scirtes goodrichi* Springer & Waller”. Deposited in the National Museum of Natural History. Allotype locality same as holotype. PARATYPES. The following paratypes from **Norfolk, Virginia** all share the type locality, collector, collection technique, and are deposited in NMNH. The genders and collection dates are as follows: 1 female 28-V-2011; 1 female 31-V-2013; 1 female 28-VIII-2013; 1 female 11-VI-2014, 1 male 17-VI-2014; 1 female 18-VI-2014; 1 female 3-VII-2014; 1 male 29-VII-2014; 1 female 24-VI-2020; 1 male 12-VII-2020; 1 male 3-VIII-2020; 1 male 11-VIII-2020; 1 male 12-VIII-2020; 1 male 18-VIII-2020; 1 male 22-VIII-2020. **South Carolina:** the next four specimens share the following collection data: “USA: SC: Georgetown Co. 33.3302 °N, 79.2469 °W Baruch/Hobcaw Barony VII.9.2015 M. Caterino & A. Deczynski”; 1 male “Clemson University 13450”, CUAC; 1 male “Clemson University 13021”, CUAC; 1 male “Clemson University 13275”, CUAC; 1 female “Clemson University 13023”, CUCA; 1 female “SC: Berkeley Co. Cypress Gardens PIN-V-8/9-98”/“At U.V. Light”/“Coll. J.C. Ciegler”, CUAC; 1 female “Moncks Corner, S.C. 9/17/2004”/“At U.V. Light”/“Coll. J.C. Ciegler”, JCC; 1 female “Moncks Corner, S.C. 5/8/98”/“At U.V. Light”/“Coll. J.C. Ciegler”, JCC. All specimens with yellow paratype labels, “PARATYPE *Scirtes goodrichi* Springer & Waller”.

Geographical range. Known from only two states, *S. goodrichi* first came to our attention with specimens from the type locality in Norfolk, Virginia, that eventually totaled 17. Loans from Clemson University and Janet Ciegler’s personal collection yielded seven more specimens from eastern South Carolina, including one location in Berkeley County and one location in Georgetown County.

Etymology. The species is named for the late Michael Goodrich, Eastern Illinois University, Charleston, Illinois, the senior author’s friend and research associate from 1961–2015. The name is a masculine noun in the genitive case.

