

THE IMAGO OF *BAETISCA BECKI* SCHNEIDER AND BERNER (BAETISCIDAE: EPHEMEROPTERA).¹

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ABSTRACT

The previously unknown male and female imagos and male subimago of *Baetisca becki* Schneider and Berner are described from reared specimens. The relationships of *B. becki* to *B. rogersi* Berner are discussed.

Since the genus *Baetisca* was established by Walsh (1862) for the species *Baetisca obesa* (Say, 1839), 10 other species have been described. The imagos of 8 of these species are known, but those of *B. becki* Schneider and Berner (1963), *B. columbinana* Edmunds (1960), and *B. gibbera* Berner (1955) are unknown.

Schneider and Berner (1963) described *B. becki* based on nymphs collected in the Perdido River, Escambia County, Florida and Sweetwater Creek, Santa Rosa County, Florida. Recently, imagos of *B. becki* were collected by us at mercury vapor lights on the Blackwater River, Okaloosa County, Florida. Nymphs collected in the same area were also reared. The following descriptions are based on these collections. In the descriptions, each segment of the fore legs is compared to the length of the fore tibiae and expressed as a ratio, while the average length in millimeters of the fore tibiae is given in parenthesis.

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Baetisca becki Schneider and Berner, 1963, Fla. Entomol. 46:183.

MALE IMAGO (In alcohol): Length: body 6.1mm; fore wings 7.1mm; cerci 5.6mm. *Head* light brown, reddish near base of ocelli, atrophied mouthparts grayish-black. Scape and pedicel of antennae light brown, flagellum pale. Upper portion of eyes yellowish-gray, lower portion black. Basal half of ocelli dark brown, apical half light brown. *Thorax*: pronotum narrow, light brown, darker at posterior margin; mesonotum yellowish-brown, median suture and inner parapsidal furrows reddish-brown, mesoscutellum light greyish-brown; metanotum brown. Pleura of pronotum pale yellow; pleura of mesothorax and metathorax yellowish-brown, carinae darker, margins of mesothoracic spiracles including adjacent sclerites brown. Prosternum pale yellow with minute black stipplings; mesosternum yellowish-brown, darker at margins, basisternum with

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minute black stiplings, a narrow, brownish-orange, longitudinal, median line on furcasternum; metasternum pale, yellowish near base of coxae. *Legs*: prothoracic legs yellow; tarsal claws darker; mesothoracic and metathoracic legs pale yellow except ventral surface of trochanters and femora paler, tarsal claws light brown, darker at apex of inner claws; ratios of segments in fore legs 1.25:1.00 (1.20mm):0.83:0.50:0.41:0.33:0.25. *Wings* (Fig. 1-2): longitudinal veins of fore and hind wings light brown, cross veins hyaline; membrane at base of fore and hind wings reddish-brown, remainder of membrane distad to base of longitudinal veins hyaline. *Abdomen*: terga 1-6 yellowish-brown, washed lightly with brown, posterior fifth of tergum 5 with black stiplings, terga 7 to 10 yellowish-brown, terga 6 to 10 with an interrupted, reddish-brown, longitudinal, median line; sterna 1 to 6 pale, translucent, sterna 7 to 10 pale yellow with minute black stipling near posterior margins; spiracles and tracheae pale. *Genitalia* (Fig. 3): forceps pale yellow, a little darker at apex, genital forceps 2 segmented, apical 1/2 of inner margin of segment 1 strongly curved, with a prominent knob at base of curve, apex of segment 2 blunt; penes pale yellow, triangular, proximal two thirds fused, length of penes 1/2 length of forceps. *Caudal filaments*: cerci pale yellow, extremely reduced median filament light brown.

