

THE HYDROPORUS BLANCHARDI-TIGRINUS COMPLEX (COLEOPTERA: DYTISCIDAE)¹

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Hydroporus blanchardi Sherman, *H. tigrinus* Fall, and the new species described in the present paper form a complex of small hydrogorids characteristic of the wooded regions of the Eastern United States. These species form a distinct ecological group and are seldom found except in such habitats as the rootmats and marginal debris of small streams associated with the trickling water and puddles in seepage springs. They swim and "burrow" in the matted vegetation or bottom silt and individuals are only rarely encountered in open water. Shading by heavy vegetation or by overhanging banks is usually a characteristic of all situations in which members of this complex are found.

Morphologically all of the forms are very similar to one another, but local populations show consistent differences in size, punctation, and coloration. The uniformity of local populations may be correlated with the apparent failure to fly. All forms key to *Hydroporus blanchardi-tigrinus* in Fall's key (1923) to the *Pulcher-Undulatus* group of *Hydroporus* (= subgenus *Sternoporus* Falkenström). The secondary sexual modifications of the males are minor, and the male genitalia are simple and fairly uniform. The differences in size and punctation, however, indicate distinct differences. Our knowledge of the distribution and variation of these small beetles is still very incomplete, but it seems worthwhile to call attention to the group by describing some of the discrete populations. Further study will doubtless indicate the occurrence of still other geographically and ecologically isolated species.

Hydroporus blanchardi Sherman (1913)

Described from Marion, Massachusetts, and Ash Grove, Virginia. A new name for *H. vitiosus* Sharp (1882) not LeConte.

This species is described by Sharp (1882) as *H. vitiosus* LeConte, and is redescribed by Fall (1923). Briefly, the species is small (3 to 3.5 mm in length), finely punctate, and usually appears smooth and polished. The elytra usually show distinct markings composed of subbasal and postmedian transverse fascia of small, separate lighter spots on a brown or dark brown background (Fig. 1). An irregular apical light spot is also evident in most specimens. The body form is moderately convex, elongate, and narrowed behind but the insect is less than twice as long as broad except in some exceptional males. The male claws and antennae are almost unmodified. The prosternal protuberance, anterior file, and widened pronotal border are characteristic of the *Pulcher-Undulatus* group.

Blanchardi does not vary greatly over its large range except in coloration and the extent of the light markings. The latter differ considerably

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with the age of the specimen as well as with locality. As in other hydroperids the light pattern actually represents the portions of the elytra which are not tanned and darkened by the deposition of melanins. Thus in teneral or callow individuals the spots may be large and in part confluent. Various degrees of the hardening and darkening process can be seen in most series.

Males and females are not positively separable on external characters. The anterior and middle tarsi are equipped with adhesive pads but are slender in both sexes. The anterior claw of the male protarsus is just perceptibly modified and subequal to the posterior claw. The antennae of the males are, or seem to be, a trifle longer than in females, but this difference is difficult to assay. The male genitalia are simple and do not offer many diagnostic features (Fig. 1).

The range as now recorded is from New Hampshire to northern Florida, southern Georgia, and Alabama west to Arkansas and Oklahoma. Specimens from Indiana average smaller than those from the northeast and south, but they are very similar in punctuation and other characters. The range of this species probably corresponds to the extent of the eastern deciduous woodland with extensions along stream valleys to the west.

Fall (1923) records *blanchardi* from New Hampshire, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Virginia, and Alabama. I have also seen material from the following localities: ALABAMA: Nocalula, vi.18.1931, H. P. Löding; Cherokee Co., near Pleasant Gap, ix.5.1949. ARKANSAS: Jefferson Co., west of Pine Bluff, iii.27.1959. GEORGIA: Decatur Co., near Chattahoochee, viii.1953, vi.1954; Decatur Co., Spring Creek, vi.1954; Hart Co., near Nuberg, ix.1.1949, viii.29.1961; Floyd Co., Cave Spring, ix.4.1949. FLORIDA: Gadsden Co., Glen Julia Spring, vi.13.1954; Holmes Co., Sandy Creek near Ponce de Leon, x.18.1941. OKLAHOMA: Pittsburg Co., near McAlester, vi.14.1956. INDIANA: Monroe Co., Baxter's Bog near Handy, v.2.1953, iv.13.1954. WEST VIRGINIA: Mercer Co., near Princeton, vii.22.1959.

