

**First Records of Troglobitic Beetles from Arkansas: Two New Species of *Speleochus* Park (Coleoptera: Staphylinidae: Pselaphinae: Bythinini), and Synonymy of *Subterrochus* Park with *Speleochus***

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**FIRST RECORDS OF TROGLOBITIC BEETLES FROM ARKANSAS: TWO NEW SPECIES OF *SPELEOCHUS* PARK (COLEOPTERA: STAPHYLINIDAE: PSELAPHINAE: BYTHININI), AND SYNONYMY OF *SUBTERROCHUS* PARK WITH *SPELEOCHUS***

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**ABSTRACT**

The two species of pselaphine staphylinid beetles described herein represent the first unambiguous records of true troglobitic beetles from caves in the Ozark Plateau region of Arkansas. *Speleochus macosar* Carlton, **new species**, is based on a series of six specimens collected from Whippoorwill Cave, Madison County, northwestern Arkansas. *Speleochus blanchardensis* Carlton, **new species**, is based on a series of four specimens collected in Blanchard Springs Caverns, Stone County, north-central Arkansas. All specimens were collected from the zone of total darkness, deep within the caves. Comparison with other troglobitic species from the southeastern United States included within the genera *Speleochus* Park, 1951 and *Subterrochus* Park, 1960 suggest that all are congeneric. An updated description of *Speleochus* is provided and the following nomenclatural changes are proposed: *Speleochus* (= *Subterrochus*, **new synonymy**); *Speleochus eurous* (Park, 1960), **new combination**; *Speleochus ferus* Park, 1951, **combination reinstated**, and *Speleochus steevesi* (Park, 1960), **new combination**. The species described from Arkansas are the only members of the genus known from west of the Mississippi River Embayment. All others are described from caves in northern Alabama.

Key Words: taxonomy, rove beetles, cavernicoles, cave endemics, biospeleology, troglobite

Troglobitic animals are restricted to cave systems, typically on karst dominated terrains, but also in deep fractures in non-limestone substrates and lava tube systems (*e.g.*, Peck 1974; Liebherr and Samuelson 1992). True troglobites are exclusively subterranean and often display a suite of morphological adaptations to life in perpetual darkness and nearly constant conditions of temperature and humidity (Barr 1968). In insects, these characteristics include depigmentation, eyes and flight wings greatly reduced or absent, and some or all appendages more elongate than epigeal relatives. Troglobitic taxa are scattered among many insect orders, but are particularly diverse in the beetle families Carabidae, Leiodidae, and Staphylinidae (predominantly Pselaphinae) (Barr 1968; Peck 1973; Klimaszewski and Peck 1986; Chandler and Reddell 2001; Peck and Thayer 2003).

The most diverse faunas of cave inhabiting beetles in eastern North America are found on the extensive karst landscapes of northern Alabama and southern Tennessee, the Cumberland Plateau of Kentucky, Tennessee, and Virginia, and the Edwards Plateau of central Texas (Reddell 1968; Peck 1995, 1998; Chandler and Reddell 2001). Caves in the Missouri Ozark Mountains harbor a few troglobitic carabids and a few more troglomorphic beetles (Peck and Lewis 1977; Elliot 2007). Surprisingly, the extensive cave fauna of the Arkansas Ozarks has until now included no records of obligately troglobitic beetles. The

widely distributed and strongly troglomorphic leiodid *Ptomaphagus cavernicola* Schwarz is known from Arkansas caves (Peck 1973). But, it also has been collected sporadically in forest litter samples, flight intercept traps, and gopher burrows (Peck 1982a, b; Peck and Skelley 2001). The type series of the carabid *Rhadine ozarkensis* Sanderson and Miller was collected in a cave near Fayetteville (Washington Co.), but Barr (1960) classified it as a facultative troglophile based on the lack of obvious morphological adaptations found in most obligate troglobites.

The new species described herein present typically troglobitic morphologies, including complete absence of eyes and flight wings, pale integument, and elongate maxillary palpi. All specimens were collected from complete darkness zones deep within limestone caves of northern Arkansas. They represent the first unambiguous records of obligate troglobitic beetles known from Arkansas.

These species are members of the Nearctic pselaphine staphylinid genus *Speleochus* Park, 1951, within the tribe Bythinini, subtribe Machaeritina. In comparing specimens and/or original descriptions with other members of the tribe (see species list for types examined), I concluded that troglobitic species described from Alabama and currently placed in the genus *Subterrochus* Park, 1960 are congeneric with the species described herein. All are modified troglobites similar to members of the Holarctic genus *Tychobythinus* Ganglbauer,

but differing from the latter in the development of thoracic foveae that are used for diagnosing otherwise similar pselaphine genera, particularly the elytral foveae and lateral metasternal foveae. Accordingly, *Subterrochus* is placed as a junior subjective synonym under *Speleochus*, resulting in two new combinations and one reinstated to its original combination for the included species. I provide a revised description of the genus, a revised checklist of included species, and descriptions of two new troglobitic species from Arkansas.

### MATERIAL AND METHODS

External examinations were performed using an Olympus SZH10 stereomicroscope fitted with a ringlight. Specimens were prepared for compound microscopy by macerating in warm ( $\approx 60^{\circ}\text{C}$ ) 10% KOH for approximately 1 hr, followed by several washes in 95% ethanol. The abdomen was separated from the forebody (head and thorax, including appendages), then split to remove the aedeagus. The forebody and abdominal ventrites were mounted in Euparal<sup>®</sup> ventral side up, and the aedeagus and abdominal tergites were mounted dorsal side up. Removal of the aedeagus from specimens that were to be dry mounted was accomplished by soaking the specimens in hot ( $\approx 80^{\circ}\text{C}$ ) water for approximately 1 hr or until the appendages were flexible, then extracting the aedeagus under ethanol using insect and minuten pins. The body was then dried and remounted, and the aedeagus was transferred to glycerol for temporary microscope mounts or storage in genitalia vials. Compound microscopy and line illustrating were performed using an Olympus BX50 fitted with a drawing tube. Habitus photographs were made using a Syncroscope Automontage imaging system. Illustrations were edited using Adobe Photoshop<sup>®</sup>.

