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ARTICLE 1

THREE NEW SPECIES OF TRICHOPTERA FROM WESTERN PENNSYLVANIA

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ABSTRACT

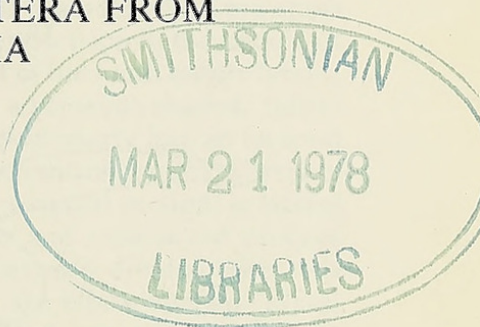
This study deals with three new species of Trichoptera from Powdermill Nature Reserve of Carnegie Museum of Natural History located in Westmoreland Co., Pennsylvania. The adult forms of *Stactobiella solzhenitsyni*, new species (♂), and *Neophylax wigginsi*, new species (♂, ♀), as well as adult, larval, and pupal stages of *Apatania blacki*, new species, are described and discussed.

INTRODUCTION

Two years of intensive collecting of western Pennsylvania Trichoptera have resulted in the discovery of three new species belonging to the following genera: *Stactobiella*; *Apatania*; *Neophylax*. *Stactobiella* and *Apatania* are holarctic in distribution with species occurring in the temperate regions of Europe, Asia, and North America. *Neophylax* species are confined to North America and Asia, most of the known species occurring on the former continent.

Collections of adults were made with light-traps and sweeping nets. Larvae and pupae were either picked by hand or were collected with a cylindrical, quantitative sampler (Hess type). The number of Trichoptera specimens collected in light-traps at Powdermill Nature Reserve were so numerous that it was virtually impossible to identify and separate all the collected material. Thus, future studies of existing material,

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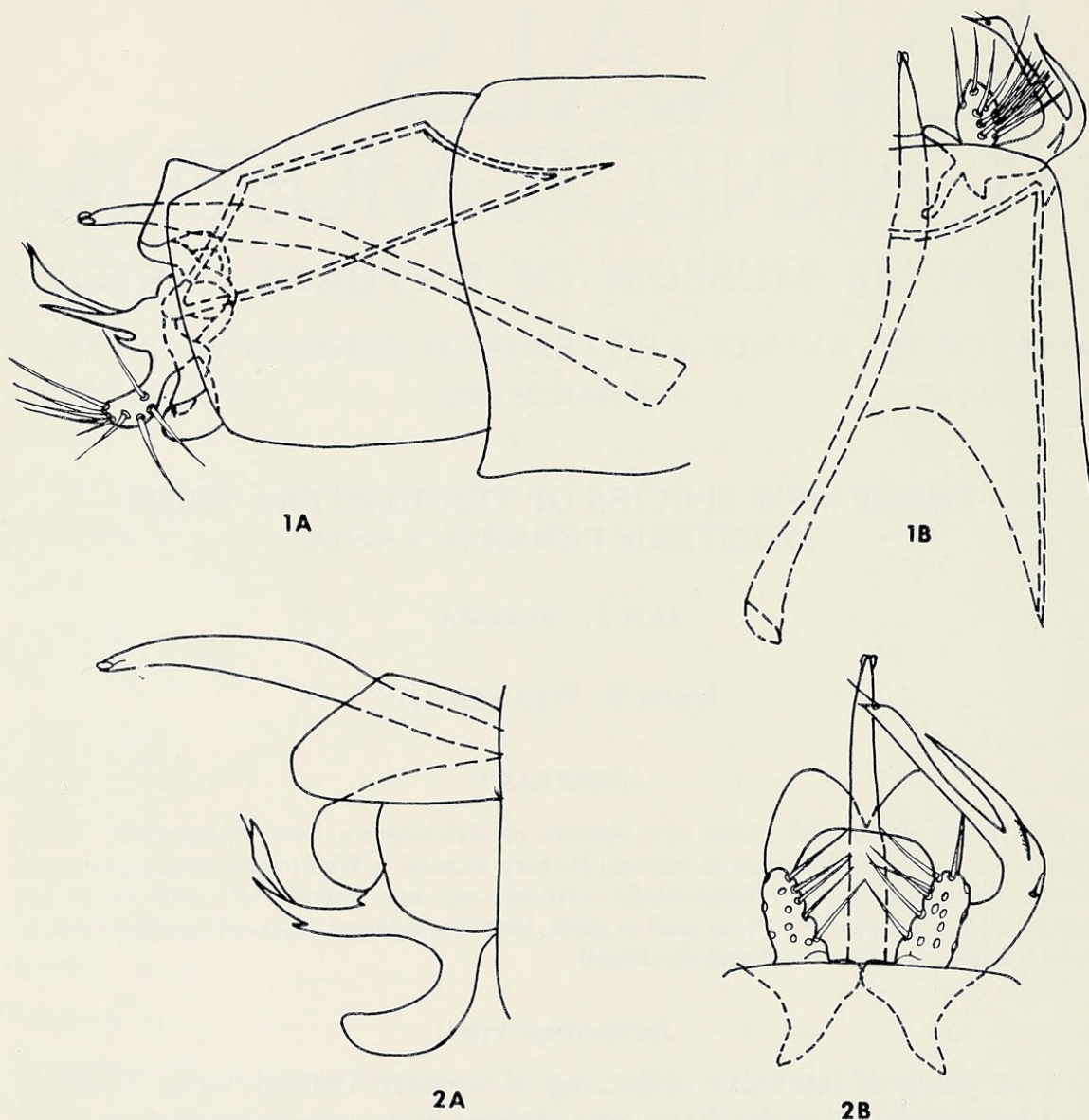


Fig. 1.—*Stactobiella solzhenitsyni*, new species, holotype, male genitalia. A, lateral view; B, ventral view.