Nearly all specimens collected by me were taken in shaded situations in small to medium sized streams with sand bottoms or areas of sand along their courses. *H. blanchardi* was most abundant in marginal situations such as small pools under heavy shade or adjacent or partly under undercut banks. Situations in or adjacent to marginal seepages were more productive than the stream margins themselves, and the species may actually breed in marginal seepage springs. The Indiana specimens were taken from tiny trickling springs along the wooded edges of a sphagnum bog in southern Monroe County, but were not found in the bog proper where *Hydroporus* (*s. str.*) *brevicornis* Fall was the only *Hydroporus* taken. The habitats in which *blanchardi* was found at Glen Julia Springs, Florida, and Spring Creek, Georgia, were previously described (Young 1955a, 1955b).

Sherman (1913) refers to *H. blanchardi* as a typical brook species, but in my experience it is seldom found in typical small stream situations. In the Piedmont of Georgia, for example, it has not been taken in the small streams with their characteristic micaceous sand margins. However, it was found abundantly in Hart County in a spring head seepage area shaded by alders and willows. Here again, *H. blanchardi* was commonest in or near the seepage areas along the edges of the flowing stream. In the root

mats and marginal gravel of the stream itself *H. carolinus* Fall was the dominant species.

The only open, unshaded situation in which I have found *blanchardi* was in rocky pools in a small intermittent stream in Cherokee County, Alabama. Here, however, the beetles had apparently been washed down from the wooded headwaters by floodwater and concentrated in the rocky pools as they dried up.

Hydroporus tigrinus Fall (1923)

Described from Ash Grove, Virginia, associated with *H. blanchardi* and *H. striatopunctatus* Melsheimer.

This species was described from material collected by J. D. Sherman, Jr., and I have seen only females from the original series. According to Fall's description, the species is distinguished from *blanchardi* by the following combination of characters.

Size small (2.95 to 3.1 mm in length). Body form more oval, less attenuate behind, and more convex than in *blanchardi*. Pronotal punctures finer medially than at the sides. Elytral punctures diminishing in size toward the apices so that the latter appear almost impunctate. Metasternal and coxal plates conspicuously more strongly punctate than in *blanchardi*.

The color and color pattern do not seem to differ significantly from that of *blanchardi*. Specimens I have seen are dark reddish brown with lighter spots small and distinct, but as mentioned in regard to *blanchardi*, the degree of darkening of the background and the intensity of the spotting varies with the age of the individual.

The characters on which this species is based are admittedly rather feeble, but they seem to be consistent in the original series. I suspect that *tigrinus* may be found to have slightly different ecological preferences from *blanchardi*.

Hydroporus rheocrinus sp. nov.

This interesting little insect has been in my collection for nearly 30 years under the name *H. blanchardi* as determined by H. C. Fall in 1938. It differs from that species, however, in several respects which I believe are important.

DIAGNOSIS: Similar to *blanchardi* but smaller in average size, more convex, less regularly acuminate behind, and conspicuously more coarsely, densely, and deeply punctate on the pronotum and elytra (Fig. 2). Size and shape similar to *tigrinus*, but dorsal punctation much coarser and denser and metasternal and coxal punctation finer and less conspicuous (although more so than in typical *blanchardi*). Elytra in fully hardened specimens piceous brown with lighter markings reduced but sharply delimited and distinct. Size range: Length 2.9 to 3.2 mm; greatest width at base of elytra 1.5 to 1.6 mm.

HOLOTYPE MALE: Ovate, acuminate behind, widest just behind bases of elytra. Length, 3.1 mm; greatest width, 1.6 mm; width of pronotum at apex, 0.93 mm; width of pronotum at base, 1.48 mm; length of pronotum at midline, 0.58 mm; width between eyes, 0.6 mm.