FEMALE IMAGO (In alcohol): Length: body 6.5mm; fore wings 8.0mm; cerci 5.0mm. *Head* pale brown with minute black stiplings, atrophied mouthparts grayish-black. Scape and pedicel of antennae pale brown, flagellum paler. Eyes grayish-yellow. Basal half of ocelli blackish-brown, remainder pale brown. *Thorax*: color and markings as in male imago, except paler and apex of mesoscutellum grayish-black. *Legs*: prothoracic, mesothoracic, and metathoracic legs pale; base of tarsal claws lightly washed with brown; ratios of segments in fore legs 2.00:1.00 (0.53mm):0.43:0.32:0.32:0.24:0.32. *Wings*: longitudinal veins of fore and hind wings

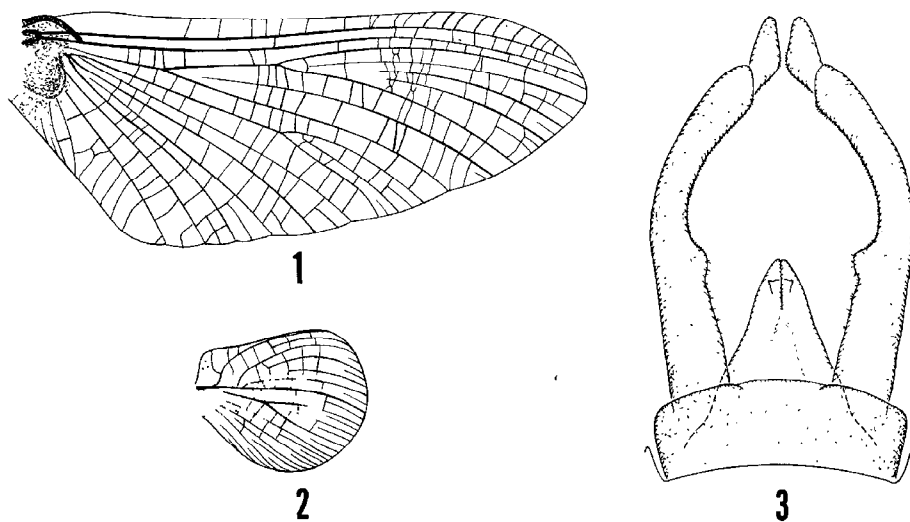


Fig. 1-3: *Baetisca becki*, male imago; 1) fore wing. 2) hind wing. 3) male genitalia, ventral view.

light brown, faded in cubital-anal area, cross veins hyaline; membrane at base of fore and hind wings light brown, remainder of membrane distad to base of longitudinal veins hyaline. *Abdomen*: terga 1 to 6 reddish-yellow with uniform minute black stiplings, stiplings heavier on tergum 6, terga 7 to 8 yellow with black stiplings near lateral and posterior margins, terga 9 to 10 pale yellow, terga 6 to 9 with an interrupted brown, longitudinal, median line; sterna yellow except sterna 8 to 9 paler. Caudal filaments pale, a little darker at base.

MALE SUBIMAGO (In alcohol): Length: body 5.2mm; fore wings 7.3mm; cerci 4.5 mm. Color of *head*, antennae, eyes, and ocelli as in male imago except darker brown. Color of *thorax* as in male imago except darker brown. *Legs*: prothoracic, mesothoracic, and metathoracic legs light brown, tarsal claws darker, apex of tarsal segments black. *Wings*: longitudinal veins of fore and hind wings light brown, cross veins of fore and hind wings hyaline; membrane of fore and hind wings dark brown, translucent, large hyaline clouds surround cross veins of fore wings, clouds larger near bulla and near middle of triad of vein R, large hyaline clouds surround cross veins near center and anterior margin of hind wings. *Abdomen*: color and markings as in male imago except darker brown. *Genitalia*: forceps dark brown, exoskeleton of segment 1 indented near middle giving appearance of 2 segments, penes paler. Caudal filaments brown, paler near apex.

FEMALE SUBIMAGO: Unknown.

The above descriptions are based on the following specimens: 1 male imago, Florida, Okaloosa Co., Blackwater Riv., Kennedy Bridge, 6 mi. W. of Blackman, 1 May 1970; 1 female imago, Florida, Okaloosa Co., Blackwater Riv., Bryant Bridge, 2 1/2 mi. W. of Holt, 9 May 1970; 1 male subimago (reared with associated nymphal skin), Florida, Okaloosa Co., Blackwater Riv., Kennedy Bridge, 6 mi. W. of Blackman, 26 April 1970. All specimens were collected by W. L. Peters, J. G. Peters, P. T. P. Tsui, E. Tsui, M. L. Pescador, and J. Jones and are in alcohol. All specimens are deposited in the collections of Florida A & M University. Association of the nymph, male subimago and male imago was by rearing, while association of the female imago and male imago is based on the wing venation and the color pattern on the wings.