Fig. 2.—*Stactobiella biramosa* Martynov (Angara River, Siberia); male genitalia. A, lateral view; B, ventral view.

as well as of any new collections from the same area may produce additional interesting species of Trichoptera.

SYSTEMATIC ACCOUNTS

***Stactobiella solzhenitsyni*, new species**

This species from the family Hydroptilidae belongs to the group of *biramosa* Martynov. It has trifurcate bracteole (sensu Ross, 1948) with two long "fingers," one small hook-like projection near the base and

ovate claspers. The tenth tergite is very short, membranous, and truncate at apex.

Holotype.—Male; Whiteoak Run near Holland House, Powdermill Nature Reserve, Westmoreland County, Pennsylvania, 19–20 June 1976, obtained by Jan L. Sykora and John S. Weaver. Deposited in collection of Carnegie Museum of Natural History.

Paratypes.—33♂, same data as for holotype. One male in the National Museum of Natural History, Smithsonian Institution, the remainder in the senior author's collection.

Description

Male: Length 2.4 mm. Wings mottled with gray and black dots. Ocelli present. Palpi, head, thorax dark gray; abdomen and legs gray. Metascutellum as described by Ross (1944) for *Stactobiella palmata*. Male genitalia (Fig. 1): Eighth segment with very short mesoventral process; ninth segment long and tubular with deep incision in the middle of apicodorsal section, from which a very short membranous part of the tenth tergite arises, covering part of phallus. Tenth tergite ventrally supported by a crescent-shaped, chitinous structure. Remaining part of the tenth segment extended posteriorly into an internal frame, rhomboid from lateral view, with relatively short posteroventral corners. Claspers in ventral aspect ovate with slightly pointed tip and dilated lateroapical section; in lateral view spoon-shaped with base attached to a large, triangular and sclerotized process directed ventromesally. Paired bracteole arising above claspers divided into two long, finger-like and pointed processes whose curved bases are elbow-shaped. Mesal "finger" one third longer than the lateral process, with dilated, arrow-shaped apex. From the base arises a short hook directed posteriorly and slightly dorsally. Aedeagus tubular, dilated shortly before apex, with a broad triangular base.

Discussion

The closest relative of *Stactobiella solzhenitsyni* is a Palaearctic species, *S. biramosa* Martynov, described from a tributary of the Ob River in Siberia. The bracteole of *biramosa* on Martynov's (1934) illustration shows only bidentate processes, a character accepted by Ross (1948) in his discussion of known species of *Stactobiella*. In the original description, however, Martynov (1934) clearly states that there is a third process, short and hooklike, arising near the base of the bidentate apex. The examination of a male collected along Angara River near Rasputina Taiga on 30 July 1926 (Fig. 2) supports Martynov's statement and reveals that the bracteole of the Siberian species *biramosa* Martynov, and of the North American *solzhenitsyni* are almost identical. These two species differ only in the ventral view of the claspers and the shape of the tenth tergite. The claspers are parallel-sided, almost quadrangular in *biramosa*, and ovate in *solzhenitsyni*; the tenth tergite is deeply divided in the former, very short and quadrangular in the latter. The Nearctic species *S. palmata* (Ross) is another close relative of *S. solzhenitsyni*, differing chiefly in the shape of the bracteole and claspers. According to Ross (1948) the genus *Stac-*

tobiella is formed by three component phylogenetic units. One of them is the *biramosa* group which is composed of the three closely related species mentioned above. Definite conclusions concerning the distribution of this group, however, cannot be made until more information on this new species is available.

Habits

The larva and the adult female of this species are not known. It is possible that the immature stages live in fast flowing, eurythermic streams such as Whiteoak Run, and not in mountain streams similar to Powdermill Run. Adults of another species, *Stactobiella delira* (Ross), were collected at the same locality (Holland House) during the previous month (May) as well as in June along Powdermill Run at a higher elevation. The flight period of *S. solzhenitsyni* seems to be limited to June, *S. delira* flying in May at the same locality.

Etymology

I take much pleasure in naming this species for Mr. Aleksander I. Solzhenitsyn, the great Russian author, who once shared the same country with the closest relative of the new species—*Stactobiella biramosa* Martynov.