Terminology of foveae follows Chandler (2001). Holotypes are deposited in the Field Museum of Natural History (FMNH), Chicago, IL, USA. Paratypes are deposited in the Louisiana State Arthropod Museum (LSAM), Baton Rouge, LA.

### TAXONOMY

**Description of *Speleochus*.** Possessing characters of the tribe Bythinini (*sensu* Raffray 1905). Head with rounded tempora, vertexal foveae small, nude, frons quadrate between antennal insertions, with moderately prominent antennal tubercles, then declivous but not excavated anterior to antennae, antennae lacking sexual modifications, scape elongate, length at least equal to that of next 4 segments combined, pedicel ovate, wider and longer than intermediate segments, segments 3–8 short, circular or slightly elongate, 9–11 forming weak club,

mainly comprising enlarged terminal segment. Ocular mandibular carinae variable, present from lateral aspect of clypeus to ocular area and sometimes beyond. Eyes absent. Ventral surface of head variable, weakly tumid to elaborately modified in males, gular foveae small, approximate and sharing a common transversely oval opening, often obscured by male sexual characters. Maxillary palpi 4-segmented, segment 1 minute, segment 2 slender, elongate, segment 3 short quadrate or subtriangular, segment 4 enlarged, elongate parallel, securiform or securiform-sinuate. Segments 2–3 bearing coarse, rounded tubercles, segment 4 with a fine pile of pubescence. Pronotum circular or elongately ovate, margins rounded, median antebasal foveae absent, subbasal sulcus weak or absent, lateral antebasal foveae present. Prosternum with lateral procoxal foveae. Mesoventrite with paired median mesosternal foveae and lateral mesosternal foveae, the latter forked or single. Lateral mesocoxal foveae present. Lateral metasternal foveae absent (in Arkansas species) or reduced (in species east of the Mississippi River). Discal striae of elytra weak or absent, antebasal foveae small or absent (sutural foveae obvious only in *Speleochus croceus* Park). Elytral humeral foveae absent. Functional wings absent. Legs narrow, mesotrochanter broadly, obliquely joined to femur. First tarsomere minute, second longest, third about half length of second. Tarsal claws unevenly developed, posterior claw elongate, normally developed, anterior claw extremely hyaline, about one-half length of posterior claw (barely visible at 400X magnification). Abdomen with 6 visible ventrites, ventrite 7 of male absent, remnant sclerites of latter internal. Aedeagus with fixed parameres, internal sac bearing pair of symmetrical or slightly asymmetrical accessory processes. Males and females similar overall; females lacking secondary sexual characters of ventral surface of head and mesotrochanters, in addition to primary differences of the terminalia.

**Comments.** The most recent checklist of North American Pselaphinae (as Pselaphidae) was provided by Chandler (1997). Since that work, no changes to the taxonomic composition or status of North American bythinines have been proposed until the present study. The North American fauna is limited compared to that of the Palaearctic, but was oversplit at the generic level by Park (1951, 1960), who established two subgenera, *Speleochus* and *Subterrochus*, within the genus *Machaerodes* Brendel to include six troglobitic species. Both subgenera were recognized as genera by Chandler (1997) and that classification is followed here. Park (1960) based these two taxa on differences in the relative proportions of the head, degree of development of antebasal foveae of the elytra, and presence or absence of male secondary characters

on the gular region of the head. These characters are variable at the species level within many pselaphine genera and are of limited use in diagnosing genera.

Species included within *Speleochochus* and *Subterrochus* share a number of characters that exclude them from *Tychobythinus* and suggest inclusion in a single genus. These include: 1) reduction or absence of elytral foveae, including the absence of subhumeral foveae, which are typically more conserved than other elytral foveae; 2) absence or reduction of lateral metasternal foveae; and 3) symmetrical or only slightly asymmetrical accessory processes of the aedeagal internal sac. In members of *Tychobythinus* examined for this study, the subhumeral foveae and lateral metasternal foveae (Fig. 15) are well developed and obvious on dried specimens, and the accessory processes of the internal sac are obviously asymmetrical, with one being much larger than the other. Among *Speleochochus*/*Subterrochus* specimens examined, the lateral metasternal foveae are externally visible only on specimens of *S. croceus*. In other specimens, these foveae are either entirely absent (*e.g.*, both *Speleochochus* species described here from Arkansas) or are shallow and extremely difficult to discern externally (*e.g.*, all *Speleochochus* specimens examined from east of the Mississippi River). Males of two species currently included in *Tychobythinus*, *Tychobythinus strinatii* Besuchet and *Tychobythinus hubrichti* Park, possess highly modified gulae, but also possess subhumeral elytral foveae, based on the descriptions. Possibly, *Tychobythinus* will prove to be paraphyletic with respect to *Speleochochus* and another round of generic reassignments will be required. But that will require a generic review of the Bythinini, including study of the large Palaearctic fauna (18 genera, approximately 475 species) (Löbl and Besuchet 2004). Upholding the generic status of *Speleochochus* and *Subterrochus* complicates describing new species by requiring arbitrary placement into one of three available genera, or worse, describing new genera to accommodate minor differences among these and other North American species with only a small sample of total tribal diversity available for comparative study.

#### *Speleochochus* Park, 1951

*Speleochochus* Park 1951: 46 (as subgenus of *Machaerites*).

Type species: *Machaerites stygicus* Park, 1951: 46 by original designation.

*Subterrochus* Park 1960: 91 (as subgenus of *Machaerites*). Type species: *Machaerites ferus* Park, 1960: 91 by original designation. **New synonymy**

Included species:

*Speleochochus blanchardensis* Carlton. **New species.**

Type locality: Blanchard Springs Caverns, Stone

Co., Arkansas. Types deposited in FMNH (holotype) and LSAM (paratypes).