HEAD: Similar to *blanchardi* with clypeal margin thickened but without definite margin. Surface microreticulate and rather coarsely punctate,

the punctures coarser and denser than in *blanchardi* particularly on the vertex; much more coarsely punctate than in *tigrinus*. Color nearly uniformly brownish yellow, the antennae and mouthparts slightly darker. *Pronotum*: Shaped and margined much as in *blanchardi* and *tigrinus*. Surface microreticulate with punctation very coarse in comparison to either *blanchardi* or *tigrinus*. Punctures on disk just perceptibly smaller than those at the margins. Anterior and posterior marginal punctures large, setigerous. Color brownish yellow with a vague infuscation on disk. *Elytra*: Widest just behind base of pronotum, narrowing posteriorly so that the conjoined elytra are moderately acuminate much as in *blanchardi*, but sides less regularly narrowed so that outline is more regularly ovate. Surface microreticulate and rather coarsely and densely punctate, the setigerous punctures along suture and on disk especially large and serially arranged. Punctures becoming smaller toward lateral margins and apices of elytra but still conspicuously large in comparison to *blanchardi* or *tigrinus*. Setae (hairs) moderately conspicuous, somewhat less so than in *blanchardi*. Color piceous brown with reduced but distinct subbasal and post-median fascia and apical spots. *Venter*: Much as in *blanchardi*, but metasternal and coxal punctures more conspicuous. Color yellowish brown, the legs darker. Secondary sexual characters not detectably different from female and much as in *blanchardi*. *Genitalia*: Fig. 2. Adeagus narrowed at base and with tip somewhat blunter than in *blanchardi*, but the simplicity of the structure of the aedeagus and parameres makes it difficult to assess the slight differences detectable.

ALLOTYPE FEMALE: Very similar to male except in minor features of color pattern and punctation.

TYPE MATERIAL: Holotype, allotype, and 61 paratypes from: FLORIDA: Alachua Co., San Felasco Hammock west of Gainesville, viii.26.1961, F. N. Young (in University of Michigan Museum of Zoology). Other paratypes from the same locality were collected on vii.9.1959 (1) and viii.1.1959 (27). A single specimen collected v.2.1937, was collected in a small stream in San Felasco Hammock near the type locality.

HABITAT: *H. rheocrinus* has been found only in small streams in San Felasco Hammock west of Gainesville, Florida. The principal series is from about 10 miles west of Gainesville on state road, Fla. 232. The surrounding area is heavily wooded with nearly virgin mesic hammock characteristic of the middle Florida hammock belt of the Peninsular Uplands (Young 1954). The small streams in this area run through shallow ravines densely shaded by magnolia, evergreen oaks, sweetgum, holly, and other forest trees and shrubs many of which are evergreen. The banks are steep and in places covered with dense mats of mosses and liverworts.

The specimens of *rheocrinus* were taken from mats of mosses and roots along the margin of the stream in areas where water trickled into the stream course from small springs or seepages. Most were collected by depressing the matted vegetation and watching for the beetles to come to the surface. Some were taken from small backwaters with the bottom covered with black organic muck under the edges of undercut banks. *Cymbiodyta blanchardi* Horn was the only other beetle taken frequently in the same situation. A few *Copelatus punctulatus* Aubé (Young 1963) were taken in the larger pools together with an unidentified *Agabus* similar to *obtusatus* (Say).