***Apatania blacki*, new species**

A detailed study of several springs in western Pennsylvania revealed a new species closely related to *A. rossi* (Morse) and *A. incerta* (Banks). In order to obtain data on quantitative and qualitative distribution of Trichoptera larvae, one of the localities, Maul Spring in Powdermill Nature Reserve, was sampled on a monthly basis resulting in the accumulation of a large quantity of *Apatania* immature stages. This plus the aforementioned collection of 1975–76 has made it possible to present description of adults, larvae, and pupae.

Holotype.—Male; Maul Spring, Powdermill Nature Reserve, Westmoreland County, Pennsylvania, 6 May 1975, obtained by Jan L. Sykora and John S. Weaver. Deposited in collection of Carnegie Museum of Natural History.

Paratypes.—1 ♂, same data as for holotype; 4 ♂ 5 ♀, same locality as for holotype, 31 May 1975; 1 ♀ same locality as for holotype, 19–20 June 1975; 1 ♀, Beck Spring, Forbes State Forest, Somerset County, Pennsylvania, 23 April 1976. One male and one female deposited in the National Museum of Natural History, Smithsonian Institution, the remaining specimens in the senior author's collection.

700 larvae and pupae: Maul Spring, Powdermill Nature Reserve, Westmoreland County, Pennsylvania, January 1975 through January

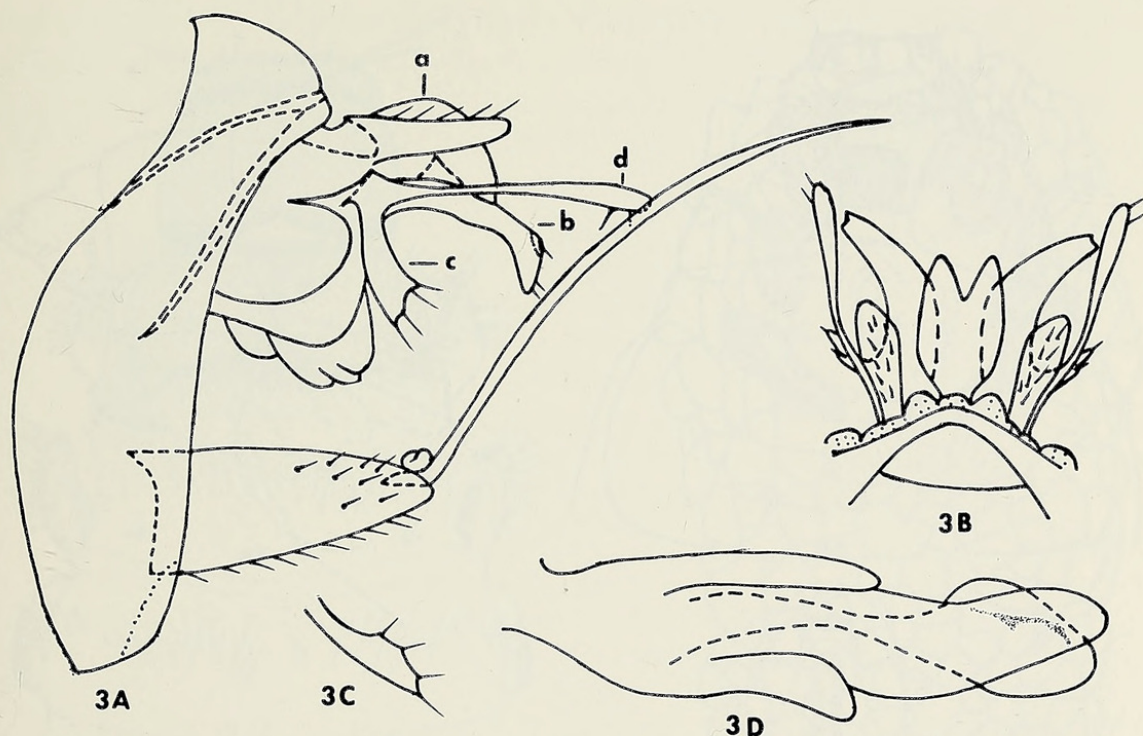


Fig. 3.—*Apatania blacki*, new species, holotype, male genitalia. A, lateral view; B, dorsal view; C, right ventrolateral process, lateral view; D, aedeagus, lateral view.

1976. 42 pupae (pharate adults): Beck Spring, Forbes State Forest, Somerset County, Pennsylvania, 23 April 1976.

Description

Apatania blacki is characterized by ventrally curved, long ventromesal process of the tenth segment and very long, slender apical segment of clasper.

Adults.—Male: Length from head to tip of wings 8.2 mm. General structure typical for the genus. Wing membrane dark brown; head, thorax, coxae and femora black; abdominal sclerites, tarsi, palpi and tibiae brown. Male genitalia (Fig. 3): Ninth segment a ring-shaped narrow strip of chitin, divided into a short and triangular "dorsal" and larger ventral sections. Tenth segment composed of several short branches.