*Speleochochus croceus* Park, 1960: 78. Type locality: Lott Cave, near Brownsboro, Madison Co., Alabama. Types deposited in FMNH (one male paratype examined).

*Speleochochus eurous* (Park, 1960: 79). **New combination** (*Subterrochus*). Type locality: Jess Elliot Cave, Jackson Co., Alabama. Type deposited in the University of Alabama Natural History Museum, Tuscaloosa, Alabama (UANH) (not examined, decision based on original description).

*Speleochochus ferus* Park, 1951: 49. Transferred to *Subterrochus*: Park (1960: 91). **Combination reinstated.** Type locality: Aladdin Cave, Sharps Cove, Madison Co., Alabama. Types deposited in UANH (holotype) and FMNH (paratypes) (one male and one female paratype examined).

*Speleochochus macosar* Carlton. **New species.** Type locality: Whippoorwill Cave, Madison Co., Arkansas. Types deposited in FMNH (holotype) and LSAM (paratypes).

*Speleochochus steevesi* (Park, 1960: 80). **New combination** (*Subterrochus*). Type locality: Guffey Cave Cave, Marshall Co., Alabama. Types deposited in FMNH (two male paratypes examined).

*Speleochochus stygicus* Park, 1951: 47. Type locality: Monte Sano, Madison Co., Alabama. Types deposited in UANH (holotype) and FMNH (paratypes) (two male paratypes examined).

*Speleochochus synstygicus* Park, 1956: 64. Type locality: Barclay Cave, Madison Co., Alabama. Types deposited in FMNH (one male paratype examined).

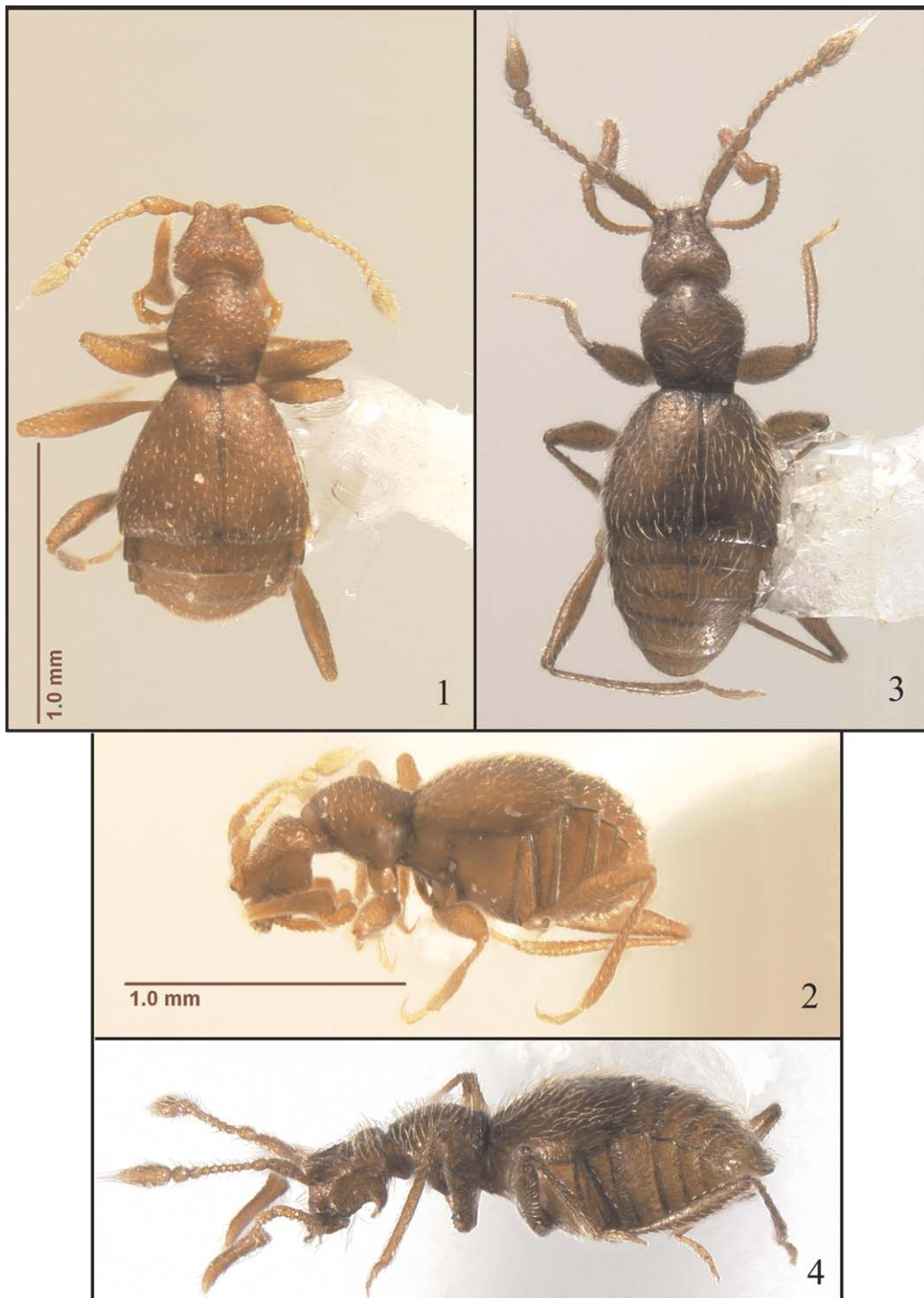
#### *Speleochochus macosar* Carlton, new species

(Figs. 1, 2, 5, 7–8, 9a, 10–13, 16)