Based on similar nymphal morphology, Schneider and Berner (1963) stated that *B. becki* is closely related to *B. rogersi*. They listed 9 nymphal characters that differentiate the 2 species; however, one of us (Pescador) has just completed a study of the life history of *B. rogersi* and has found that 2 of these characters are quite variable, depending on the age of the nymphs. The shape of the mesothorax and the size of the mid-dorsal abdominal tubercles vary in different nymphal instars of *B. rogersi*. The shape of the mesothorax of mature *B. becki* is more rounded dorsally compared to the sixth through tenth instar nymphs of *B. rogersi*. However, the shape of the mesothorax of the eleventh and twelfth instars of *B. rogersi* is similar to the rounded shape of mature nymphs of *B. becki*. The mid-dorsal abdominal tubercles of the sixth through tenth instar nymphs of *B. rogersi* are more pronounced and keeled than those of mature *B. becki*; however, in the eleventh and twelfth instars of *B. rogersi* the tubercles are similar in development to those of mature *B. becki*. The 7 re-

maining characters listed by Schneider and Berner (1963) will separate mature nymphs of the 2 species.

Based on the presence of dorsal spines on the mesonotum, the nymph of *B. becki* keys to couplet 1, *B. obesa*, in the nymphal key to the southeastern species of *Baetisca* by Berner (1955). However the nymph of *B. becki* can be distinguished from that of *B. obesa* by the more developed lateral spines on the mesonotum, and the less developed frontal process and the more developed genae of the head. We note that while dorsal projections do occur on the mesonotum of *B. rogersi*, these projections do not approach being spine-like in mature nymphs and the apex is rounded.

The imago of *B. becki* can be distinguished from that of *B. rogersi* by the following characters. The male and female imagos of *B. becki* are smaller. The single male imago of *B. becki* has a body length of 6.1mm and a fore wing length of 7.1mm, while male imagos of *B. rogersi* have a body length of 6.5 to 8.6mm and a fore wing length of 8.0 to 9.5mm. The general color of the thorax and abdomen of *B. becki* is light brown, while the general color of these regions of *B. rogersi* is dark brown. In *B. becki* the base of the fore and hind wings is reddish-brown (Fig. 1-2) proximad to the base of the longitudinal veins, while in *B. rogersi* the basal fifth to third of the fore wings and the basal three fourths of the hind wings are dark reddish-brown. A large knob occurs on the inner margin near the middle of segment 1 of the male genital forceps of *B. becki* (Fig. 3), while only a rounded protuberance occurs on the genital forceps of *B. rogersi*.

The male and female imagos of *B. becki* key to couplet 3, *B. rogersi*, in the adult key given by Berner (1955). However, the 2 species can be distinguished by the characters given above.

While studying the imagos of *B. becki* it became apparent to us that the forceps of the male genitalia are 2 segmented. Since the time of Traver (1931) all major accounts of *Baetisca* indicate the forceps of the male imago are 3 segmented, but 2 of the drawings made by Traver (1935) show only 2 segments. This led us to study the genital forceps of the males of all species of *Baetisca* available to us. The forceps of the subimaginal skin of *B. becki* appear 3 segmented, and the exoskeleton of the subimago is indented to give the appearance of segmentation. In the imago there is no sign of segmentation or indentation of the exoskeleton and segments 1 and 2 are entirely fused. The same condition occurs in the subimaginal skin, subimago, and imago of *B. rogersi* and *B. obesa*. In the subimago and imago of *B. laurentina* McDunnough (1932) and *B. escambiensis* Berner (1955) the exoskeleton is indented to give the appearance of segmentation. The extent of indentation is greater in the imago of *B. escambiensis*, and while the indentation is paler than the remaining portion of the forceps, no membranization exists in the indentation. The genital forceps of the male imago of the various species of *Baetisca* studied are 2 segmented; however, various degrees of an indentation occur in some species giving the appearance of segmentation. Further the character state in the subimago appears to be independent of that in the imago. It appears that the evolution of the genital forceps of *Baetisca* may be from a 3 segmented to a 2 segmented condition. As muscles do not occur in the genital forceps of Ephemeroptera, as pointed out by Grandi (1964) and observed by us in *Baetisca*, the classical definitions of the types of seg-

