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H.H. Ross

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MICRASEMA KLUANE, A PROBABLE
STEPPING STONE TO THE ARCTIC
(TRICHOPTERA BRACHYCENTRIDAE)¹

Herbert H. Ross and John C. Morse²

The arctic fauna has tacitly been considered as a collection of offshoots arising from elements of the boreal deciduous forest, its neighboring biome to the south. Two circumstances make this conjecture plausible. First, the Arctic has a relatively small fauna compared with biomes south of it, and second, the animal species found in the Arctic usually show phylogenetic affinities to groups found in more southern regions. Yet this statistical approach is not well founded logically. It derives from the assumption that the ancestral home of a group is where its greatest numbers now occur, an assumption shown not to be of general application (Ross, 1965). In order to test the validity of the boreal-to-arctic evolutionary pathway, it is necessary to discover circumstances in which the arctic species are derived entities that evolved from more ancestral southern relatives.

In collections of caddisflies made in the Yukon Territory of Canada and in the arctic region of Alaska at Point Barrow in 1968 by Ross et al. and by Goeden and Jewett, a new species of the caddisfly genus *Micrasema* was collected that provided evidence for such a probable origin of the arctic species *M. scissum* McLachlan from a subarctic ancestral form.

Micrasema kluane n. sp.

MALE. Length 8 mm. Color dark brown with membranous areas cream. Wings with uniformly light brown hair and white marks along the base of M_{1+2} and s, r-m, and apical cu-a cross-veins. Eyes large such that the frontal region is scarcely visible in lateral view; 3-segmented maxillary palps long, similar to *sprulesi* and *wataga* (see Ross, 1938, fig. 122). Venation, tibial spurs, and general structure typical for genus. Posterior process of sixth sternum as long as or longer than broad.

Genitalia as in figure 1. Ninth segment annular, widened laterally. Sclerotized lateral arms of the tenth tergum subequal in length to the claspers, upturned and sharply pointed apically, with a cluster of preapical setae and two pairs of setae near the base.

¹This study was supported by a research grant from the National Science Foundation.
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²Department of Entomology, University of Georgia, Athens, Ga. 30602.

Cerci long, pointed apically, separated by a membranous area on the dorsum, and diverging at an acute angle. Claspers clavate, rounded apically, uniformly concave on the meson, and with two semimembranous processes and a sclerotized cusp dorsomesally. The tubular aedeagus is variable in shape, being somewhat angled one-third the distance from the base.

FEMALE. Length 9 mm. Similar in color and general structure to male. Abdomen with a small triangular projection on the sixth sternum. Sclerite of the bursa copulatrix twice as long as wide.

Holotype ♂.—Burwash Landing, Lake Kluane, Yukon Territory, Canada, July 13, 1968, Ross, Ross, and Miller, swept from foliage bordering a small, clear, rocky brook. Paratypes.—Same data as holotype, 2♂, 1♀, Alaska, Steese Highway between Fairbanks and Eagle, July 4, 1968, Goeden and Jewett, along small creek in sparse forest, 5♂; Alaska, Glenn Highway 16 mi E. Tazlina. Goeden and Jewett, along Tolsoma Cr. in boreal forest area, 4♂. Holotype and 7 paratypes to be deposited in the Illinois Natural History Survey, 1 paratype to be deposited in the U.S. National Museum, and 4 paratypes in the collection of S. G. Jewett, Jr.

Discussion.—This species runs to *scissum* in Ross' (1947) key to the nearctic species due to its similarly shaped clasper and upturned pointed apices of the lateral arms of the tenth tergum. It differs from *scissum* in the longer and more slender lateral arms of the tenth tergum and in having a posterior triangular process on the sixth sternum. From *sibiricum* Martynov (1924), to which it is also closely related, the male of *kluane* differs in having the mesal margins of the two cerci divergent and in having the lobes of the tenth tergum slightly shorter, wider basally, and not slightly expanded near the apex in dorsal view.

Together with *sprulesi* Ross, *scissum*, *sibiricum*, and *kluane* form a closely knit group characterized by the possession of a more basal hairy lobe and an adjacent more apical sclerous lobe dorsally on the clasper (Fig. 1B, *a* and *b*, respectively). The sclerous nature of the more apical process *b* appears to be a derived character state distinctive for this complex. In *scissum* (Kimmins and Denning, 1951, Fig. 25*b, c*), *sibiricum* (Martynov, 1924, Figs. 5, 7), and *kluane* (Fig. 1B) the clasper has an additional elongate, narrow, curved dorsomesal process *c* situated just beyond the sclerous lobe *b*, apparently a derived state unique to these three species. From these data it appears that in clasper structure *sprulesi* is essentially like the ancestral form of the group, and that *kluane*, *sibiricum*, and *scissum* are species that arose from a more derived ancestor. The larger, parallel cerci of *sibiricum* indicate this species to be the most primitive of the three, leading to the inference that *kluane* and *scissum* are sister species at the end of this phylogenetic branch of four species.

The known range of *sprulesi* is in the boreal forest of eastern North America, that of *sibiricum* is apparently in the boreal forest of south-central Siberia (Minousinsk), and that of *kluane* is in the boreal forest of western North America. The indicated phylogenetic position of *scissum*, a highly derived species, suggests that it is an Arctic tundra offshoot of its common ancestor with *kluane*, presumably a nearctic species inhabiting the boreal coniferous forest.

