SPANGLEROGYRUS ALBIVENTRIS, A PRIMITIVE NEW GENUS AND SPECIES OF GYRINIDAE (COLEOPTERA) FROM ALABAMA

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ABSTRACT

Spanglerogyrus albiventris Folkerts, new genus, new species, in the new subfamily Spanglerogyrinae, occurs in streams in southwestern Alabama. This genus is characterized by having the dorsal and ventral compound eyes in contact on the margin of the head and having unbroadened meso- and metatarsal segments which are as long as or longer than broad. It is the smallest (approx. 2.9 mm) and most primitive of the gyrinids. To reflect more accurately the diversity in the family the three traditional subfamilies are reduced to tribes.

In 1975, while collecting in a stream in Butler Co., Alabama, I obtained one specimen of a very unusual, exceptionally small gyrinid. Intensive work yielded no additional individuals until May 1978, when several more were obtained at a similar site in Monroe Co., Alabama. The specimens represent a new genus and species which may be of significance in understanding the evolution of the Gyrinidae.

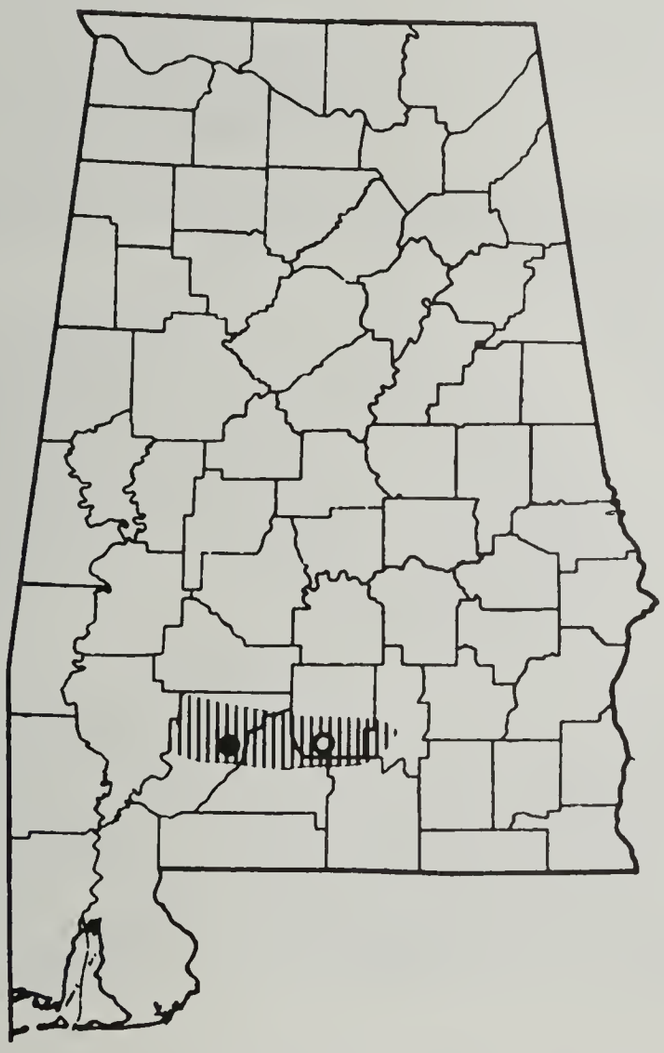

Fig. 1. Presumed range of *Spanglerogyrus albiventris* in southwestern Alabama. Solid circle indicates the type locality in Monroe Co. Hollow circle indicates the other known locality in Butler Co.

Spanglerogyrus Folkerts, **new genus**

Form. Elongate-oval, convex, slightly flattened dorsally.

Head. Slightly swollen between eyes. Front curving downward to near vertical. Epistomal sulcus feebly impressed. Mouthparts tending more toward a hypognathus position than in other gyrinids. Dorsal and ventral compound eyes in contact on margin of head; eyes separated only by a narrow ridge which bears no ommatidia. Galea present. Antennae short, cylindrical, rounded and blunt terminally; antennal flagellum 9-segmented (Fig. 2A, B).