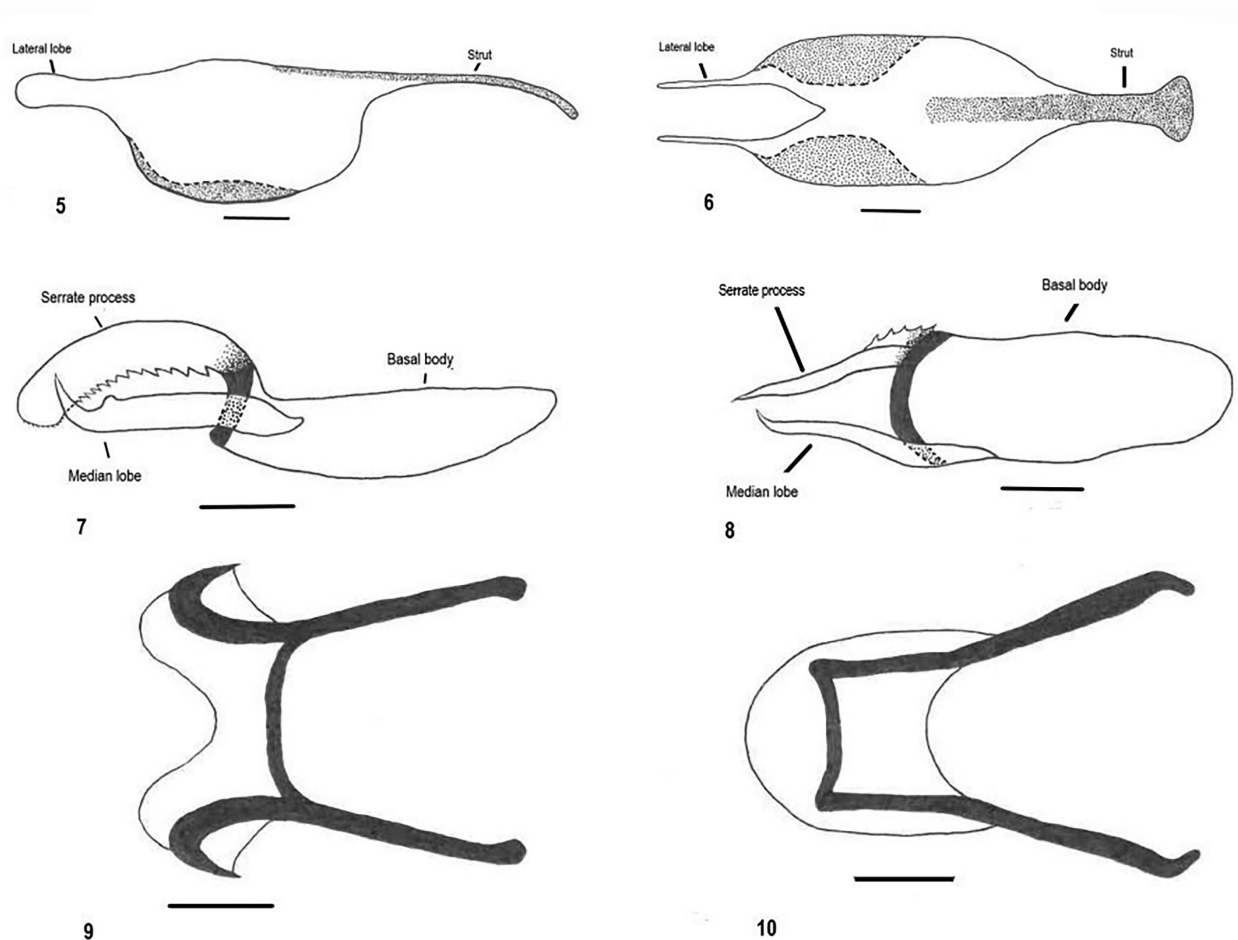
Range of intraspecific variation. *Body*. Smallest specimen: male, Georgetown Co., South Carolina, VII.9.2015, 33. 3302 °N 79. 2469 °W, Baruch/Hobcaw Barony, M. Caterino & A. Deczynski, Clemson University 13021. Largest specimen: female, VA:Norfolk, 11-VI-2014, C. A. Springer. Size range in normal deflexed position from anterior margin of pronotum to apex of elytra; body length 2.39–3.10 mm, width across both elytra 1.63–1.97 mm, length 1.47–1.65 times width. Head width across both eyes 0.77–0.88 mm, pronotal width across posterior margin 1.20–1.38 mm, pronotal width 1.52–1.62 times head width, elytral width 1.30–1.47 times pronotal width. *Coloration*. Base color dorsally ranges from brown to black. Width of orange-brown sutural stripe varies from two dorsal eye widths on each elytron to completely absent. *Head*. Clypeal emargination 13–25 times wider than deep; dorsal interocular distance 2.75–3.75 times one dorsal eye width; subocular carina height equals one to three eye facet diameters, more strongly developed laterally than medially; antennal length 1.07–1.28 mm, antennal length 1.31–1.66 times head width, body length 1.95–2.70 times antennal length, elytral width 2.03–2.36 times head width; eye color highly variable, can be all argenteous, black, grey or magenta; bicolored eyes include a background of the previous colors with contrasting spots or variegations, or black with argenteous or magenta

rim. *Mouthparts*. Labrum 1.90–2.20 times wider than long, anterolateral angles broadly rounded, anterior margin slightly convex. Mandibles unidentate (Fig. 3), tooth length equals $\frac{1}{4}$ – $\frac{1}{3}$ greatest width of mandible, teeth overlap each other (left over right) in closed position, denticles absent. Maxillary palps with 4 palpomeres, I shortest, II widest of all and usually slightly longer than, or subequal to III; IV longest, 1.25 times longer than II, attenuate at apex. Labial palps with 3 palpomeres, I shortest, II longest, more than 2 times longer than I and 1.25 times longer than III, III arises subapically from middle of II on medial side, II and III rounded at apex, all palpomeres subequal in greatest width. *Thorax*. Prosternal process (Fig. 4) with anterior margin convex, posterior margin concave, both converging posteriorly to a rounded apex, length of prosternal process equal to, but does not exceed, apices of procoxae; metafemoral length 1.76–1.97 times width; metatibial long spur length



Figures 1–4. *Scirtes goodrichi*. 1) Adult dorsal habitus. 2) Female prehensor. 3) Mandible. 4) Prosternal process lateral aspect.