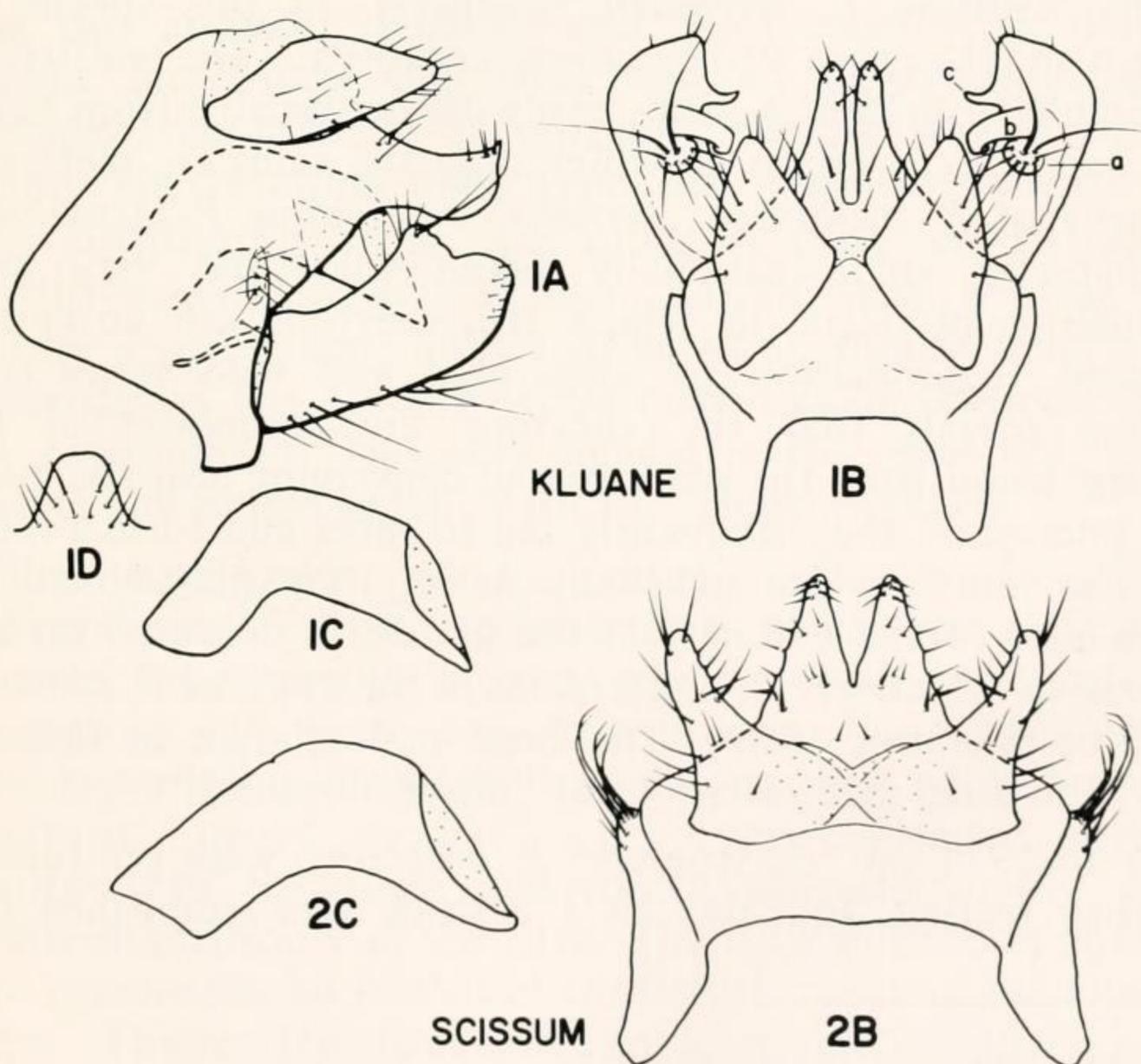
Abstract:—*Micrasema kluane*, a probable stepping stone to the Arctic (Trichoptera, Brachycentridae). A new species *Micrasema kluane* is described from Yukon Territory, Canada, and southern Alaska, belonging to a monophyletic species group embracing also *sprulesi* Ross (eastern Canada), *sibiricum* Martynov (south-central Siberia), and *scissum* McLachlan (from Arctic tundra of Alaska and Siberia). From a consideration of these known distributions and the phylogeny of the group, it is inferred that the group initially evolved in the boreal coniferous forest and that the Arctic tundra lineage represented by *scissum* evolved from a boreal coniferous forest ancestor.—Herbert H.

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Descriptors: Trichoptera, Brachycentridae, *Micrasema*, Arctic tundra, boreal coniferous forest.

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Figs. 1-2. Male genitalia of *Micrasema*. 1, *M. kluane*; 2, *M. scissum*. A, lateral aspect; B, dorsal aspect; C, aedeagus, lateral aspect; D, posterior process of sixth sternum. a, b, c, mesal processes of clasper.

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SCISSUM

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