Dorsum. Pronotum 2.2 times as long medially as behind eyes, lateral vertical portions pubescent. Scutellum present, triangular. Elytra without conspicuous striae or rows of punctures, truncate posteriorly; apices produced and acute in females, angulate in males; posterolateral portions of elytra with covering of coarse pubescence.

Venter. Prosternal process margined laterally, channeled medially; apex pointed, curving dorsally between procoxae. Profemora subcylindrical, not flattened; apices slightly expanded, but not produced. Mesosternum with low, sharp-edged anterior medial carina. Meso- and metafemora flattened, ovate. Meso- and metatibiae flattened, about 4 times as long as broad. Meso- and metatarsi flattened, not broadened; tarsal segments as long as or longer than broad (Figs. 3, 4A, B, C).

Genitalia. Male genitalia with lateral lobes flattened, of constant width throughout their length, not expanded apically, bearing brush of setae on tip, no setae laterally; median lobe cylindrical, not flattened, slightly wider than lateral lobes, faintly constricted near tip, distal third bearing short, stiff, retrorse setae (Fig. 4D). Female genitalia with coxite and valvifer of approximately equal lengths; coxite subcylindrical, slightly flattened, approximately 3 times as long as wide, with spinulose, medially-directed field, bearing tuft of posterior setae which protrude from the segment; valvifer approximately 6 times as long as wide (Fig. 4E).

Etymology. The masculine generic name honors Paul J. Spangler for his contributions to the study of aquatic Coleoptera and for his many kindnesses to me and my students. The suffix *gyrus* refers to the gyrating swimming motion of members of this family and is a traditional component of the names of many of the genera.

Type-Species. Spanglerogyrus albiventris Folkerts, new species, which is described below.

Spanglerogyrus albiventris Folkerts, **new species**

Form. Body about twice as long as wide, widest in basal third of elytra. Mean length 2.89 mm, mean width 1.51 mm.

Coloration. Elytra (except for narrow lateral margin), median portion of pronotum, dorsum of head, and antennal flagellum black, inconspicuously bronzed. Dorsal and ventral compound eyes black. Lateral portions of pronotum light yellow. A narrow light yellow border along lateral elytral margins, often narrowed and obscured posteriorly. Venter of head (except genae), mouthparts (except mandibles), venter of antennal pedicel, ventral thoracic surfaces, epipleura, and appendages yellowish white to straw colored. Ventral portions of abdominal segments yellowish white in female, brown in male; terminal segment semi-transparent.

Head. Length when viewed from above approximately 0.3 mm; head length about half medial length of pronotum; width at eyes approximately 0.8 mm. Dorsal compound eyes laterally directed. Dorsal head surface with few scattered setae which tend to be concentrated in the region of the obscure epistomal sulcus. Antennal flagellum with scattered setae, terminal segment with irregular cluster of setae. Labrum protruding only slightly from beneath clypeus, its anterior margin weakly emarginate. Lateral lobes of labium with straight medial margin, angulate anteriorly; labial palpi 3-segmented, last segment pointed, cylindrical, not expanded, equalling combined lengths of other two segments.

