BRANDON, RONALD A. 1967. *Gyrinophilus*. Catalogue of American Amphibians and Reptiles, p. 31.

Gyrinophilus Cope
Spring salamanders

Gyrinophilus Cope, 1869:108–109. Type-species *Salamandra porphyritica* Green, 1827, by monotypy.

Pseudotriton Tschudi:Grobman, 1959:60–63 (partim). Grobman suggested this nomenclatural change, but its first application to the genus was by Organ (1961); see COMMENT.

• CONTENT. Two species, the epigean G. *porphyriticus* and the cavernicolous *G. palleucus*, are recognized. Both are polytypic. Until recently two additional species often were included; see REMARKS.

• DEFINITION. Branchiate individuals: These plethodontids of larval form have no ypsiloid cartilage, no anterior projection of the pubis, no lungs, 3 epibranchials, a dorsal tail fin not extending onto the body, 18–20 trunk vertebrae (17–19 costal grooves between limbs), and a single premaxilla with nasal processes unfused and well separated.

Fully metamorphosed individuals: the tongue is free all around; the premaxillae usually are separate (corpus fused in 2% of individuals); a fontanelle exists between the unfused nasal processes of the premaxillae; a septomaxilla is present; the prefrontals do not reach the nares in adults; prevomerine and paravomerine tooth series are continuous; occipital condyles are not stalked; a canthus rostralis is present and is usually marked by a nonpigmented line that extends from the anterior corner of the eye to the nasolabial groove; 5 toes are present on the hind feet.

• DIAGNOSIS. The only genus that might be confused with *Gyrinophilus* is *Pseudotriton*. In general body form *Gyrinophilus* is less stout and more elongate; the snout is broader and more truncate, and in transformed individuals is marked by a light canthus rostralis (the canthus is present but fairly indistinct in *G. porphyriticus duryi*). The premaxilla is usually (98 per cent of specimens) separated into two bones in adult *Gyrinophilus*, and the nasal processes of the premaxilla are never fused. In all adult *Pseudotriton* the premaxilla is a single bone, and the nasal processes are fused medially (see also Martof & Rose, 1962).

Larvae of *Pseudotriton* and *Eurycea* are similar to those of *Gyrinophilus*. No species of *Eurycea* east of the Mississippi River has more than 15 costal grooves; no *Gyrinophilus* has so few. In addition, the larval pigmentation differs strikingly: *Eurycea* has a dorsal double row of light spots, or a light band; *Gyrinophilus* is uniformly pigmented dorsally, darkly reticulated, or randomly and darkly dotted.

Larvae of *Pseudotriton* resemble those of *Gyrinophilus* rather closely. They overlap somewhat in the number of costal grooves. In *Pseudotriton* larvae the nasal processes of the premaxilla are fused, at least on larger individuals. Martof & Rose (1962) report that fusion occurs between 26 and 45 mm snout-vent length. The nasal processes of the premaxilla are never fused in *Gyrinophilus*. Martof & Rose also report differences in the nasals: *Pseudotriton* has nasals that are about as wide as long, never in contact with the maxilla, and formed before metamorphosis; *Gyrinophilus* has nasals that are greatly elongated, in broad contact with the maxilla, and formed during metamorphosis. All larval *Pseudotriton* and some *Gyrinophilus* are flecked with black dorsally. The snout of larval *Pseudotriton* is rounded and the eyes are large (corneal diameter enters distance from snout tip to anterior corner of the eye 1–1¾ times). The snout of larval *Gyrinophilus*, especially those from Tennessee southward, is elongate, rather truncate, and slightly turned up at the tip. The eyes are small (corneal diameter enters distance from snout tip to anterior corner of the eye 1½–3¼ times). Corneal diameter of larvae varies geographically in *Gyrinophilus* and is smallest in individuals from the southern Appalachian Mountains, largest in those from New England and Canada (see Brandon, 1966).

• DESCRIPTIONS. These are moderately large salamanders (about 220 mm maximum total length) with elongate (18–20 trunk vertebrae), fairly stout bodies. No sexual dimorphism is apparent except in the reproductive tract and the inner contour of the vent. Adult males have no mental gland. Considerable geographic and ontogenetic variation is present in color and pattern (see species accounts).

• ILLUSTRATIONS. See accounts of *G. palleucus* and *G. porphyriticus*.