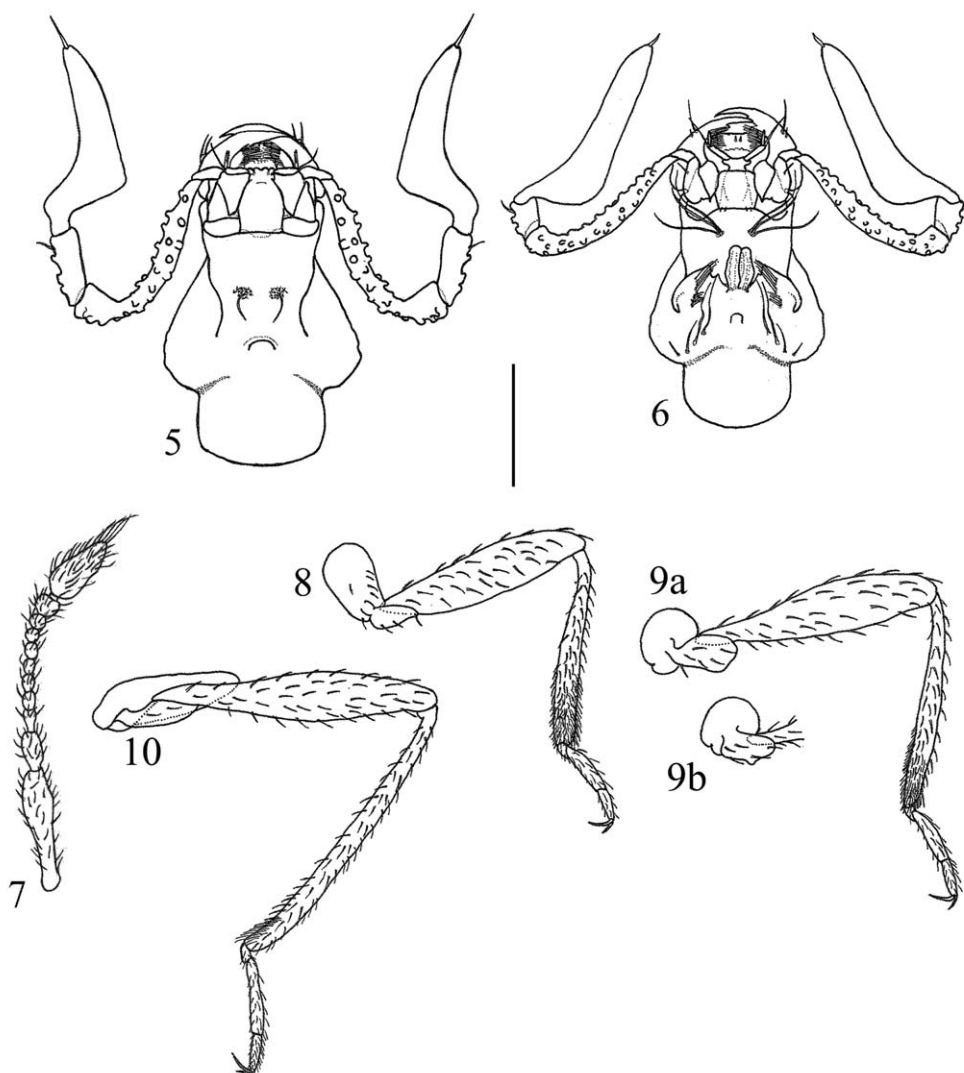
**Type Material.** **Holotype** (male). USA: AR: Madison Co., Whippoorwill Cave, 24 Aug. 2008, M. Slay (FMNH). **Paratypes** ( $n = 5$ ). Same locality as holotype, 11 Jul. 2009, 1 ♂, 2 ♀♀, M. Slay, C. Brickey; 29 Aug. 2009, M. Slay, C. M. Slay, 1 ♂; 23 Dec. 2009, M. Slay, 1 ♂ (all LSAM).

**Etymology.** The specific epithet is a phonetic combination of letters honoring the Madison County Search and Rescue Team (*i.e.*, **MA**dison **CO**ounty **S**earch **A**nd **R**escue), who conduct training exercises in Whippoorwill Cave, where all specimens were collected.

**Description of Male. Measurements:** Head 0.38 mm long (clypeal margin to posterior of occiput), 0.32 mm wide; pronotum 0.38 mm long, 0.33 mm wide; elytra 0.54 mm long, 0.69 mm wide (maximum width slightly anterior to posterior