Cerci long with truncate apex. Dorsomesal process of tenth tergite (a) short with closely fused lobes, similar to *A. prevolans* (Morse), forming a triangular incision; ventromesal process (b) curved sharply ventrally and laterally, with a slightly undulating ventral margin and rather sharp apex; dorsal part of the curved section with a heavy sclerotized patch bearing several setae; ventrolateral processes (c) variable, either scoop-shaped, gradually broadening towards the apex, bearing four setae, or (similar to those of *A. rossi*) with slightly clavate apices. Shape of tenth sclerite (Fig. 3C) varies considerably even between left and right side of one individual. Dorsolateral process (d) long and club-shaped. Claspers two-segmented, with the lateral aspect of the basal segment triangular; apical segment longer than in *A. rossi* and *incerta*, gradually curved along its length and with pointed apex bearing short spiculae. Phallus with a large, bulbous apex, and a long, broad lateral process.

Female terminalia (Fig. 4): Ninth and tenth segments very short. Ventral aspect of tenth segment with five very small, rounded lobes at posterior margin; posterolateral

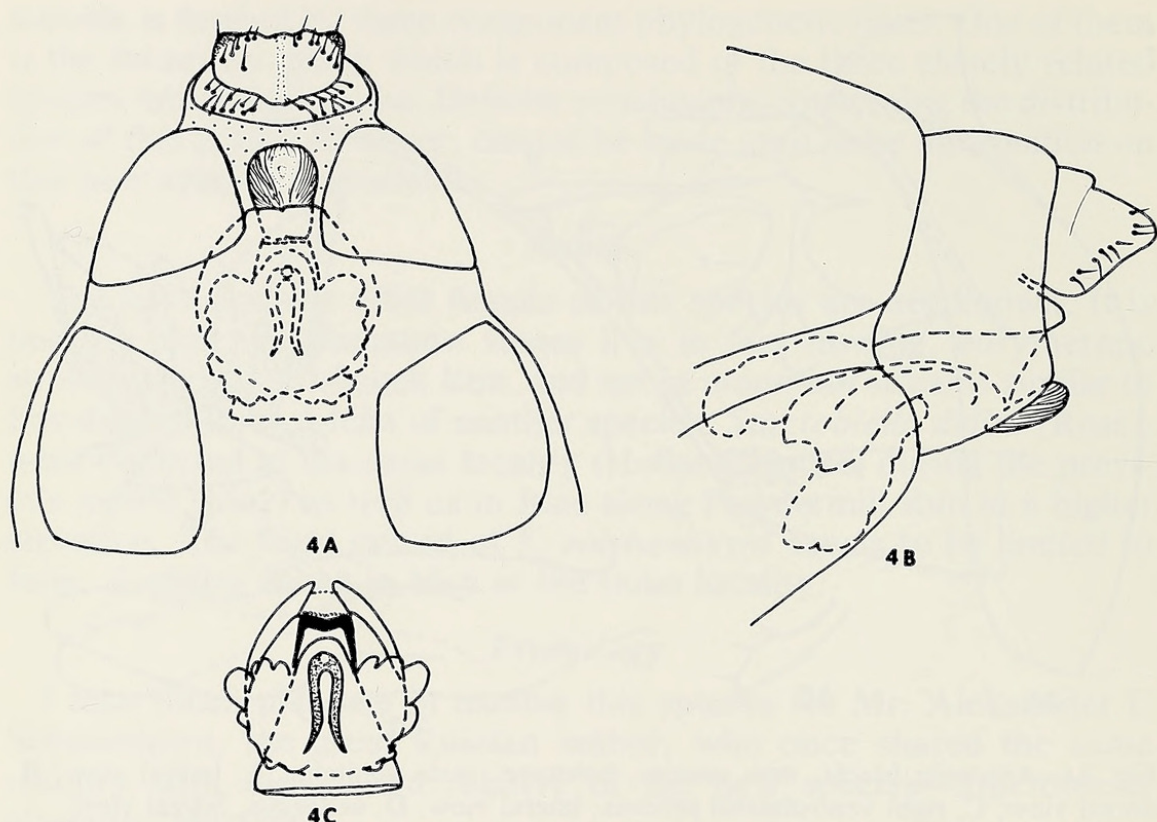


Fig. 4.—*Apatania blacki*, new species, female genitalia. A, ventral view; B, lateral view; C, bursa copulatrix, ventral view.

corners rounded, and more sclerotized than remainder of terminalia. Genital pocket trapezoidal of ninth segment, similar to *A. prevolans* (Morse). A heavily sclerotized, narrow semicircular area situated dorsally to genital pocket with two pairs of "wings" surrounding bursa copulatrix. Bursa is flask-shaped, with a round and bulbous posterior part, and a long, narrow anterior neck.

