

DESCRIPTION OF THE NYMPH OF *SOMATOCHLORA*  
*PROVOCANS* CALVERT (ODONATA: CORDULIIDAE)<sup>1</sup>

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## ABSTRACT

The nymph of *Somatochlora provocans* Calvert, previously undescribed, is morphologically similar to the nymphs of *Somatochlora elongata* (Scudder), *S. minor* Calvert and *S. walshii* (Scudder). It can be distinguished from *elongata* by the shorter hind tibiae, from *minor* by the absence of a dorsal hook on abdominal segment 3, and from *walshii* by the median anal appendage being longer than the lateral appendages. The *S. provocans* nymphs were found in a small lake inlet with sphagnum-covered edges.

The known distribution of *Somatochlora provocans* Calvert is essentially southeastern, ranging from New Jersey to northern Florida, west to southern Mississippi and north to Tennessee and Kentucky (Needham and Westfall, 1955). Beatty and Beatty (1968) point out that the Pennsylvania record was based on a misdetermination. Adults are not commonly collected and the nymph has been unknown until this paper. While collecting aquatic insects on 2 occasions in Cheraw State Park, Chesterfield County, South Carolina, I found several *Somatochlora* nymphs which I kept alive and reared. One male and 1 female of *S. provocans* emerged, and it is from the exuviae and 2 nymphs that I have drawn the following description of the last-instar nymph. The discovery of this species in South Carolina constitutes a new state record.

## DESCRIPTION

General body color in life pale green, blending with brown at margins and extremities. Head widest at level of eyes, twice as wide as long; lateral margins behind eyes slightly convex and converging posteriorly to meet the concave occiput; fringe of long setae on frons (frontal ridge) between antennae; a row of long setae directly behind eyes, other setae scattered on top of head and along lateral and occipital margins; a row of smaller setae on postocciput. Antennae 4.9 to 5.1 mm long; antennal ratio 13:15:14:7:9:11:11; segments 1 and 2 with many long setae, remaining segments with few, shorter setae. Labium extending posteriorly between procoxae nearly to anterior level of mesocoxae; 8 palpal setae in male, 7 in female; 11 premental setae (8 long, 3 short, progressively diminishing in length toward midline); end hook of palpal lobe shorter than adjacent first palpal seta; 8 or 9 crenulations on margin of each palpal lobe, each crenulation with 5 to 8 stiff, spinelike setae; anterior margin of prementum angulate with edges slightly concave (Fig. 1).