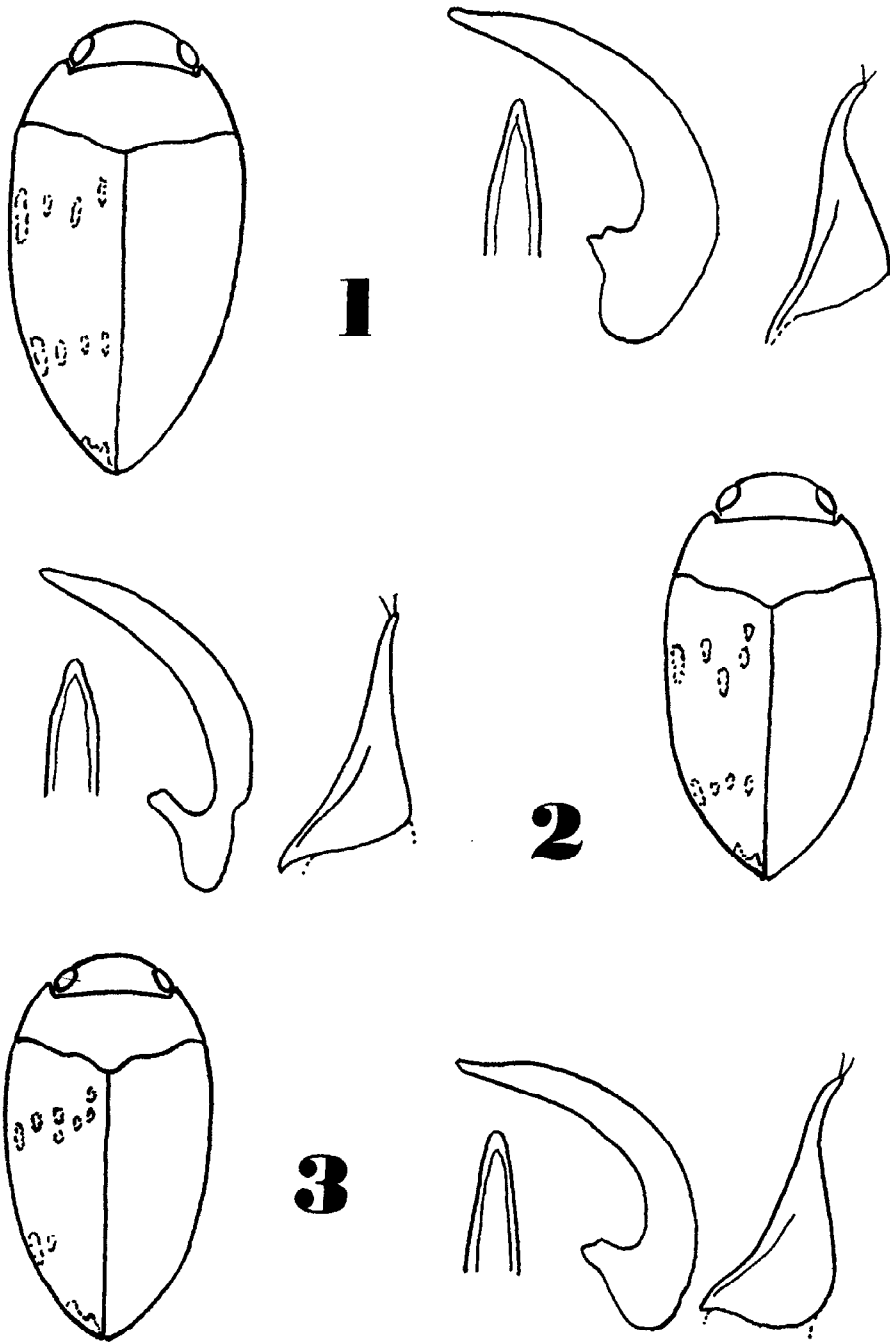


Fig. 1. *Hydroporus blanchardi* Sherman, semidiagrammatic outline of body and color pattern; tip and lateral view of aedeagus, and left paramere.

Fig. 2. *Hydroporus rheocrinus* sp. nov., same as for *blanchardi*.

Fig. 3. *Hydroporus helocrinus* sp. nov., same as for *blanchardi*.

When removed from the water the small hydropterids go into a death feint which lasts from $\frac{1}{2}$ to 2 minutes. They may then scramble about rapidly for some time until they regain the water or are disturbed again. None were observed to spread the elytra or attempt to fly even when placed in direct sunlight. In direct sunlight they died within 10 minutes, but none attempted to fly. In contrast, *Cymbiodyta* from the same habitat flew readily even when in moist situations, and always spread the wings and attempted flight when placed in direct sunlight. The hind wings of *H. rheocrinus* seem to be normally developed, but it seems doubtful that the species flies.