Immature Stages.—Larva (Fig. 5): Length of full-grown larvae 4.9 to 5.2 mm, case 6.0 to 6.2 mm. Head uniformly dark brown except yellow patches around both eyes with flat dorsum, rounded sides and the rear surface bearing short spiculae. Two prominent, black setae 14 and 15 (*sensu* Nielsen, 1942), arising even closer together than in *A. arizona* (Wiggins, 1973); the distance between their base is much less than one-half diameter of the eye. Labrum with anterolateral lobes covered with soft hairs; two pairs of primary setae present on dark sclerotized area are black, three posterolateral pairs are transparent. Anteromesal pair (*sensu* Nielsen, 1942) is evidently missing as in *A. arizona*. Labium with small labial palp, otherwise similar to that of *A. arizona*. Pronotum dark reddish brown, its posterior edge forming a dark ridge. Mesonotum with two reddish brown, large, rectangular sclerites. Metanotum with sclerite sa 1 (Nielsen, 1942) represented usually by 22 setae arranged in transverse row (Fig. 5A); sa 2 reduced, usually divided into two patches surrounded by five setae; sa 3 is typical, sickle-shaped sclerite with 10 setae. Mesosternum with 4 to 5 setae in middle; metasternum with mesal, round patch of 25 to 27 setae. Legs, similar to those of *A. arizona* with tarsal claw short, basal seta reaching almost to tip of claw, trochanter brush present on forelegs, absent from others. Dorsal hump on first abdominal segment lacking, dorsum covered with several rows of setae, ventral hump smaller than in *A. arizona* and covered with short, stiff hairs (approximately 130). Abdominal segments 2 and 3 dorsally with a pair of presegmental,

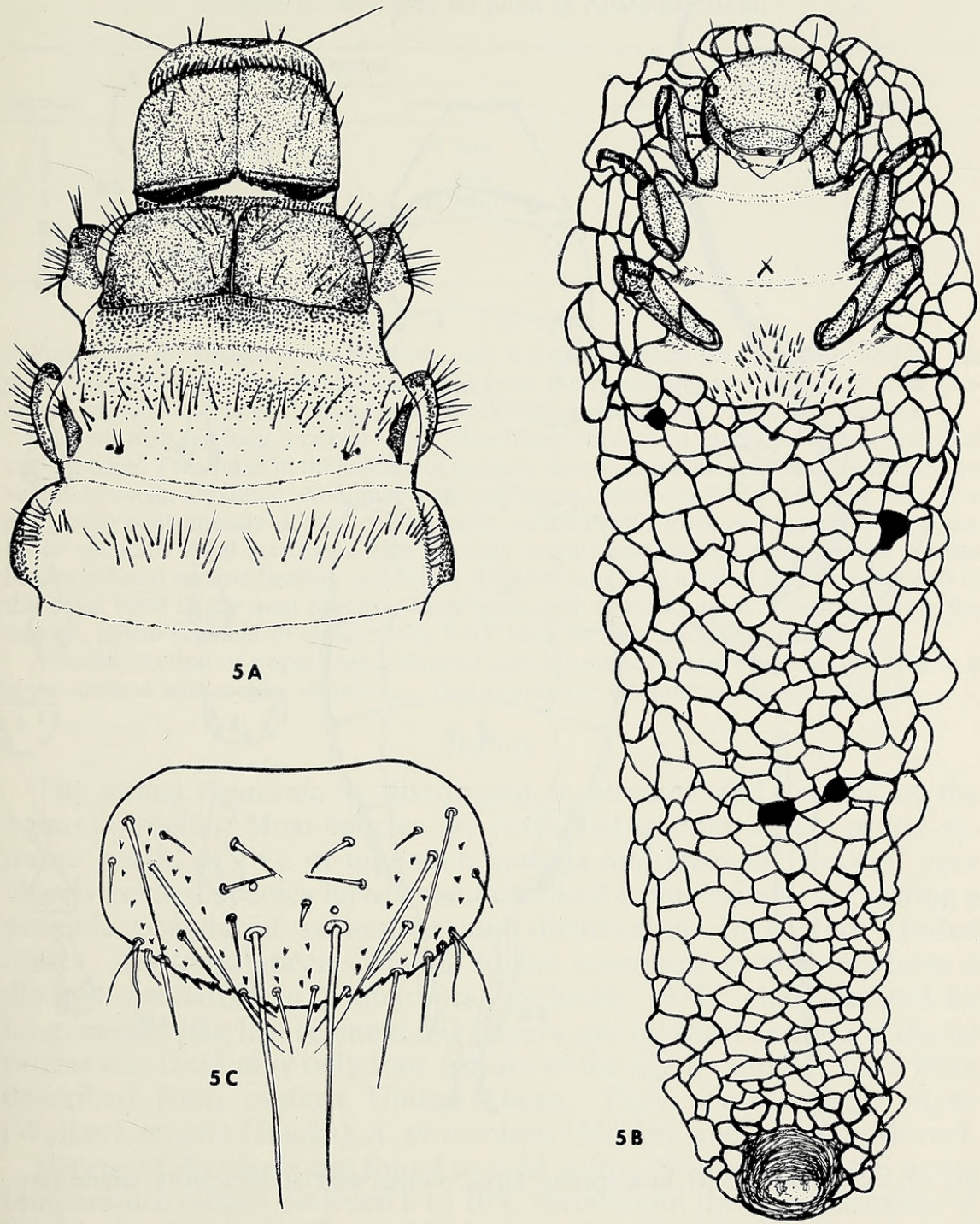


Fig. 5.—*Apatania blacki*, new species, larva. A, head and thorax, dorsal view; B, larva in the case, ventral view; C, dorsal sclerite of ninth segment.