Dorsum. Pronotum slightly narrower than elytra at base, longest medially,

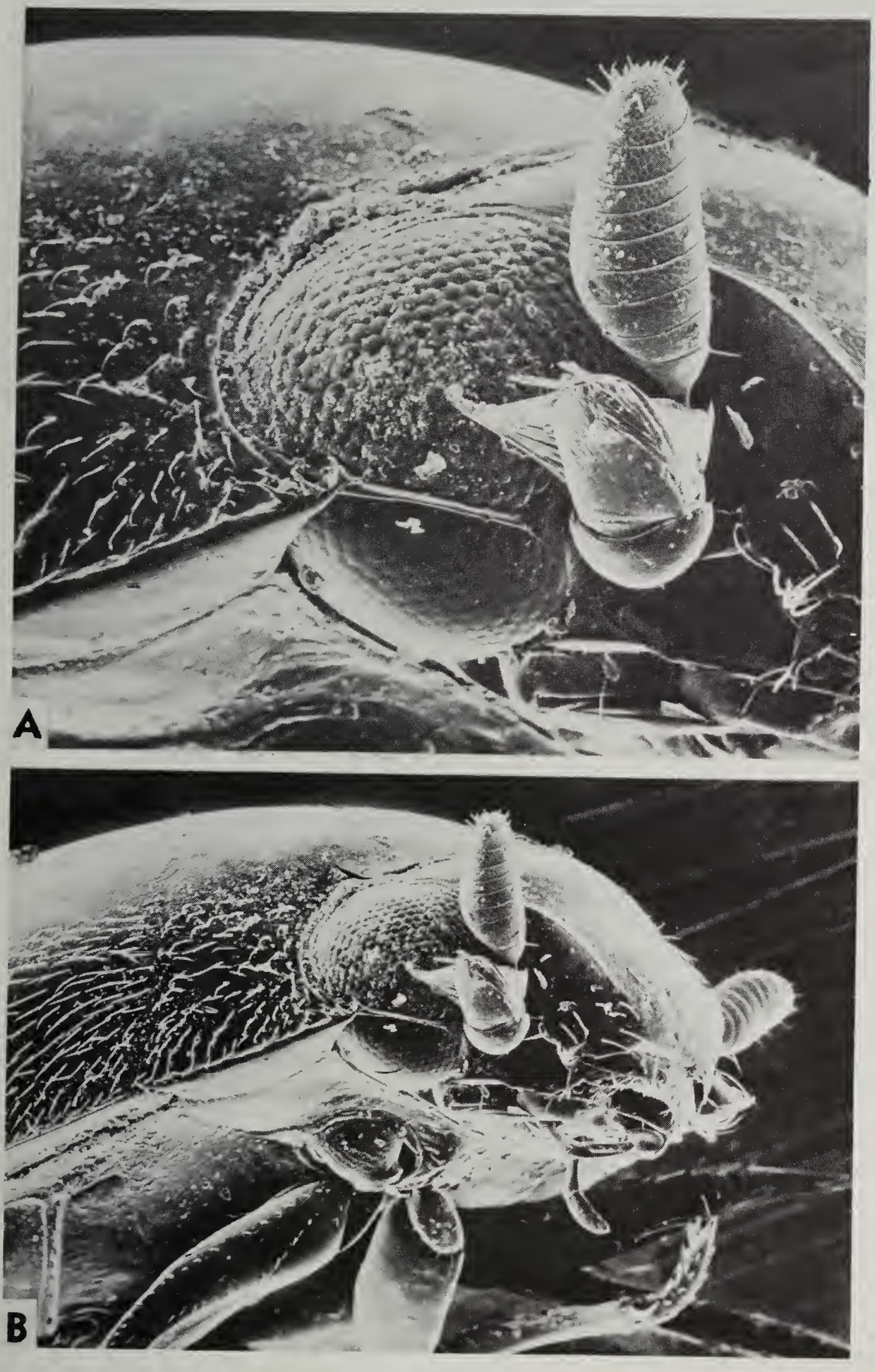

Fig. 2. Scanning electron micrographs of the left anterolateral portions of *Spanglerogyrus albiventris*. A.x185. B.x85.

Fig. 3. Scanning electron micrograph of the distal portion of the right metathoracic leg of *Spanglerogyrus albiventris* showing the proportions of the tarsal segments. x150.

narrowest behind eyes, expanded anteriorly below eyes, with sharp, narrow lateral margin; surface microreticulate; marginal thirds bearing pubescence of coarse setae. Scutellum triangular, variable in size, conspicuously larger in males. Elytra widest in basal third; lateral margin narrow and sharp; sutural stria of scattered punctures present, few scattered punctures elsewhere; apices truncate, sutural angle produced and acute in female; surfaces microreticulate; pubescent border restricted to lateral fourth anteriorly, widening posteriorly, reaching suture and covering entire elytra in posterior fifth; an exceptionally long seta curving posteromedially from lateral apical angle.

Venter. Procoxae subglobose. Protarsi cylindrical in female, expanded and flattened in male. Ends of profemora extending slightly beyond edge of pronotum when positioned at right angles to body axis. Margins of mesotrochanters essentially continuous with margins of mesofemora. Mesofemora reaching edges of elytra when positioned at right angles to body axis. Metacoxal processes conical. Margins of metatrochanters essentially continuous with margins of metafemora. Metafemora extending beyond margins of elytra when positioned at right angles to the body axis. Tips of metatibiae extending well beyond posterior margins of elytra when metathoracic legs extended posteriorly. Six abdominal sternites visible ventrally, the anterior two fused; terminal abdominal segment broadly triangular. Conspicuous punctation or sculpturing absent from all ventral surfaces.