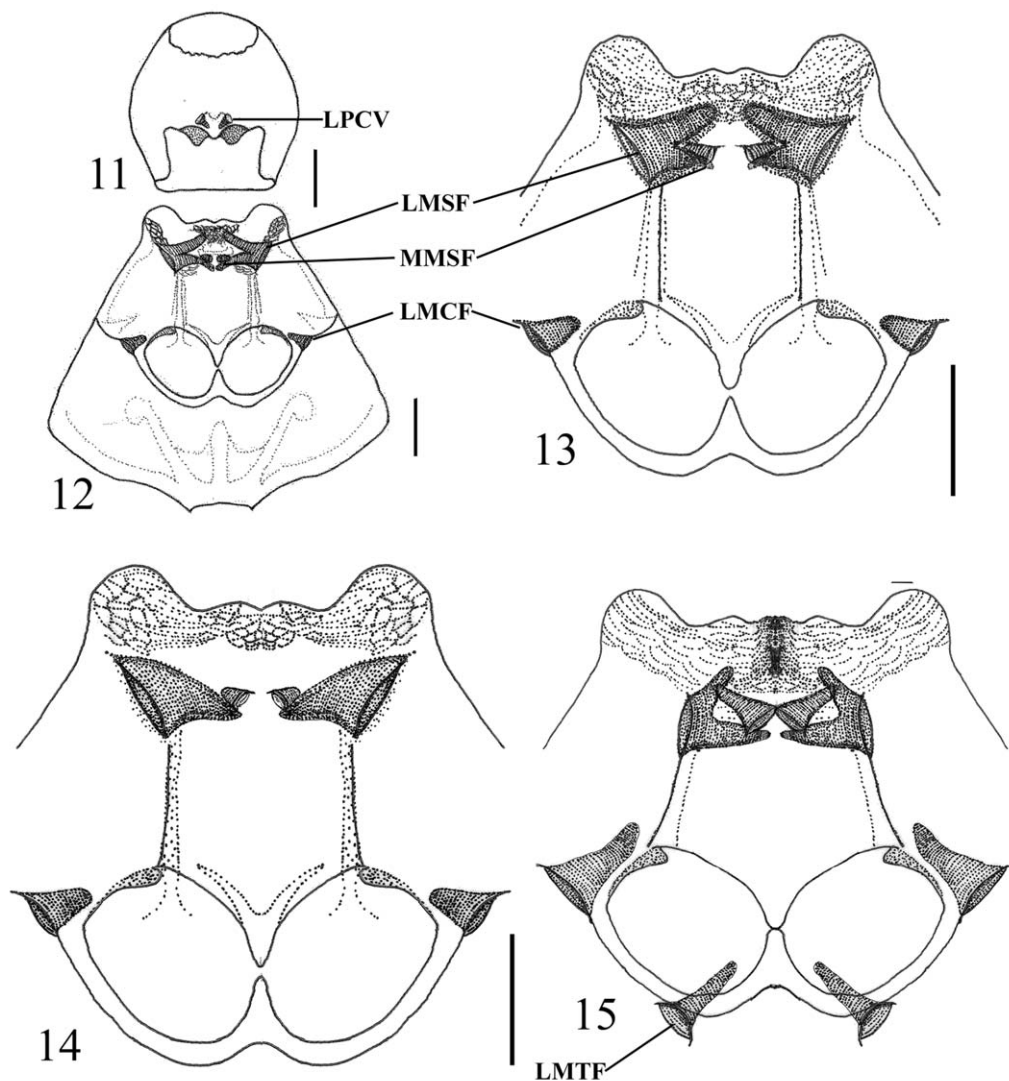
**Figs. 1–4.** *Speleochus* spp. 1) *S. macosar*, dorsal view; 2) *S. macosar*, lateral view; 3) *S. blanchardensis*, dorsal view; 4) *S. blanchardensis*, lateral view.



**Figs. 5–10.** *Speleochus* spp. **5)** *S. macosar*, head, ventral view; **6)** *S. blanchardensis*, head, dorsal view; **7)** *S. macosar*, antenna, dorsal view; **8)** *S. macosar*, prothoracic leg, anterior view; **9a)** *S. macosar*, mesothoracic leg, anterior view; **9b)** *S. blanchardensis*, mesothoracic coxa and trochanter, anterior view; **10)** *S. macosar*, metathoracic leg, anterior view. Scale bar equals 0.2 mm for all figures.

margin); median lengths of apparent abdominal tergites 1–6, respectively, 0.10, 0.15, 0.12, 0.12, 0.12, 0.09 mm. Antennomeres 1–11, respectively, 0.19, 0.07, 0.05, 0.03, 0.02, 0.02, 0.02, 0.02, 0.03, 0.05, 0.17 mm. Maxillary palpomeres 1–4, respectively, 0.04, 0.28, 0.10, 0.29 mm. Aedeagus 0.29 mm long, 0.16 mm wide. Maximum length (combined lengths of head, pronotum, elytra, and tergites 2–6) 1.90 mm. **Color:** Body and appendages light brown, evenly covered by short, sparse, semierect pubescence, length of individual setae about equal to dis-

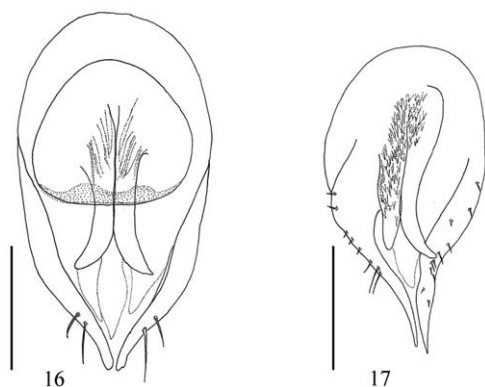
tance between them. **Head:** Tempora moderate, evenly rounded to cervical constriction. Vertexal foveae small, nude, located posterior to shallow, weakly trapezoidal frontal depression, the lateral margins of which are convergent to interantennal frontal boundary. Frons declivous to labrum at approximately 45° angle. Antennae short and unmodified except for elongate antennomere 1. Labrum expanded distally, apical margin straight, lateral angles rounded. Mandibles sickle-shaped with 3 incisor teeth. Maxillae and labium typical for subfamily,



**Figs. 11–15.** Thoracic ventrites, ventral view. **11)** *Speleochus macosar*, prothorax; **12)** *S. macosar*, meso-metathorax; **13)** *S. macosar*, meso-metathoracic foveae; **14)** *S. blanchardensis*, meso-metathoracic foveae; **15)** *Tychobythinus carolinae* (Casey) (Montgomery Co., Arkansas), meso-metathoracic foveae. Scale bars equal 0.1 mm. Foveal terminology follows Chandler (2001): LMCF = lateral mesocoxal fovea; LMSF = lateral mesosternal fovea; LMTF = lateral metasternal fovea; LPCF = lateral procoxal fovea; MMSF = median mesosternal fovea.

including minute, 2-segmented labial palpi. Maxillary palpi elongate, slightly exceeding length of antennae when extended, palpomere 1 recurved and obliquely joined to palpomere 2, palpomere 2 narrow in basal four-fifths, then strongly procurved and capitate distally, covered with prominent, rounded tubercles, palpomere 3 straight, with a smaller number of tubercles on lateral face, palpomere 4 securiform, narrow at base, curved anteriorly, then laterally and expanded to the shape

of an elongate shoe, lacking tubercles but covered with dense, erect pubescence. Eyes completely absent, ocular area prominent laterally, then abruptly constricted ventrally to projecting anterior gular area. Mandibular ocular carinae nearly obliterated, scarcely indicated just ventral to antennal insertions. Venter of head strongly projecting anterior to gular foveae, bearing paired patches of fine tubercles, each of which bears a fine, elongate seta projecting from its middle. **Thorax:** Prothorax