1.97–2.60 times short spur length; metatibial long spur length 0.69–1.16 times metatarsomeres II–V combined length; metatarsomere 1 length 1.23–1.48 times metatarsomeres II–V combined length; all femora and tibiae can be lighter in color at both ends, as well as all trochanters. *Elytra*. Elytral length 4.10–5.58 times mid-elytral height (convexity). *Scutellar shield*. Triangular, range of width 0.27–0.32 mm, range of length 0.22–0.25 mm, width 1.16–1.50 times length. *Abdomen*. Emargination of 5th abdominal sternite, width for males 4.6–8.6 times depth and females 5.8–15.0 times depth. *Secondary sex characters*. No secondary sex characteristics were recognized. *Male genitalia*. The aedeagus is composed of an outer tegmen (Fig. 5–6) surrounding the inner penis (Fig. 7–8). Tegmen laterally flattened, with two lateral lobes (parameres) directed posteriorly and a dorsal strut directed anteriorly, tegmen closed dorsally, open ventrally. The penis is composed of a large supporting basal body (pala) with two movable processes directed posteriorly. The median lobe (parameroid) arises subapically from the right side of basal body, with a large apical tooth directed dorsally, tooth is 1.0–1.7 times width of median lobe. The serrate process (trigonium) arises apically from the left side of basal body, with a row of 15–18 small ventral teeth, apex rounded, without large apical tooth. Males dissected, 12. *Male tergites VIII and IX*. Male tergite VIII (Fig. 9), has two longitudinal apodemes that curve ventrally at apex, connected by a cross-bar at their midpoint, these three rods support an apical membrane between them with posterior margin deeply concave; tergite IX (Fig. 10) has two longitudinal apodemes supporting an apical membrane, with posterior margin convex, anterior margin concave. Tergite VIII is different from all other *Scirtes* in our area except *S. orbiculatus*, and tergite IX is unique



Figures 5–10. *Scirtes goodrichi*. **5)** Male tegmen lateral view illustrating lateral lobe (paramere) and strut. **6)** Male tegmen dorsal view illustrating lateral lobe (paramere) and strut. **7)** Male penis, lateral view illustrating basal body (pala), median lobe (parameroid) and serrate process (trigonium). **8)** Male penis, dorsal view illustrating basal body (pala), median lobe (parameroid) and serrate process (trigonium). **9)** Male tergite VIII. **10)** Male tergite IX. Scale lines = 0.1 mm.

among *Scirtes*. *Female prehensor*. The female prehensor (bursal sclerite) (Fig. 2) is a well sclerotized structure usually found at the midline within abdominal segments two to four, but in gravid individuals the presence of eggs can displace it to other areas. The central structure is a transverse bar that supports three pairs of processes and one unpaired tooth; the inner anterior pair of processes are the longest, the lateral anterior pair are the smallest, and the lateral posterior pair are intermediate in size; a single dorsoventrally flattened tooth at the dorsal midline points anteriorly. Prehensor width range 0.32–0.41 mm, elytral width 4.0–5.5 times prehensor width. Females dissected, 12.

Life history. Little is known about the ecology and life history of *S. goodrichi*. Specimens have been taken at the type locality every month from May to August, all by UV light trap. In South Carolina, they were collected in May, July and September, at UV light and by sweeping near water, but no other collection or ecological data are provided. However, two well-known species in the genus, *S. orbiculatus* and *S. tibialis*, sympatric with each other and *S. goodrichi*, have aquatic larvae associated with decomposing plant material in marshes, ponds, springs, swamps, tree holes and phytotelmata (Kraatz 1918; Beerbower 1943). The suggestion is strong therefore, that when studied, *S. goodrichi* will exhibit similar ecological and life history characteristics.