Genitalia. As described for the genus.

Etymology. The epithet *albiventris* is derived from the Latin roots *alb-* meaning white, and *ventr-*, the lower surface, referring to the whitish appearance of the venter in gross aspect.

Holotype. Male, ALABAMA, Monroe Co., Brushy Creek, 0.5 km E. Peterman on Monroe Co. Rd. 31. 20-V-1978. G. W. Folkerts. USNM type no. 75847.

Allotype. Same data as holotype. In USNM.

Paratypes. (9 specimens) ALABAMA, Butler Co. Persimmon Creek at U. S. Hwy. 31, 4.4 km NW McKenzie. 12-IV-1975. G. W. Folkerts [APIC] (1). Same data as holotype [APIC] (2). Monroe Co., Brushy Creek, 0.5 km E. Peterman on Monroe Co. Rd. 31. 27-V-1978. Folkerts and Eiland. [USNM] (2), [INHS] (2), [IUIC] (2), [F. W. Eiland, II collection] (1).

Habits and Habitat. All known specimens of *Spanglerogyrus* were obtained along banks of well-shaded, moderate-sized (7-10 m wide) streams at

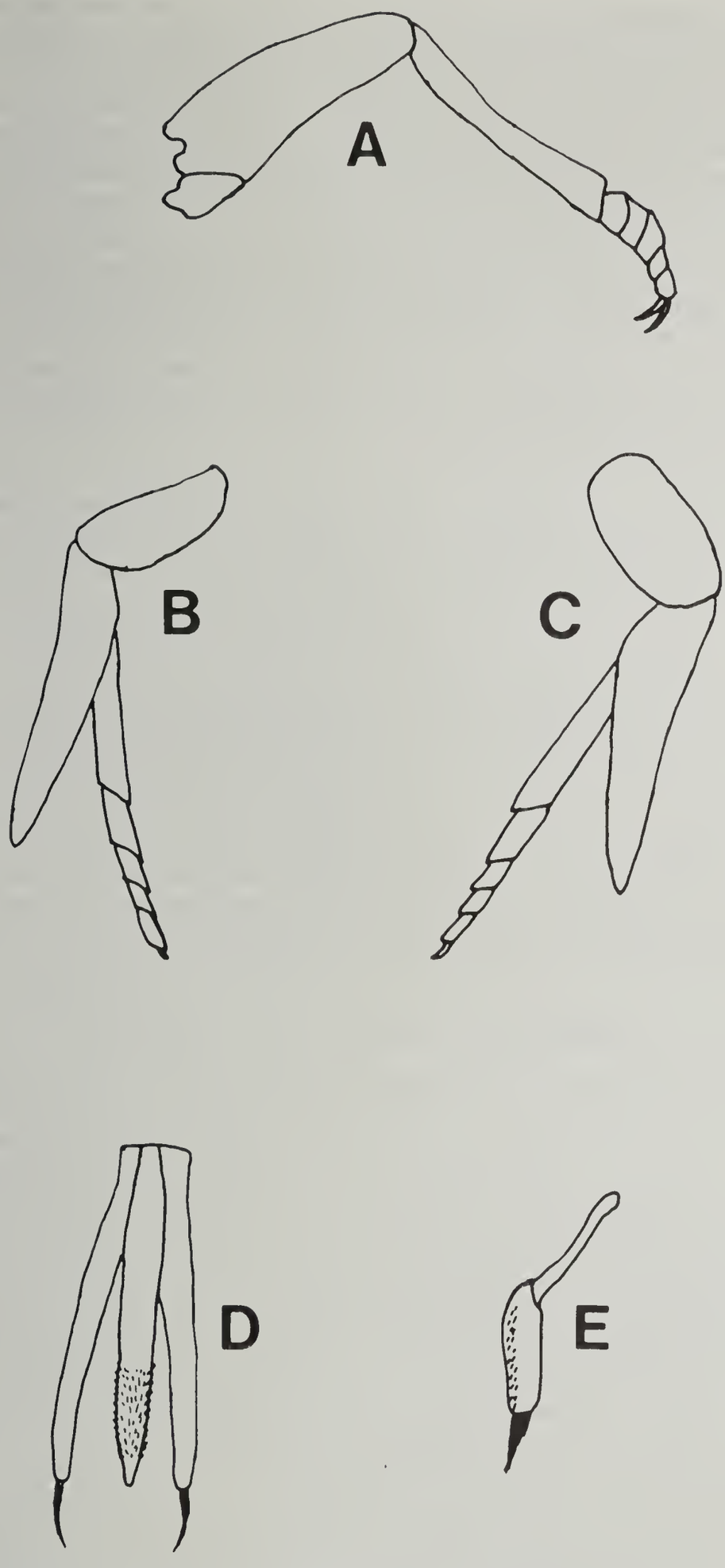

Fig. 4. Outline sketches of morphological features of *Spanglerogyrus albiventris*. A. Left prothoracic leg of male, x65. B. Right metathoracic leg, x65. C. Left mesothoracic leg, x65. D. Male genitalia, x120. E. Left portion of female genitalia, x80.

sites where the bank forms a shelf overhanging the stream and small rootlets penetrate through and hang down into the water. The small size of the individuals coupled with the low light intensity in such sites usually precludes visual detection of specimens. It is likely that the beetles climb out of the water and rest on rootlets as do members of other gyrinid genera (Folkerts and Donavan, 1973). Both *Gyretes sinuatus* and *Gyrinus marginellus* were obtained at the same sites, apparently in the same microhabitat.

Spanglerogyrus beetles are very active and move rapidly. They hop with a facility reminiscent of alticine chrysomelids. Prior to hopping they elevate the front portion of the body by extending the prothoracic legs. In my experience, such a movement is not characteristic of other North American gyrinids. Although specimens of other genera, notably *Gyretes,* make short rapid hops with great dexterity, the hops are not preceded by conspicuous elevation of the front of the body.

The wings of both sexes seem to be well-developed. One specimen attempted to fly after hopping onto the edge of the dipnet used to capture it.