mentation cannot apply to the apparent segmentation of the genital forceps. However we do feel that the state of the apparent segmentation or indentations (giving the appearance of segmentation) in the genital forceps of *Baetisca*, as well as other mayflies, should be indicated in each taxonomic description and key.

The known distribution of *B. becki* is extreme northwestern Florida. The types were collected from the Perdido River and Sweetwater Creek, while Schneider (1967) recorded the species from the Blackwater River and the Shoal River. We cannot add any new localities. The known distribution of *B. rogersi* is northwestern Florida, southeastern Alabama, and Georgia, south of the Fall Line. The distribution of *B. rogersi* entirely overlaps the known distribution of *B. becki*.

Little is known about the ecology and habits of *B. becki*. The species has been collected only from swift, white, sand bottomed streams. Specimens collected by us were taken from swifter, deeper water with more shifting, cleaner sand than nymphs of *B. rogersi* occurring in the same river. Schneider (1967) reported the species from "gravel or rock, sand bottom," while Schneider and Berner (1963) noted that the holotype was collected on a sand bar covered by a thin layer of organic detritus.

In our collections of *B. becki* from the Blackwater River, extremely small nymphs were collected in the middle of September. By March, middle instar nymphs were collected, and nearly mature to mature nymphs were taken by middle April. The 2 imagos and the 1 reared subimago all were obtained within the first 10 days of May. Both imagos collected in the field were sitting on the sandy banks at dusk near a mercury vapor light.

LITERATURE CITED

- Berner, L. 1940. *Baetisca rogersi*, a new mayfly from northern Florida. *Canad. Entomol.* 72:156-160; 5 Fig.
- Berner, L. 1955. The southeastern species of *Baetisca* (Ephemeroptera: Baetiscidae). *Quart. J. Fla. Acad. Sci.* 18:1-19; 23 Fig.
- Edmunds, G. F., Jr. 1960. The mayfly genus *Baetisca* in western North America. *Pan-Pac. Entomol.* 36:102-104; 1 Fig.
- Grandi, M. 1964. Contributi allo studio degli Efemerotteri Italiani XXV. Gli organi genitali esterni maschili nelle forme preimmaginali degli Efemerotteri. *Boll. Ist. Ent. Univ. Bologna.* 27:77-117; 17 Fig.
- McDunnough, J. 1932. New species of North America Ephemeroptera II. *Canad. Ent.* 64:209-215; 3 Fig.
- Say, T. 1839. Descriptions of new North America neuropterous insects and observations on some already described. *J. Acad. Nat. Sci. Philadelphia* 8:9-46.
- Schneider, R. F. 1967. Mayfly nymphs from northwestern Florida. *Quart. J. Fla. Acad. Sci.* 29:202-206.
- Schneider, R. F., and L. Berner. 1963. A new southeastern species of *Baetisca* (Ephemeroptera: Baetiscidae). *Fla. Entomol.* 46:183-187; 6 Fig.
- Traver, J. R. 1931. The Ephemerid genus *Baetisca*. *J.N.Y. Entomol. Soc.* 39:45-67; 34 Fig.

Traver, J. R. 1935. Part II, Systematic *In* Needham, J. G., J. R. Traver, and Yin-Chi Hsu, *The Biology of Mayflies with a Systematic Account of North American Species*. Comstock Pub. Co., Ithaca, p. 237-793.

Walsh, B. D. 1862. List of the Pseudoneuroptera of Illinois contained in the cabinet of the writer, with descriptions of over forty new species, and with notes on their structural affinities. *Proc. Acad. Nat. Sci. Philadelphia* 1862:361-402.

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