Key to Species of *Scirtes* Illiger for America North of Mexico

1. Larger, body length of pronotum and elytra together more than 4.50 mm; body elongate, more than 1.67 times longer than wide; pronotum with anterolateral angles produced anteriorly; pronotum less transverse, pronotal width across posterior margin less than 2.75 times length of lateral margin; eyes notched medially by recess for antennomere I; lateral margin of elytra more explanate, width of turned out rim equal to width of mesotibia; elytra with three longitudinal carinae on lateral half, or absent; elytra variously vittate or immaculate; body length 4.50–4.94 mm; Florida to Texas ***S. oblongus* Guérin-Méneville**
- Smaller, body length of pronotum and elytra together less than 4.50 mm; body more oval, less than 1.67 times longer than wide; pronotum with anterolateral angles not produced; pronotum more transverse, pronotal width across posterior margin more than 2.75 times length of lateral margin; eyes unnotched, medial margin entire; lateral margin of elytra less explanate, width of turned-out rim less than width of protibia; elytral carinae absent; elytra never vittate, but can have single orange-red to orange-brown sutural stripe on middle $\frac{1}{3}$ **2**
- 2(1). Clypeus with antero-lateral angles recurved laterally to form a point near scape; elytra unicolorous, without orange-brown sutural stripe on middle $\frac{1}{3}$, head, pronotum and proepisternum without light markings **3**
- Clypeus with antero-lateral angles not recurved; elytra usually with a distinct orange-brown sutural stripe on middle $\frac{1}{3}$; head, pronotum and proepisternum with white, yellowish, tan or orange markings to various degrees, or none **5**
- 3(2). Antennomere II arises subapically on lateral side of antennomere I; antennomeres IV–X with various degrees of serration, or none; clypeus with large antero-medial emargination, 3.28–4.0 times wider than deep; last visible abdominal sternite of males broadly rounded or straight, not emarginate; length 2.15–3.13 mm; Arizona ***S. plagiatus* Schaeffer**
- Antennomere II arises apically from antennomere I; antennomeres IV–X not serrate; clypeus with small antero-medial emargination, about 10 times wider than deep; last visible abdominal sternite of males with shallow emargination, 7–17 times wider than deep; size variable **4**
- 4(3). Larger, length of pronotum and elytra together 2.60–4.13 mm; antennae longer than 1.30 mm; body more oval, 1.31–1.59 times longer than wide; clypeus with antero-medial emargination shallower, 10–28 times longer than wide; mandible without a tooth, apex rounded; generally distributed east of the 100th meridian ***S. tibialis* Guérin-Méneville**
- Smaller, length of pronotum and elytra together 2.19–2.45 mm; antennae shorter than 1.30 mm; body more elongate, 1.60–1.64 times longer than wide; clypeus with antero-medial emargination deeper, 5.33–6.76 times longer than wide; mandible with very long tooth, longer than greatest width of mandible; southern Florida ***S. goliai* Epler**

- 5(2). Pronotum usually with at least lateral $\frac{1}{4}$ white to yellowish, orange or tan, varying to entire disc completely lighter; proepisternum same color as lateral pronotum; head can be orange or tan like pronotum; elytra with sutural stripe usually orange-red to orange-brown, or absent; areas without above pigmentation brown to black; elytra more convex, length of elytra 2.71–3.75 times mid-elytral height (convexity); body more circular, less than 1.47 times longer than wide; mandibular tooth longer, length of tooth $\frac{1}{2}$ or more than width of mandible; body length 2.11–3.08 mm; generally distributed east of the 100th meridian ***S. orbiculatus* (Fabricius)**
- Head, pronotum and proepisternum completely unicolorous, brown to black; elytra with sutural stripe usually orange-brown, or absent; elytra less convex, length of elytra 4.10–5.58 times mid-elytral height; body more elongate, 1.47 or more times longer than wide; mandibular tooth shorter, length of tooth $\frac{1}{3}$ or less than width of mandible; body length 2.39–3.10 mm; Virginia, South Carolina ***S. goodrichi* Springer and Waller, new species**

Discussion

Taxonomic results and conclusions. Detailed study of the clypeus, antennae and mandibles; elytral convexity; prosternal process; color pattern; and male and female genitalic structures were particularly useful in working out the relationships for the six species of *Scirtes* for America north of Mexico. Taxonomic results of this study are: a new species, *S. goodrichi* is described with limited distribution in South Carolina and Virginia; two species, *S. orbiculatus* and *S. tibialis*, are common and have widespread distribution east of the 100th meridian; *S. goliai*, *S. oblongus* and *S. plagiatus* are uncommon (or rarely collected) and restricted to the southern tier of states. The type locality is the only known site where *S. goodrichi* (17 specimens), *S. orbiculatus* (34 specimens) and *S. tibialis* (21 specimens) have been collected, even on the same day (22-VIII-2020). This study demonstrates the need for more critical collection and examination of local populations and museum specimens to identify unrecognized species which are increasingly confronted by the loss of habitat and the biodiversity crisis.