Thorax widens posteriorly, as wide as head at metathorax. Prothorax

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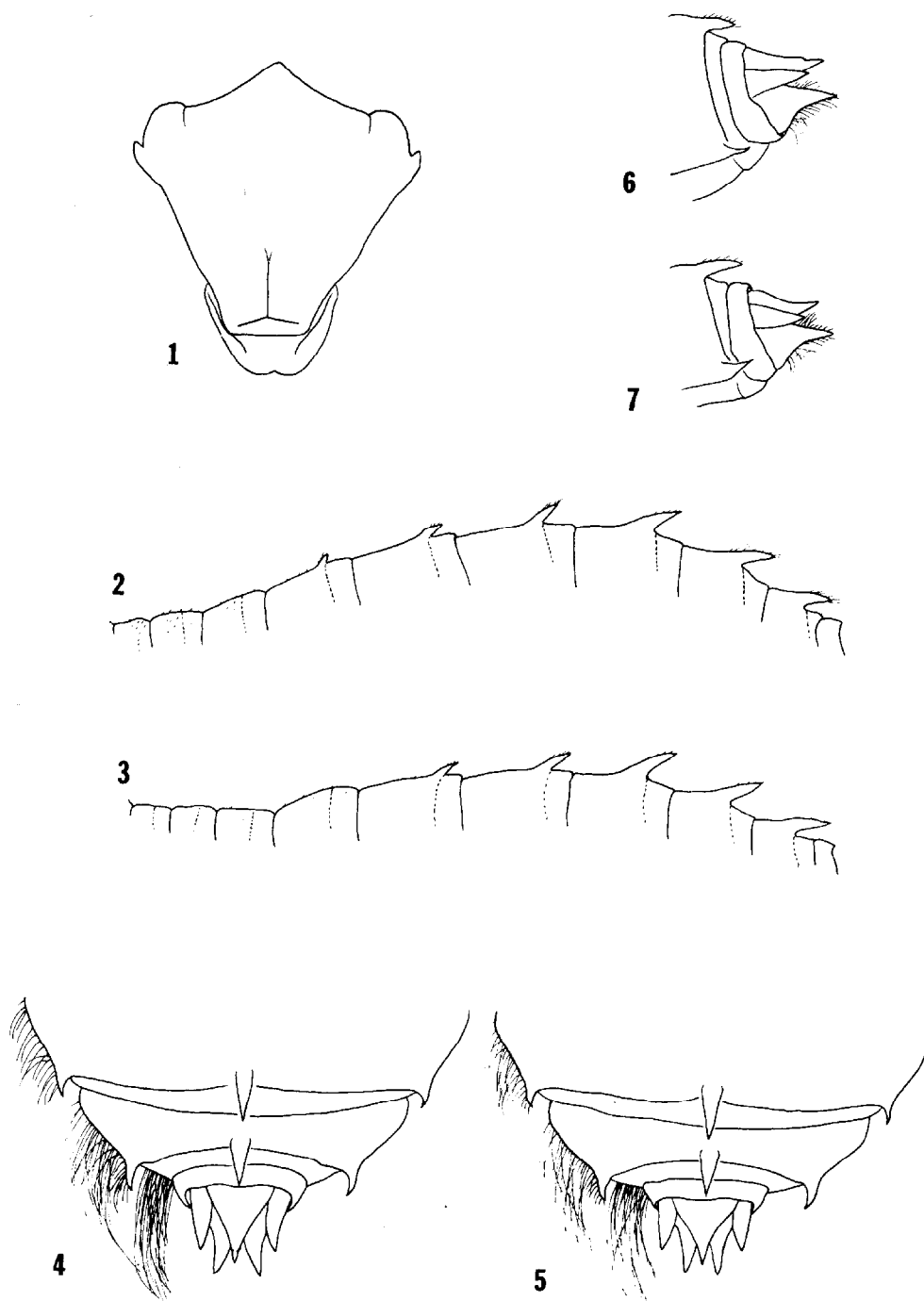


Fig. 1-7. *Somatochlora provocans* Calvert nymph: 1) prementum in ventral view; 2-3) dorsum of abdomen in lateral view, male and female, respectively; 4-5) posterior segments and appendages in dorsal view, male and female, respectively (setae on posterior margins of segments and margins of appendages omitted); 6-7) anal appendages in lateral view, male and female, respectively.

with elevated protuberances at dorso-lateral angles bearing 20 to 25 long setae. Lateral margins of thorax bear numerous long setae dorsal to coxae; all coxae with long dorsal setae, procoxae with greatest number of ventral setae; sternum with setae near coxae; metasternum with scattered setae medially. Femora with a row of 4 to 6 widely spaced, dorsal long setae; hind femora extend posteriorly to middle of abdominal segment 7. Hind wing pads extend to anterior margin of abdominal segment 6.

Abdomen oval-shaped, widest at segment 6; lateral margins of each segment bearing 30 to 50 setae, these setae 2 to 3 times longer on segments 8 and 9 (longest on 9); posterior margins of segments 1 to 9 fringed with setae becoming progressively longer on posterior segments. Segment 10 cylindrical with a row of 6 to 8 small setae on ventrolateral margins. Venter of abdomen scattered with numerous small setae; postero-ventral margin of segment 9 clothed with many very long setae which extend posteriorly to tips of inferior anal appendages. Dorsal hooks present on segments 4 to 9 in male, 5 to 9 in female; hooks in lateral view (Fig. 2 and 3) sharp and straight, not decurved (dorsal margin very slightly convex); hook on 4 in male less than 0.33 size of that on 5; in dorsal view, tip of hook on 9 reaches posterior margin of segment 10; dorsal margins of hooks with a staggered row of 12 to 20 small setae. Lateral spines present on segments 8 and 9 only, those on eight 0.66 length of those on 9, and less than 0.2 length margin of segment 8 (margin length includes spine); spines on 9 about 0.25 length margin of segment 9. Segment 10 about 0.4 as wide as segment 9 at widest points; segment 9 about 0.75 as wide as and 0.5 as long as segment 8. Lateral margins of median anal appendage slightly concave in dorsal view, appendage tapering posteriorly to an acuminate tip (Fig. 4 and 5); median appendage slightly longer than lateral appendages and shorter than inferiors; lateral margins of inferior appendages of male concave in dorsal view, tips divergent (Fig. 4); inferiors of female not divergent (Fig. 5); in lateral view of anal pyramid, dorsal margin of median appendage nearly straight in male with a very slight preapical protuberance (Fig. 6), slightly concave in female (Fig. 7). Numerous setae clothe venter of median appendage and dorsal, medial and ventral surfaces of inferior appendages.