single gill filaments, one pair of postsegmental gills present on dorsum of segment 2-4; ventral aspect of abdominal segments only with postsegmental pairs of gills on segment 2-4. Last abdominal segment with lateral sclerite sickle-shaped, bearing three long setae located dorsally, and with a single proleg hook (Fig. 5D). Ninth tergite (Fig. 5C) quadran-

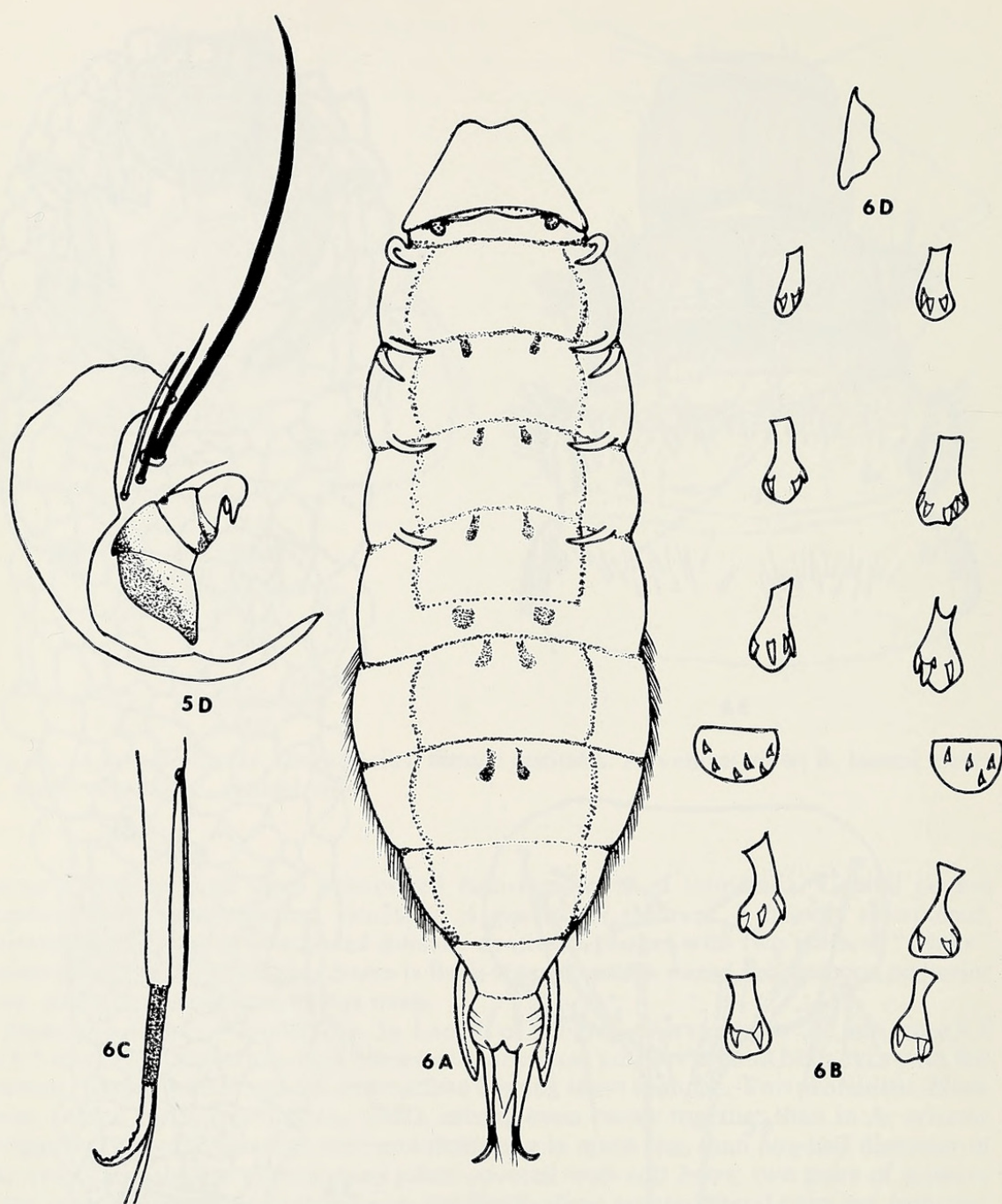


Fig. 5D.—*Apatania blacki*, new species, larva, prolegs with lateral sclerite, lateral view.

Fig. 6.—*Apatania blacki*, new species, pupa. A, abdomen; B, enlarged sclerotized dorsal plates; C, enlarged anal process; D, left mandible.

gular with rounded corners similar in shape to that of *A. incerta* (Flint, 1960). Case is cornucopia shaped, very smooth and built of small sand grains. Fourth and fifth instar larvae build the front section into a hood covering the head, which is less pronounced in younger instars. The same "curved hood" has been described by Wiggins for *A. arizona*. End of the case covered with silky membrane perforated with a round opening in the middle.

Table 1.—Gill data for pupa of *Apatania blacki*.

Segment	Dorsum		Ventrum	
	presegmental	postsegmental	presegmental	postsegmental
1	1 pair	1 pair	—	1 pair
2	1 pair	1 pair	—	1 pair
3	—	1 pair	—	1 pair
4	—	—	—	1 pair
5	—	—	—	1 pair

Pupa (Fig. 6): Length 6.0 to 6.2 mm, case 6.5 mm. Typical for the family and for the genus *Apatania* but may be distinguished from the remaining species by the anal processes in male specimens, shape and decoration of sclerotized plates on abdomen.