**Figs. 16–17.** Aedeagi, dorsal view. **16)** *Speleocheilus macosar*; **17)** *S. blanchardensis*. Scale bars equal 0.1 mm.

strongly convex, rounded, unmodified, lacking mediobasal fovea and subbasal sulcus, bearing small basolateral foveae. Prosternum bearing closely approximate lateral procoxal foveae, other foveae absent. Median mesosternal foveae present, divergent dorsally above lateral mesosternal foveae. Lateral mesosternal foveae present, prominent and paired, with anterior and posterior branches. Lateral metasternal foveae absent. Lateral mesocoxal foveae present. Metaventricle afoveate. Elytra narrow basally, then strongly wider posteriorly, simple, without traces of foveae or striae. Mesotrochanters broadly produced and carinate ventrally. **Abdomen:** Abdominal segments simple, unmodified, and lacking all traces of foveae. **Genitalia:** Aedeagus symmetrical, parameres evenly, narrowly convergent, each bearing two elongate setae laterally, internal sac bearing pair of elongate, symmetrical accessory sclerites.

**Description of Female.** Similar to male except gular region of head less produced ventrally, lacking paired patches of fine tubercles and specialized elongate setae, and with mesotrochanter normally convex in outline.

**Comments.** The gular region of males of *S. macosar* is mildly modified and lacks a transverse shelf. Males of several species have unmodified gulae possessing, at most, paired subapical tufts of specialized setae. Others possess more profoundly modified gulae that include transverse gular shelves, such as that of *S. blanchardensis*. The gulae of *S. macosar* males lack a transverse shelf, but do possess paired patches of small tubercles with a large seta emerging from the middle of the patch. The expanded sigmoid fourth maxillary palpomere is unique among North American species. In *S. blanchardensis*, the fourth palpomere presents a weak version of this shape, but in other species it is elongate cylindrical or weakly securiform, curved, and expanded. The aedeagus of *S. macosar* is similar to that illustrated for *S. ferus* by Park

(1960: 103) and is similar to that of several other species, suggesting that aedeagal morphology is less useful for diagnosing species within this genus than it is in most other genera of pselaphines.

Whippoorwill Cave is a limestone cave on Arkansas Game and Fish Commission Wildlife Management Area property. It is approximately 2 km in length and has several levels that connect the various rooms. Most areas of the cave are high enough for a person to stand upright (Krist and Prigmore 2004). This and other caves in Madison County are popular with recreational spelunkers. Access to Whippoorwill Cave is currently restricted because of white nose syndrome in the native bat population.

The following collecting notes were provided by Michael Slay (MES) of The Nature Conservancy:

“The first specimen was collected by MES while participating in a practice cave rescue segment of a basic cave rescue training course offered by the Madison County Search and Rescue team. The beetle was collected from the underside of a small piece of damp wood lying on the clay floor near the wall of a cave passage approximately 200 m from the entrance. Following the initial collection, MES visited the cave several times over the next year in attempt to acquire more specimens. During these trips, numerous in-cave habitats and passages (Whippoorwill Cave has approximately 1,950 m of mapped passages) were searched for beetles using teams of 2–3 people. Search effort at each location ranged from 15–30 minutes. Total time spent searching per trip ranged from 5–6 hours. On 11 July 2009, four specimens were collected. Three of the beetles were collected in the same passage as the initial beetle. These beetles were individually found under small stones that were lightly attached to the clay floor. Some organics, small pieces of woody debris and bat guano, were also scattered among the rocks. The fourth specimen was collected deeper in the cave, 250 m from the entrance, under a large flat rock resting on a clay floor. On 29 August 2009, a single individual was collected 98 m from the entrance under a rock on a breakdown covered floor. On 23 December 2009, another beetle was collected in the same location as the initial specimen from under a rock that was slightly embedded into the clay floor and proximal to an old bat carcass covered in fungi. Other cave-limited taxa observed in association with these beetles were *Apocthonius* (Pseudoscorpiones: Chthoniidae) and *Pygmarrhopalites* (Collembola: Arrhopalitidae).”



***Speleochus blanchardensis* Carlton, new species**  
(Figs. 3, 4, 6, 9b, 14, 17)

**Type Material. Holotype** (male). USA: AR: Stone Co., Blanchard Springs Caverns, 35.9636°, -92.1791°, under rock in the maze section of wild cave tour, M. Slay, C. M Slay, 7 Nov. 2009 (FMNH). **Paratypes** ( $n = 3$ ). Same locality as holotype, area around station 13, 1 Apr. 2010, M. Slay, D. Carpenter, 1 ♀; near station 13, 17 Mar. 2010; M. Slay, K. Furr, 2 ♂♂ (all LSAM).

**Etymology.** The specific epithet refers to Blanchard Springs Caverns in Stone County, Arkansas, where all specimens of this species were collected.