Measurements: total length 22-22.5 mm; width of head 6.3-6.43 mm; length of abdomen 12.5 mm; hind femur 6.6-7.35 mm; hind tibia 7.65-8.2 mm; hind wing pad 6.8-7.1 mm; prementum 4.6 mm.

#### DISCUSSION

The nymph of *Somatochlora walshii* (Scudder) was described by Walker (1941) and compared to that of *S. minor* Calvert. The nymph of *provocans* is morphologically more similar to these 2 species than any of the other known *Somatochlora* nymphs. In the key to the nymphs of *Somatochlora* by Needham and Westfall (1955), *provocans* keys out to couplet 7, in which *minor* and *walshii* are separated. According to the characters in that couplet, *provocans* is more like *walshii* in number of dorsal hooks but similar to *minor* in number of premental setae. The following emendation to the key will separate these 3 species.

- 7 —Dorsal hooks present on segments 3-9; dorsal hook on segment  
4 in lateral view about 0.75 length of hook on segment 5.....*minor*

—Dorsal hooks present on segments 4 or 5-9; dorsal hook on segment 4, if present, less than 0.5 length of hook on segment 5.....7a

7a—Median anal appendage longer than lateral appendages; dorsal hooks on segments 7-9 nearly straight in lateral view.....*provocans*

—Median anal appendage distinctly shorter (male) or nearly same length (female) as lateral appendages; dorsal hooks on segments 7-9 slightly decurved in lateral view.....*walshii*

The addition of *provocans* to Needham and Westfall's key presents other problems. The third character to help separate *S. elongata* (Scudder) from *minor* and *walshii* in couplet 6, "lateral spines of 9 one-sixth as long as its margin", must be omitted as this ratio is variable and approximates the ratio in *provocans*. In fact, these 4 species are remarkably similar morphologically. Although *elongata* usually has longer legs than the other species, variation and possible overlap cast doubt upon the usefulness of leg length as a diagnostic character. For example, in a series of 12 last nymphal instar *elongata* collected and reared in North Carolina by M. J. Westfall, Jr., femur and tibia length varied from 7.9-8.75 mm and 9.1-9.95 mm, respectively. However, an *elongata* nymph reared by Dr. P. D. Harwood in West Virginia is markedly smaller, with femur and tibia lengths of 7.15 mm and 8.45 mm, respectively. These latter measurements fit more closely the second part of couplet 5 in Walker (1925) and couplet 6 in Needham and Westfall (1955). Also, little is known of variation within *minor*, *walshii* and *provocans*, and overlap with *elongata* in femur and tibia lengths should be anticipated.

In an effort to find additional characters to separate the nymphs of these 4 species, 9 characters were studied and the results summarized in Table 1. The nymph of *elongata* is most similar to *minor* in measurements, number of palpal and premental setae and in often possessing a dorsal hook on segment 3. Walker (1941) reported no such hook in the single nymph available to him, but noted it showed "a very slight elevation" on this segment. The nymph of *walshii*, based on just 2 specimens examined and Walker's description (1941), is slightly smaller than *provocans* and quite similar in number of premental setae and dorsal hooks. It is the only 1 of the 4 species in which the median anal appendage is shorter than the lateral appendages. The nymph of *provocans* is similar to *minor* in size but can be distinguished by the absence of a hook or elevation on abdominal segment 3, by the median anal appendage being longer than the lateral appendages, and by the lateral spine of segment 9 being only 0.2 as long as the segment margin. Also, the dorsal hooks of *provocans* in lateral view are nearly straight, whereas in *elongata*, *minor* and *walshii* they are notably to slightly decurved.