Hydroporus helocrinus sp. nov.

DIAGNOSIS: Similar to *rheocrinus* but smaller in average size, much less convex, more regularly attenuate behind, and with dorsal punctation finer (Fig. 3). Smaller in average size than *blanchardi* and probably than *tigrinus*, and much more coarsely punctate on the dorsum than either. Discal punctures of pronotum smaller than marginal punctures as in *tigrinus*, but relatively coarser and elytral punctures much coarser and not strikingly decreasing in size apically. Metasternal and coxal punctures relatively coarse, about as in *rheocrinus*. Size range: Length 2.9 to 3.0 mm; greatest width of elytra, 1.4 to 1.6 mm. This may prove to be a local population representing the extreme of *rheocrinus* but the differences seem to be consistent.

HOLOTYPE MALES: Ovate, acuminate behind but less regularly ovate than *rheocrinus*, widest just behind base of pronotum. Length, 3.0 mm; greatest width, 1.6 mm; width of pronotum at apex, 0.9 mm; width of pronotum at base, 1.43 mm; length of pronotum at midline, 0.58 mm; width between eyes, 0.6 mm.

Head: Similar to *rheocrinus*. Surface microreticulate and punctate much as in *rheocrinus*, more finely punctate than in *blanchardi* or *tigrinus*. Color nearly uniformly brownish yellow, antennae and mouthparts slightly darker. *Pronotum*: Lateral margin narrower than in *rheocrinus*. Surface microreticulate and irregularly punctate. Discal punctures perceptibly smaller than those along base and apex, distinctly smaller than in *rheocrinus* but larger than in *blanchardi* or *tigrinus*. Marginal punctures coarse, but finer than in *rheocrinus*. Color brownish yellow with only a vague infuscation on disk. *Elytra*: Widest just behind pronotum and acuminate toward the tip, somewhat more regularly acuminate than in *rheocrinus* so that general body outline is less regularly ovate and more as in typical *blanchardi*. Surface microreticulate and rather coarsely punctate. Punctures finer than in *rheocrinus* but distinctly coarser than in either *blanchardi* or *tigrinus*. Discal punctures the largest, the punctures decreasing in size laterally and toward the apices of the elytra, but apical punctures not conspicuously smaller than discal. Color dark reddish brown with lighter spots brownish yellow arranged much as in *rheocrinus* but not clearly delimited and rather indistinct. Setae (hairs) moderately conspicuous about as in *rheocrinus*. *Venter*: Much as in *rheocrinus* in color and sculpture but appearing flatter and thus giving insect a less convex lateral outline. Elytral epipleurae less visible from side than in *rheocrinus*. Secondary sexual characters not developed; tarsi and claws much as in female. *Genitalia*: Fig. 3. Aedeagus narrower

and more regularly pointed at tip than in *rheocrinus*. Base much as in *blanchardi*. Parameres apparently identical with those of *rheocrinus* and *blanchardi*.

ALLOTYPE FEMALE: Similar to male but slightly larger and differing in minor color and punctation characters.

TYPE MATERIAL: Holotype, allotype, and 3 paratypes from: FLORIDA: Alachua Co., Gainesville, ii.19.1949. Paratypes from same locality xii.31.1947. (13) and ii.1.1948 (1). All specimens were collected from seepage areas near Rattlesnake Branch by F. N. Young and Irving J. Cantrall.

HABITAT: The habitat of this species is the helocrene springs or seepages bordering sand-bottomed streams. We did not find *helocrinus* in the stream itself in situations such as those in which *rheocrinus* was abundant. Most specimens were collected by depressing the mat of moss well back in the seepage area and watching for the beetles to surface. The seepage area was shaded by evergreen oaks and other trees and the surface matted with mosses and liverworts. This is a typical situation along streams in many parts of the middle Florida hammock belt so that *helocrinus* should be expected in several north Florida counties.

So far, *H. blanchardi* has not been found in Florida except in the Apalachicola River area. *H. rheocrinus* and *helocrinus* seem to be derivatives of *blanchardi* isolated in the northern peninsular region.

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