• DISTRIBUTION. The genus occurs on the Appalachian uplift of the eastern United States and adjacent Canada. It ranges northward to western Maine and southern Quebec, westward into areas adjoining the Appalachian uplift from Cincinnati, Ohio, to northeastern Mississippi, and southward to the Fall Line in Alabama, and nearly to the Fall Line in South Carolina and Georgia.

• FOSSIL RECORD. None.

• PERTINENT LITERATURE. Of more than 100 publications that contain some mention of *Gyrinophilus*, most merely report on its distribution. General surveys of distribution are found in Dunn (1926), Bishop (1943), and Conant (1958). The genus is monographed by Brandon (1966).

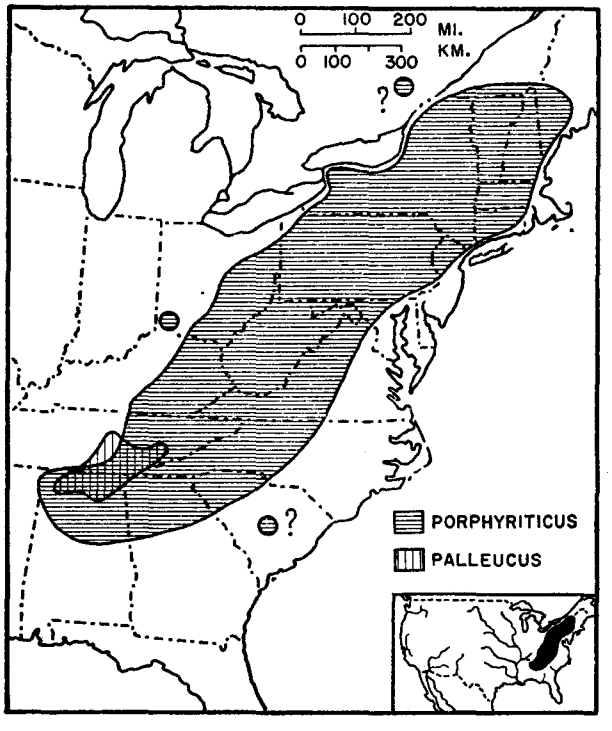
• KEY TO SPECIES.

1. Larval form, external gills present 2
— Metamorphosed, no external gills ..... *G. porphyriticus*
2. Distance from anterior corner of eye to snout tip 4–5 times diameter of eye ..... *G. palleucus*
— Distance from anterior corner of eye to snout tip 1½–3¼ times diameter of eye .... *G. porphyriticus*

• REMARKS. Two additional species have been included in the genus *Gyrinophilus* until recently: *G. lutescens* and *G. danielsi*. The name *Gyrinophilus lutescens* was applied by Mittleman (1942) to specimens he considered to represent a neotenic, cave-adapted species. The specimens actually are larval *G. porphyriticus duryi* (see Brandon, 1963). *G. danielsi* is not considered a separate species by Brandon (1966), but its subspecies are geographic races of *G. porphyriticus*. There is considerable evidence of intergradation between what were formerly considered the subspecies of *G. danielsi* and those of *G. porphyriticus*.

The name *Gyrinophilus warneri* appeared in print unaccompanied by a description (Sinclair, 1953, 1955); it is a nomen nudum and is based on specimens of *Pseudotriton*.

• ETYMOLOGY. The name *Gyrinophilus*, to judge from Cope's original discussion, alludes to the fact that these salamanders spend several years as larvae. It derives from the Greek



MAP. Distribution of the genus *Gyrinophilus*. Question marks indicate doubtful localities.

gyrinos, signifying "tadpole," and the Greek *phil-*, signifying "loving or fond of."

Gyrinophilus is of masculine gender.

Comment

Grobman (1959) suggested that *Gyrinophilus* should be included in the genus *Pseudotriton*, and several authors have followed this nomenclatural change. Other workers (Lazell & Brandon, 1962; Martof & Rose, 1962; Brandon, 1966) regard *Gyrinophilus* as nomenclaturally distinct. The arguments primarily relate to details of ontogenetic development and adult variation in cranial traits. Grobman's suggestion was based on ontogenetic changes in certain cranial elements. Lazell & Brandon were not satisfied that Grobman presented a convincing case for the suggested change. Martof & Rose thought that, on the basis of morphological, ontogenetic, and ecological considerations, *Gyrinophilus* is best assigned generic status. See cited papers for detailed arguments in favor of each arrangement.

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