#### MATERIAL STUDIED

*Somatochlora provocans*. SOUTH CAROLINA (new state record): Chesterfield Co., Cheraw State Park, 23-IV-1972, 1 nymph, K. J. Tennessen, male emerged 30-V-1972 (KJT); 1 nymph, M. J. Westfall, Jr. (FSCA); same locality, 21-V-1974, 2 nymphs, K. J. Tennessen, female emerged 28-V-1974 (KJT).

*Somatochlora elongata*. NORTH CAROLINA: Macon Co., Ravenel Lake, near Highlands, VI-1953, 21 nymphs, M. J. Westfall, Jr., 11 reared (FSCA).

TABLE 1. VARIATION IN 9 MORPHOLOGICAL CHARACTERS IN LAST NYMPHAL INSTAR OF 4 *Somatochlora* SPECIES.

	<i>elongata</i>	<i>minor</i>	<i>walshii</i>	<i>provocans</i>
Total length (mm)	21-23	21-22.5	20.5	22-22.5
Hind femur (mm)	7.15-8.75	6.75-7.0	6.3-6.4	6.6-7.35
Hind tibia (mm)	8.46-9.95	8.0-8.4	7.0-7.1	7.7-8.2
Palpal setae	6-8 (usu. 7)	6-8	5-7	7-8
Premental setae	11-14 (usu. 12)	11-13	9-10	11-12
Abdominal segments with dorsal hooks	3 or 4-9	3-9	4-9	4 or 5-9
Shape of hook on segment 8 (lateral view)	notably to slightly decurved	notably decurved	slightly decurved	straight
Relative length of lateral spine on segment 9 to length of segment margin*	about 1/4 to 1/6	about 1/3	about 1/3	about 1/4 to 1/5
Relative length of median anal appendage to lateral appendages	male: longer or equal female: longer	equal equal	shorter slightly shorter	longer longer

\*length of segment margin includes spine.

WEST VIRGINIA: Tucker Co., strip-mine pond near Davis, 8-VI-1971, 1 nymph, P. D. Harwood, male emerged 16-VI-1971 (FSCA); Tucker Co., Alder Creek, 24-V-1974, 1 nymph, P. D. Harwood, female emerged (PDH).

*Somatochlora minor*. WISCONSIN: Price Co., Needle Creek, 13-V-1971, 1 nymph, K.J. Tennessen (KJT).

*Somatochlora walshii*. ONTARIO: Mer Bleue, died I-1930, 1 female nymph, E. M. Walker (ROM). PENNSYLVANIA: Centre Co., Bear Meadows Natural Area, 30-V-1956, 1 nymph, G. H. Beatty, female emerged 12-VI-1956 (FSCA).

Collections containing the specimens are given in parentheses and are abbreviated as follows: FSCA: Florida State Collection of Arthropods; ROM: Royal Ontario Museum; PDH: Paul D. Harwood Collection; KJT: K. J. Tennessen Collection.

#### HABITAT

The nymphs of *S. provocans* were found in a very small, sand-bottomed inlet flowing into a small lake in Cheraw State Park, South Carolina (34° 30' N. Lat., 80° W. Long.). This inlet drains a low, swampy area thickly overgrown with brush and vines, and crosses a nature trail on the northern edge of the lake. Here the little stream varies from about 1 to 2 ft in width and from 1 to 4 inches in depth, and is nearly inaccessible 5 ft on either side of the trail. Sphagnum moss grows thickly along the muddy edges; the nymphs were taken in the flowing water on both sides of the trail with a small strainer dipped near the sphagnum-covered edges.

The addition of the nymph of *S. provocans* to our knowledge leaves 9 North American species of *Somatochlora* still unknown in the nymphal stage: *brevicineta* Robert, *calverti* Williamson & Gloyd, *ensigera* Martin, *filosa* (Hagen), *georgiana* Walker, *hineana* Williamson, *incurvata* Walker, *margarita* Donnelly, and *sahlbergi* Trybom.

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