Acknowledgments

We extend special thanks to Terry L. Erwin (deceased) and Floyd W. Shockley at the National Museum of Natural History for making available facilities to examine specimens for three days. We are grateful to Charles Darwin Springer, Norfolk, VA, for translating the French and Latin literature, and his help in the orthography of the new specific name. Gratitude is also extended to: The individuals and institutions listed in Materials and Methods for loan of specimens; Peter B. Schultz and Helene Doughty of Virginia Tech Hampton Roads Agricultural Research and Extension Center, Virginia Beach, VA, for providing specimens from their UV light trap from 2014–2016; Brett Ratcliffe and John H. Epler for their helpful comments as reviewers.

Literature Cited

- Beerbower FV. 1943.** Life history of *Scirtes orbiculatus* Fabricius (Coleoptera: Helodidae). *Annals of the Entomological Society of America* 36: 672–680.
- Ciegler JC. 2003.** Water beetles of South Carolina (Coleoptera: Gyrinidae, Haliplidae, Noteridae, Dytiscidae, Hydrophilidae, Hydraenidae, Scirtidae, Elmidae, Dryopidae, Limnichidae, Heroceridae, Psephenidae, Ptilodactylidae, and Chelonariidae). *Biota of South Carolina*. Vol. 3. Clemson University; Clemson, SC. 207 p.
- Epler JH. 2010.** The water beetles of Florida - an identification manual for the families Chrysomelidae, Curculionidae, Dryopidae, Elmidae, Gyrinidae, Haliplidae, Helophoridae, Hydraenidae, Hydrochidae, Hydrophilidae, Noteridae, Psephenidae, Ptilodactylidae and Scirtidae. Florida Department of Environmental Protection; Tallahassee, FL. 399 + iv p.
- Epler JH. 2012.** A new species of *Scirtes* (Coleoptera: Scirtidae) from southern Florida and the Caribbean. *Zootaxa* 3530: 77–82.
- Fabricius JC. 1801.** *Systema Eleutherotorum. Secundum Ordines, Genera, Species adiectis Synonymis, Locis, Observationibus, Descriptionibus*. Tomus I. Impensis Bibliopolii Academici Novi; Kiel. 687 p.

- Guérin-Méneville FE. 1843.** Species et iconographie generique des animaux articules ou representation des genres, avec leur description et celle de toutes les especes de cette grande division du regne animal: ouvrage formant une serie de monographies completes. Prem. partie: Insectes coleopteres 9(3): 3.
- Guérin-Méneville FE. 1861.** Monographie du nouveau genre *Dicranopselaphus* et description de quelques autres insectes coléoptères appartenant aussi a la famille des Dascillies. Revue et magasin de zoologie pure et appliquée, 13: 531–547.
- Kraatz WC. 1918.** *Scirtes tibialis*, Guer., (Coleoptera-Dascyllidae), with observations on its life history. Annals of the Entomological Society of America 11: 393–400.
- Lawrence JF, Yoshitomi H. 2007.** *Nipponocyphon*, a new genus of Japanese Scirtidae (Coleoptera) and its phylogenetic significance. Elytra 35: 507–527.
- Libonatti ML. 2017.** Notes on some South American species of *Scirtes* Illiger, 1807 (Coleoptera: Scirtidae). Annales Zoologici 67(2): 349–368.
- Ruta R, Klausnitzer B, Prokin A. 2018.** South American terrestrial larva of Scirtidae (Coleoptera:Scirtoidea): the adaptation of Scirtidae larvae to saproxylic habitat is more common than expected. Austral Entomology 57: 50–61.
- Ruta R, Thorpe S, Yoshitomi H. 2011.** *Stenocyphon neozealandicus*, a new species from New Zealand of a previously monotypic subfamily from Chile (Coleoptera:Scirtidae:Stenocyphoninae). Zootaxa 3113(1): 65–68.
- Schaeffer C. 1906.** New Dascyllidae. Psyche 13: 114–116.
- Tetrault RC. 1967.** A revision of the family Helodidae (Coleoptera) for America north of Mexico. Unpublished Ph.D. dissertation, University of Wisconsin, Madison, WI. 160 p.
- Wheeler QD, Platnick NI. 2000.** The phylogenetic species concept (*sensu* Wheeler and Platnick) p. 55–69. In: Wheeler QD, Meier R (eds.). Species concepts and phylogenetic theory: A debate. Columbia University Press; New York, NY. 239 p.

Received June 24, 2021; accepted August 5, 2021.

Review editor Kyle Schnepf.