**Description of Male. Measurements:** Head 0.40 mm long (clypeal margin to posterior of occiput), 0.31 mm wide; pronotum 0.38 mm long, 0.36 mm wide; elytra 0.52 mm long, 0.64 mm wide (maximum width slightly anterior to posterior margin); median lengths of apparent abdominal tergites 1–6, respectively 0.11, 0.14, 0.14, 0.10, 0.14, 0.11 mm. Antennomeres 1–11, respectively, 0.24, 0.07, 0.05, 0.04, 0.02, 0.02, 0.02, 0.02, 0.05, 0.06, 0.19 mm. Maxillary palpomeres 1–4, respectively, 0.03, 0.27, 0.06, 0.32 mm. Aedeagus 0.26 mm long, 0.13 mm wide. Maximum length (combined lengths of head, pronotum, elytra, and tergites 2–6) 1.93 mm. **Color:** Body and appendages medium brown, evenly covered by long, sparse, semierect pubescence, length of individual setae about twice the distance between them. **Head:** Tempora moderate, evenly rounded to cervical constriction. Vertexal foveae small, nude, located posterior to shallow, weakly trapezoidal frontal depression, the lateral margins of which are convergent to interantennal frontal boundary. Frons declivous to labrum at approximately 45° angle. Antennae short and unmodified except for elongate antennomere 1. Labrum expanded distally, apical margin straight, lateral angles rounded. Mandibles sickle-shaped with 3 incisor teeth. Maxillae and labium typical for subfamily, including minute, 2-segmented labial palpi. Maxillary palpi elongate, slightly exceeding length of antennae when extended, palpomere 1 recurved and obliquely joined to palpomere 2, palpomere 2 narrow in basal fourths, then weakly procurved and clavate distally, covered with prominent, rounded tubercles, palpomere 3 straight, with a smaller number of tubercles on lateral face, palpomere 4 elongate securiform, narrow at base, then weakly curved anteriorly, expanded along mesial margin in basal one-third, weakly, evenly concave along lateral margin, lacking tubercles but covered with dense, erect pubescence. Ocular area prominent laterally, then abruptly constricted ventrally to projecting anterior gular area. Mandibular ocular carinae strong,

extending from clypeus to tempora. Venter of head strongly projecting anterior to gular foveae, bearing a prominent, anterior, ventrally projecting shelf, the anterior margin of which is emarginate and bears a median pair of elongate hyaline processes. Lateral corners of shelf angulate, each bearing a clump of elongate setae. Gular region posterior to base of shelf bearing 3 pairs of elongate setae in a close set series. Excavation formed by shelf bearing paired clusters of 3 elongate setae each near anterior margin. Area of head dorsal to projecting shelf sharply carinate laterally. **Thorax:** Prothorax strongly convex, rounded, unmodified, lacking mediobasal fovea and subbasal sulcus, bearing small, basolateral foveae. Prosternum bearing closely approximate lateral procoxal foveae, other foveae absent. Median mesosternal foveae present, divergent dorsally above lateral mesosternal foveae. Lateral mesosternal foveae present, prominent, unpaired, with posterior branches only. Lateral metasternal foveae absent. Lateral mesocoxal foveae present. Meta-ventrite afoveate. Elytra narrow basally, then strongly widened posteriorly, simple, without traces of foveae or striae. Mesotrochanters weakly convex ventrally with short carinate area near midpoint. **Abdomen:** Abdominal segments simple, unmodified, and lacking all traces of foveae. **Genitalia:** Aedeagus slightly asymmetrical, right paramere larger and broader than left, each bearing series of setae laterally, internal sac bearing pair of elongate, accessory sclerites, right larger and more elongate. Internal sac bearing field of small spinules surrounding bases of accessory sclerites.

**Description of Female.** Similar to male except gular region of head simply tumid and lacking sexual modifications, and mesotrochanter evenly convex in outline, not produced at midpoint.

**Comments.** A gular excavation covered by an anterior projecting shelf occurs in males of two other North American species of *Speleochus*. The structure in *S. blanchardensis* is most similar to that of *S. ferus* among species examined or illustrated. Both possess a transverse, anterior, projecting shelf on the gular surface of the head that bears a pair of thick median processes. The shelf is slightly more pronounced in *S. blanchardensis* than in *S. ferus*, and the median processes are broader and slightly widened at the base (slender and parallel in *S. ferus*). The gular shelf of *S. steevesi* is more limited than in either *S. blanchardensis* or *S. ferus*, and the median processes are short and rounded. In *S. macosar*, which also occurs in north Arkansas caves, the gular shelf is entirely absent. The terminal segment of the maxillary palpus of *S. blanchardensis* is strongly convex basally along its posterior aspect, and weakly concave along the anterior aspect. It is not strongly curved anteriorly at the base as it is in *S. macosar*. The parameres of

*S. blanchardensis* are more narrow and acute than those of *S. macosar* and more elongate and less symmetrical than those of *S. ferus*.

The type locality, Blanchard Springs Caverns, is a large, multilayer cave system managed by the U.S. Forest Service (Sylamore Ranger District, Ozark National Forest). Portions of the cave have been included in guided tours for the public since 1973, when artificial access was completed. Access was extremely difficult prior to this. The vertical section occupied by the cave system spans numerous limestone and dolomite formations ranging from late Ordovician to early Carboniferous (Anonymous 2011).

The following collecting notes were provided by Michael Slay of the The Nature Conservancy:

“The first specimen was collected by Christy Slay during a preliminary trip to establish monitoring stations for a multi-season study of the invertebrate community found in the cave. On 7 November 2009, a single individual was collected from under a lightly embedded rock in “The Maze” section of cave along the Wild Cave Tour route. During the subsequent invertebrate community study, considerable effort was made to collect additional beetle specimens in “The Maze”, at each of 24–27 invertebrate monitoring stations distributed along 3 commercial tour routes (Wild Cave Tour, Discovery Trail, and Dripstone Trail), and at random locations between monitoring stations. Beetle searches occurred over a period of 16 trips from winter 2009 to summer 2010. Trips consisted of 2–3 people, and total time in cave was 5–6 hours per trip. The species was only observed in “The Maze” section of the cave, and individuals were found separately under rocks slightly embedded into the clay floor. Soil temperature, air temperature, and relative humidity were recorded at the location where beetles were collected during 6 monitoring trips. Soil temperature ranged from 14.0–14.3°C, air temperature ranged from 14.2–14.6°C, and relative humidity ranged from 92.0–97.6%. Other cave-limited taxa observed in association with these beetles were *Causeyella causeyae* (Diplopoda: Trichopetalidae), *Pseudosinella* (Collembola: Entomobryidae), and *Litocampa* (Diplura: Campodeidae).”