Specimens of *Spanglerogyrus* are apparently not abundant at the sites sampled. The specimens available were obtained with an effort of two man hours of intensive collecting per specimen. Perhaps adults are more abundant later in the season. A number of the specimens obtained in May were teneral. No larvae have been found.

Range and Zoogeography. The two sites from which *Spanglerogyrus* specimens have been taken lie in the western portion of the Red Hills region of the Coastal Plain Province in south-central Alabama (Fig. 1). The western Red Hills is probably the most deeply dissected area in the Coastal Plain of North America. Topographically, and in many respects floristically, it resembles areas found elsewhere only above the Fall Line. The area harbors a number of endemics, relicts, and disjunct populations. The most notable endemic is the monotypic salamander genus *Phaeognathus.* This species lives in burrows only in the Tallahatta and Hatchetigbee formations (Eocene) and is present at sites only a few hundred meters from both *Spanglerogyrus* localities. Mount (1975) noted that the pickerel frog (*Rana palustris*) and the zig-zag salamander (*Plethodon dorsalis),* commonly found in Alabama at sites above the Fall Line, are also found in the Western Red Hills. Ross and Ricker (1971) remarked on the presence of a disjunct population representing the ancestral form of *Allocapnia recta* (Plecoptera: Capniidae) in this same area. Among the plants, *Schisandra glabra* and *Magnolia tripetala* are Red Hills forms which occur either only above the Fall Line or at widely scattered Coastal Plain sites elsewhere.

Evolutionary and Systematic Implications. The unseparated dorsal and ventral compound eyes and the relatively unmodified meso- and metatarsi of *Spanglerogyrus* are features hypothesized in the dytiscoid ancestor of the Gyrinidae. *Spanglerogyrus* may represent an early offshoot from this ancestral stock. Cursory examination of the features listed by Hatch (1925) indicates that *Spanglerogyrus* shares more obvious features with members of the Orectochilinae than with the other gyrinid subfamilies. Among these are the presence of elytral pubescence, the angulate elytral apices, and the unsculptured dorsal surface. However, *Spanglerogyrus* lacks the conspicuous elongation of the terminal abdominal segment, and differs from the orectochilines in many other ways. The shared features therefore seem to be symplesiomorphous.