Labrum with ten long, hooked setae. Mandible with a short apical tooth and proximal cutting edge. Two setae in the middle of the face shorter than the pair of setae located on vertex between antennae. Abdomen with sclerotized plates as illustrated (Fig. 6B); five pairs with substantially dilated caudal parts, usually with three spines and narrow anterior sections. Anal processes with laterally serrate and curved apices and a median brown colored section bearing two setae. Another long seta located at the caudal end of the basal third of the anal process. Male pupa with typical lateral sheath covering the curved, apical segment of clasper (Fig. 6A). Data on gills are given in Table 1.

Anterior section of pupal case extended into a rounded hood which is attached to a stone surface with a silky membrane, that covers the opening on the ventral side.

Habits

The genus *Apatania* is distributed in streams and springs of the holarctic region. Most species are restricted to cold waters of the extreme north, or live in mountain springs and streams. Several very closely related species have been described from springs, suggesting a possible postglacial separation and distribution. In eastern United States, *Apatania* species belong to the *complexa* group, but form a distinct special *nigra* “subgroup” (Schmid, 1953), characterized by long, needle-like last segment of claspers and by short and broad dorsal processes. Until now only four species of the *nigra* complex have been described from eastern United States. They are *Apatania nigra* (Walker), *incerta* (Banks), *A. praevolans* (Morse), and *A. rossi* (Morse).

Larvae of *A. blacki* are found in cold spring brooks where the water temperature ranges between 8 to 10°C throughout the year. Because of this narrow ecological range they occur in fairly short reaches of springfed streams near the source where temperature variations are minimal. In Maul Spring area they inhabit the first 400 ft of the run-off stream, below this the *Apatania* larvae are scarce, and disappear at a distance of approximately 800 ft from the spring. The life cycle is similar to that of *A. incerta* (Flint, 1960). Larvae of *A. blacki*, however, hatch earlier, probably in May or June, the second instar larvae appearing early in July. Larval development is nearly complete by the begin-

ning of cold season, and most of the winter is spent as prepupae, the pupae occurring in late March through May. Adults are rather rare, apparently diurnal and are not particularly attracted to light.

Etymology

It is a great pleasure to name this species for Dr. Craig C. Black, the director of Carnegie Museum of Natural History, whose interest and assistance was essential for completion of this study.

***Neophylax wigginsi*, new species**

This new species is closely related to *N. atlanta* Ross, differing chiefly in the lateral aspect of the tenth tergite, which is divided by a shallow incision into two very short lobes. The lateral view of the preanal appendage (*sensu* Schmid, 1955) is almost "parrotbeak"-shaped, with an extended and rounded dorsal portion. The clasper, closely attached to the ninth segment, is large with a posteriorly pointed dorsal projection and rounded ventral section.

Holotype.—Male; Maul Spring, Powdermill Nature Reserve, Westmoreland County, Pennsylvania, 10–11 September 1975, collected by Jan L. Sykora and John S. Weaver. Deposited in collection of Carnegie Museum of Natural History.

Paratypes.—11♂ 5♀, same data as for holotype; 1♂ 13♀, same locality as for holotype, 11–12 October 1975. One male and one female in the National Museum of Natural History, Smithsonian Institution, one male and one female in the Royal Ontario Museum, Toronto, Canada. The remaining specimens are in the senior author's collection.

Description

Male: Length 12 mm. Head, antennae, palpal, legs, and body generally brownish yellow. Abdominal tergites somewhat darker, genitalia brown. Front wing membrane uniformly gray, a large yellow area along the posterior margin not forming the typical double diamond shape as in *Neophylax concinnus* McLachlan. Another light yellow mark located near the apex along the margin surrounding the apical section of M2, and an oval and almost transparent area located near the tip of the wing between R5 and M1. Hind wings almost transparent, somewhat grayish and yellow in color. Male genitalia (Fig. 7): Seventh sternite with a ventral, spear-shaped projection. Ninth segment triangular in lateral view, the dorsal half reduced to a narrow, chitinous strap. Tenth tergite large, its apex divided by a shallow incision into two very short lobes with rounded apices of which the dorsal one is larger than the ventral. Preanal appendages large "parrothead"-shaped sclerites with rounded dorsal section, and ventrally pointed, sharp "beak." Clasper is a dark brown sclerite, located ventrally of the preanal appendage divided into terminal and basal segments. The terminal segment (Fig. 7A,a) large, approximately quadrangular with the posterodorsal corner extended into a short and sharp projection; posteroventral corner blunt, bent and extended mesally, forming a ribbon-shaped process. Basal section (Fig. 7A,b) of the clasper short and quadrangular in ventral view. Phallus with tubular base; its apex composed of long, pointed dorsal lobe and short, spear-shaped ventral part.