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#### REFERENCES CITED

- Anonymous.** 2011. Welcome to the world of Blanchard Springs Caverns. Available from: [www.fs.usda.gov/wps/portal/fsinternet!ut/p/c4/04\\_SB8K8xLLM9MSSzPy8xBz9CP0os3gjAwhwtDDw9\\_A18zPyhQoY6BdkOyoCAGixyPg!/?ss=110810&navtype=BROWSEBYSUBJECT&cid=STELPRDB5303060&navid=1500000000000000&position=Feature\\*&ttype=detail&pname=Ozark-St. Francis National Forests-Learning Center](http://www.fs.usda.gov/wps/portal/fsinternet!ut/p/c4/04_SB8K8xLLM9MSSzPy8xBz9CP0os3gjAwhwtDDw9_A18zPyhQoY6BdkOyoCAGixyPg!/?ss=110810&navtype=BROWSEBYSUBJECT&cid=STELPRDB5303060&navid=1500000000000000&position=Feature*&ttype=detail&pname=Ozark-St. Francis National Forests-Learning Center) (Accessed 3 May 2012).
- Barr, T. C., Jr.** 1960. The cavernicolous beetles of the subgenus *Rhadine*, genus *Agonum* (Coleoptera: Carabidae). *American Midland Naturalist* 64: 45–65.
- Barr, T. C., Jr.** 1968. Cave ecology and the evolution of troglobites. *Evolutionary Biology* 2: 35–102.
- Chandler, D. S.** 1997. A catalog of the Coleoptera of America North of Mexico. Family: Pselaphidae. USDA, Agriculture Handbook Number 529–31.
- Chandler, D. S.** 2001. Biology, morphology, and systematics of the ant-like litter beetle genera of Australia (Coleoptera: Staphylinidae: Pselaphinae). *Memoirs on Entomology, International*, volume 15, Associated Publishers, Gainesville, FL.
- Chandler, D. S., and J. R. Reddell.** 2001. A review of the ant-like litter beetles found in Texas caves (Coleoptera: Staphylinidae: Pselaphinae). *Texas Memorial Museum, Speleological Monographs* 5: 115–128.
- Elliot, W. R.** 2007. Zoogeography and biodiversity of Missouri caves and karst. *Journal of Cave and Karst Studies* 69: 135–162.
- Klimaszewski, J., and S. B. Peck.** 1986. A review of the cavernicolous Staphylinidae (Coleoptera) of eastern North America: Part I. Aleocharinae. *Questiones Entomologicae* 22: 51–113.
- Krist, M., and J. Prigmore.** 2004. Whippoorwill Cave. *The Guano* 18(1–2): 6–9. Available from: [www.kcgrotto.org/guano/guano200402.pdf](http://www.kcgrotto.org/guano/guano200402.pdf) (Accessed 3 May 2012).
- Liebherr, J. K., and G. A. Samuelson.** 1992. The first endemic troglobitic carabid beetles in Hawaiian lava tubes (Coleoptera, Carabidae). *Pan-Pacific Entomologist* 68: 157–168.
- Löbl, I., and C. Besuchet.** 2004. Subfamily Pselaphinae Latreille, 1802 [pp. 272–329]. *In: Catalogue of Palaearctic Coleoptera*, Vol. 2. (I. Löbl and A. Smetana, editors) Apollo Books, Stenstrup, Denmark.

- Park, O. 1951.** Cavernicolous pselaphid beetles of Alabama and Tennessee, with observations on the taxonomy of the family. Geological Survey of Alabama, Museum Paper 31: 1–107.
- Park, O. 1956.** New or little known species of pselaphid beetles from southeastern United States. Journal of the Tennessee Academy of Science 31: 54–100.
- Park, O. 1960.** Cavernicolous pselaphid beetles of the United States. American Midland Naturalist 64: 66–104.
- Peck, S. 1973.** A systematic revision and the evolutionary biology of the *Ptomaphagus* (*Adelops*) beetles of North America (Coleoptera: Leiodidae: Catopinae), with emphasis on cave-inhabiting species. Bulletin of the Museum of Comparative Zoology 145: 29–162.
- Peck, S. 1974.** Biology of the Idaho lava tube beetle, *Glacicavicola*. The NSS Bulletin 36: 1–3.
- Peck, S. 1982a.** Occurrence of *Ptomaphagus cavernicola* in forests in Florida and Georgia (Coleoptera: Leiodidae: Cholevinae). Florida Entomologist 65: 378–379.
- Peck, S. 1982b.** New records of poorly known *Ptomaphagus* beetles in the southeastern United States (Coleoptera: Leiodidae: Cholevinae). The Coleopterists Bulletin 36: 109–111.
- Peck, S. 1995.** The cave fauna of Alabama. Part II: the insects. NSS Bulletin 57: 1–19.
- Peck, S. 1998.** A summary of diversity and distribution of the obligate cave-inhabiting faunas of the United States and Canada. Journal of Cave and Karst Studies 60(1): 18–26.
- Peck, S., and J. J. Lewis. 1977.** Zoogeography and evolution of the subterranean invertebrate faunas of Illinois and southeastern Missouri. NSS Bulletin 40: 39–63.
- Peck, S., and P. E. Skelley. 2001.** Small carrion beetles (Coleoptera: Leiodidae: Cholevinae) from burrows of *Geomys* and *Thomomys* pocket gophers (Rodentia: Geomyidae) in the United States. Insecta Mundi 15: 139–149.
- Peck, S., and M. K. Thayer. 2003.** The cave-inhabiting rove beetles of the United States (Coleoptera: Staphylinidae; excluding Aleocharinae and Pselaphinae): diversity and distributions. Journal of Cave and Karst Studies 65: 3–8.
- Reddell, J. R. 1968.** A checklist of the cave fauna of Texas. II. Insecta. The Texas Journal of Science 18: 25–56.

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