

Smokies Stripetail

Isoperla bellona Banks

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DESCRIPTION

Taxonomy and Basic Description

Nathan Banks described *Isoperla bellona* in 1911 from a female holotype collected from the Black Mountains of North Carolina. Needham and Claassen (1925) included this species in their Monograph. Banks (1947) placed this species in the genus *Megahelus*. No additional information has been published on this rare taxon. Currently, this species is only known from North Carolina and South Carolina. The Georgia records cited by Needham and Claassen (1925) have not been verified.

General color of the adult Smokies Stripetail is pale yellow with medium brown markings. Adults are fully winged, and the male has a forewing length of 7.5–8.9 mm (0.30–0.35 in.). The head of the adults have wide medium brown bands connecting the ocelli extending anterolaterally, truncated anteriorly, darkest near anterior ocell. The interocellar area is light (occasionally light brown); a thin, light U-shaped band extends anteriorly from the median ocellus. The frontoclypeus area is a diffuse light brown (Fig. 1). The pronotum has a median light, slightly hourglass shaped stripe. The middorsal pronotal suture is a faint light brown line. Rugosities are irregular, raised, and medium brown. Pronotal disks are pale yellow. The anterior margin has bipartite medium brown bands with lateral and posterior margins with thin medium brown margins. The abdominal sterna are pale yellow. Sternum 8 has a vesicle ca. as wide as it is long, and darker than the rest of the segment. The posterior margin is evenly rounded, extending slightly over the anterior margin of sternum 9. The posterior margin of sternum 8 has a thin, medium-brown band. Abdominal terga are pale yellow. In the male, the 9th tergum is elevated near the anterior margin. Paraprocts of the male are sclerotized, long, thin, recurved slightly over 10th tergum, deflected downward anteriorly, and tapering to sharp points. From the study of cleared male specimens, it is evident that the Smokies Stripetail has paired posteromedian sclerotized plates with median posteriorly directed strong spines with bands of short, stout spinulae lateral to sclerotized plates. Paired posteroventral sclerotized bands with dense, stout spinulae are below the sclerotized plates and posteromedian band of long, stout, reddish-brown spines. These are above the sclerotized plates and paired dorsoventral rectangular patches of dense, short, stout, reddish-brown spinulae near the aedeagal stalk. The female is similar to the male with a forewing length of 8.4–9.5 mm (0.33–0.37 in.). The 8th sternum has a broad triangular shaped subgenital plate that extends to near the posterior. Needham and Claassen (1925) illustrated the subgenital plate of *I. bellona* as being broadly rounded which does not agree with the original illustration provided by Banks (1911) who illustrated it as broadly triangular. The nymph is unknown.

Status

The Smokies Stripetail is globally ranked as imperiled (G2) because it is at high risk of extinction due to a very restricted range, very few populations (often 20 or fewer), steep declines, or other factors (NatureServe 2011). The species is currently not ranked in South Carolina.

POPULATION SIZE AND DISTRIBUTION

The Smokies stripetail is currently known in South Carolina only from small springs draining into Upper Wash Branch along Tamassee Road in the Sumter National Forest, part of the Andrew Pickens Ranger District in Oconee County. Another site is at Wildcat Creek, 9 km (5.6 mi.) Northwest of Clemson in Pickens County. The specimens known from the Wildcat Creek site were collected in 1976. Population sizes have not been determined.

HABITAT AND NATURAL COMMUNITY REQUIREMENTS

No information is currently available on the ecological requirements. Apparently adults emerge from early April to late May. This species occurs in small, spring-fed streams.

CHALLENGES

It is acknowledged that the higher elevations of the southern Appalachian will be impacted by global climate change (Graham and Grimm 1990), and in particular aquatic habitats (Mulholland 1997). Additionally, land use changes continue to occur in western South Carolina (Epsy 2007).

CONSERVATION ACCOMPLISHMENTS

A known South Carolina site for the Smokies stripetail is within the Sumter National Forest, Pickens Ranger District in Oconee County, probably resulting in some habitat protection in this multi-use area.

CONSERVATION RECOMMENDATIONS

- Surveys for the Smokies stripetail should be made at both the Oconee and Pickens county localities and nearby similar ecological sites.
- Evaluate and develop a long-term management program for habitat quality of unique headwater sites in western South Carolina.
- Encourage long-term best management practices in these watersheds.

LITERATURE CITED

Banks, N. 1911. Descriptions of new species of North American neuropteroid insects. *Transactions of the American Entomological Society*, 37: 335-337.

Banks, N. 1947. Some characters in the Perlidae. *Psyche* 54: 266-291.

Espey, M. F. Fakhruddin, L. R. Gering, and H. Lin. 2007. Living on the edge: residential property values in urban-rural interface. *Journal of Agricultural and Applied Economics* 39: 689-699.

Graham, R. W. and E. C. Grimm. 1990. Effects of global climate change on the patterns of terrestrial biological communities. *Trends in Ecology and Evolution*. 5: 289-292.

NatureServe. 2011. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.

Needham, J. G. and P. W. Claassen. 1925. A monograph of the Plecoptera or stoneflies of America north of Mexico. The Thomas Say Foundation, Entomological Society of America. Volume II. 397 pp.