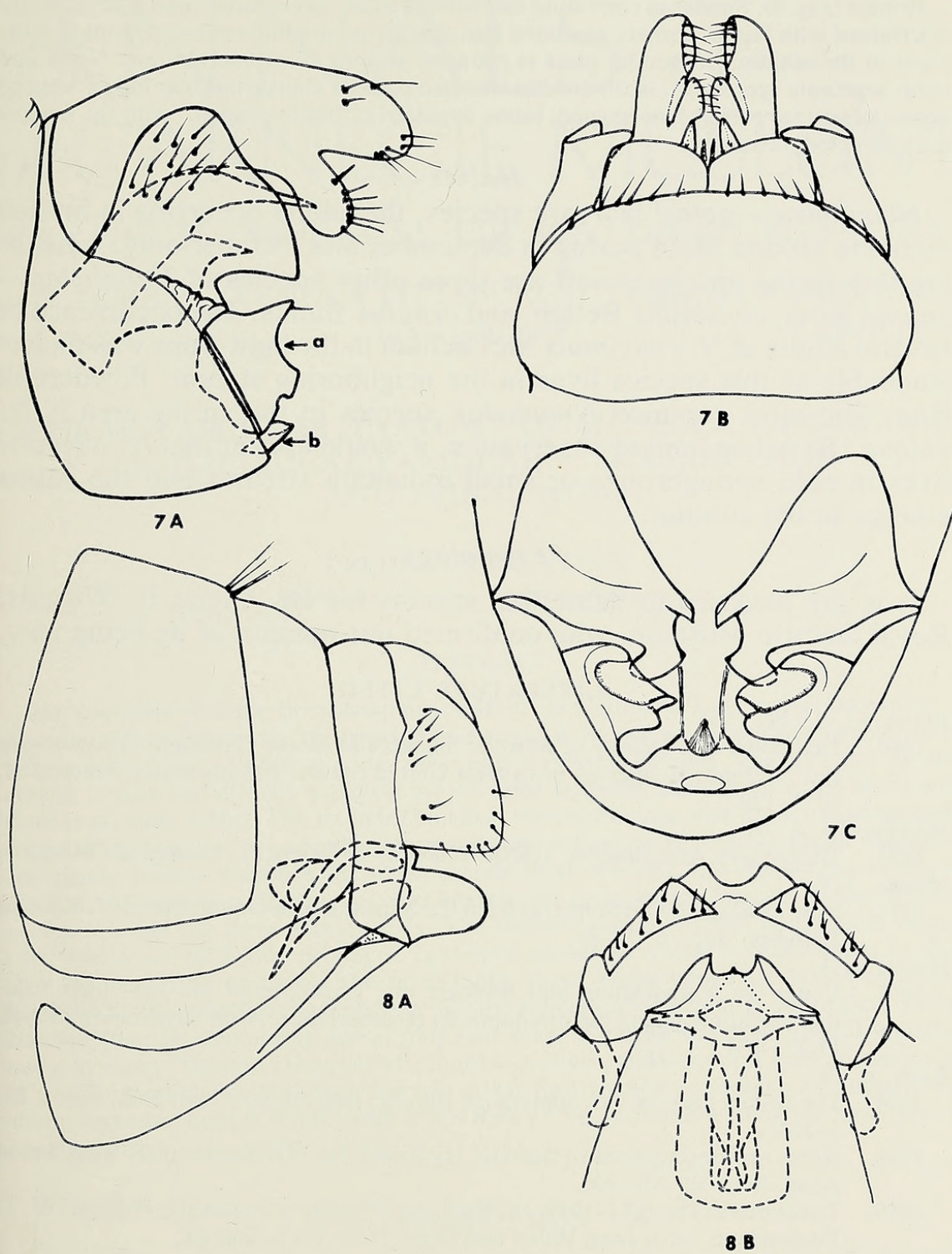


Fig. 7.—*Neophylax wigginsi*, new species, holotype, male genitalia. A, lateral view; B, ventral view; C, caudal view.

Fig. 8.—*Neophylax wigginsi*, new species, female genitalia. A, lateral view; B, ventral view.

Female (Fig. 8): Similar in coloration and habitus to the male. Subgenital plate strongly sclerotized with lateral corners extended into sharply pointed lobes, and bearing a short point in the middle. Subgenital plate is rounded at apex from lateral view. Ninth and tenth segments very short, tenth divided into two pairs of short triangular lobes. Ventral aspect of genital pocket lens-shaped; bursa copulatrix "bottle-shaped" with the narrow neck directed anteriorly.

Habits

Neophylax wigginsii is a rare species, the adults occurring in limited numbers around Maul Spring in September and October only. Inhabiting this spring and its runoff are three other species of *Neophylax*—*aniqua* Ross, *consimilis* Betten, and *ornatus* Banks. The occurrence of several adults of *N. concinnus* McLachlan in the light-traps was understandable as this species lives in the neighboring stream, Powdermill Run. The most common *Neophylax* species in the spring area is *N. aniqua*. Based on limited observation, it would appear that *N. wigginsii* lives in cold springbrooks or small mountain streams and the adults emerge in the autumn.

Etymology

It is my pleasure to name this species for Dr. Glenn B. Wiggins, Royal Ontario Museum, who confirmed our opinion of its being new.

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