Hatch (1925) listed the following features (among others) as primitive in the Gyrinidae: 9-segmented antennal flagellum, exposed scutellum, presence of galea, lack of pubescence, rounded elytral apices, large size, widened lateral lobes on the male genitalia. *Spanglerogyrus* specimens possess the first three features, possibly verifying their primitive nature. However, *Spanglerogyrus* is small in size, possesses dorsal pubescence, has angulate elytral apices, and the male genitalia have narrow lateral lobes. The contention that these are derived features is thus open to question. Ochs (1926) disagreed with Hatch and thought that small size was primitive. Hatch, Ochs, and other workers hypothesized that the gyrinids evolved in lentic waters, but *Spanglerogyrus* occupies the lotic habitat.

It might be argued that the features of *Spanglerogyrus* are largely the result of evolutionary miniaturization and are therefore derived. The position of the eyes and the unmodified tarsi weigh strongly against this viewpoint.

In reference to the position of the eyes in *Spanglerogyrus* a brief comment on the status of the Oligocene fossil genus *Paleogyrinus* Schlechtendal (1894) may be in order. Hatch (1927) remarked that the emargination on the side of the head was "undoubtedly an artifact" and concluded that the eyes were probably entire. Although it is now apparent that the eyes of primitive gyrinids could have been entire, I agree with Hatch, and Darlington (1929), that *Paleogyrinus* belongs in the Dytiscidae. It does not resemble *Spanglerogyrus* in any significant details of its visible morphology. In shape and in tarsal features it presents a facies similar to that of a laccophiline dytiscid.

Detailed comparative studies are necessary before the evolutionary implications of the features of *Spanglerogyrus* can be ascertained with any certainty. However, they are clearly highly divergent from the remainder of the gyrinids. This divergence necessitates the placement of *Spanglerogyrus* in a separate subfamily.

Spanglerogyrinae Folkerts, **new subfamily**

Diagnosis. Gyrinids with the dorsal and ventral compound eyes in contact on the margin of the head, separated only by a narrow ridge; meso- and metatarsal segments as long as or longer than broad.

Type-genus. Spanglerogyrus Folkerts.

The features of *Spanglerogyrus* necessitate alteration of the concept of diversity within the family Gyrinidae. The three subfamilies traditionally delineated, Gyrininae, Orectochilinae, and Enhydrinae, are clearly more closely related to one another than any of them are to *Spanglerogyrus*. Retention of these taxa at the subfamily level would clearly be inconsistent. I therefore propose the following classification for the family:

Family Gyrinidae
- Subfamily Gyrininae
  - Tribe Gyrinini
  - Tribe Orectochilini
  - Tribe Enhydrini
- Subfamily Spanglerogyrinae

For those who wish to retain the taxa heretofore considered tribes, these may now be used at the subtribe level. Their names may be formed by using the root of the type-genus in plural form, e.g., subtribe Dineuti.

An artificial key to the subfamilies and tribes is presented below. This key will also function to separate the four U. S. genera.

1. Dorsal and ventral compound eyes in contact on the margin of the head, separated only by a narrow ridge; meso- and metatarsal segments as long as or longer than broad..... ..... Spanglerogyrinae (*Spanglerogyrus*, southwestern Alabama).

1′. Dorsal and ventral compound eyes divided, the upper eyes inset from the margin of the head to a distance of at least half the width of an eye; meso- and metatarsal segments broadened, segments 2, 3, and 4 much broader than long...Gyrininae 2

2(1′). Dorsum of elytra with a lateral pubescent field; last abdominal segment elongate, conical, bearing a medial row of setae on the ventral surface..... Orectochilini (*Gyretes*, Florida, north to Illinois and Kansas, west to California).

2′. Dorsum of elytra glabrous; last abdominal segment obtusely rounded, not elongate or conical, no medial row of setae on ventral surface 3

3(2′). Each elytron with 11 striae of punctures; scutellum exposed ..... Gyrinini (*Gyrinus*, continent-wide).

3′. Elytra smooth or each with 9 indistinct or weakly impressed striae; scutellum concealed ..... Enhydrini (*Dineutus*, eastern U. S., southwest to Colorado and California).

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