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NOTEWORTHY RECORDS OF CADDIS FLIES FROM  
MICHIGAN, WITH DESCRIPTIONS  
OF NEW SPECIES<sup>1</sup>

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IN THE course of extensive field studies on the ecology and life histories of aquatic insects in Michigan trout waters, we have collected several species of Trichoptera which appear not to have been known previously, and have taken examples of other species which have already been described but deserve special mention. All material discussed herein, including types, has been placed in the collections of the Division of Insects, University of Michigan Museum of Zoology, except as noted.

We gratefully acknowledge the assistance in field collecting received from Dr. C. L. Hess and from colleagues in the Michigan Department of Conservation. We are deeply indebted, also, to Dr. H. H. Ross, Illinois Natural History Survey, who verified our determinations and generously offered the use of his original drawings of the male of *Brachycentrus fuliginosus*.

*Agapetus hessi*, new species

MALE.—Length of body, 4 mm.; of forewing, 5.5 mm.

<sup>1</sup> Contribution from the Institute for Fisheries Research, Michigan Department of Conservation co-operating with the University of Michigan.

General color of body, antennae, and palps dark brown. Forewings grayish brown, apical half very faintly irrorate; hind wings slightly paler than forewings, immaculate. Legs very pale grayish brown except coxae, which approximate the body color. General characteristics typical of the group, including the paired, ovate, lateral organs of the fifth sternite and the stout, median, curved process of the sixth sternite. Genitalia as shown in Plate I, Figures 1, 2, 5. Claspers about 8 per cent longer than greatest length of ninth segment, semicylindrical in cross section, expanding in width from base to apex, apical margin markedly trilobed in lateral view; from the ental surface of the median lobe a broad-based, sharp-pointed, sclerotized flat plate projects mesad, and immediately ventrad of this plate there arises a heavily sclerotized, rounded, acuminate horn or hook which projects mesocaudad so that its tip is generally visible in lateral view. Cerci, viewed from above or below, rounded, thumb-shaped, apically divaricate; viewed from the side, slender, the lower margin sinuate, the upper gently curved, and fringed with long setae. Tenth tergite nearly as long as claspers; dorsal part largely membranous; ventral part divided into two sclerotized rods which bear two dark, curved, divaricate horns subapically, and which appear to fuse basally with the cerci and the dorsal element of the tenth tergite.

FEMALE.—Length of body, 4.5 mm.; of forewing, 5.5 mm. In color and general appearance closely similar to male. Fifth, sixth, and seventh sternites bearing crescentric ridges, and the sixth sternite a short, straight, subacuminate process, as described for females of other species in the group. Evaginated terminalia are shown in Plate I, Figure 7.

Holotype, male, Michigan, Crawford County, T. 25 N., R. 2 W., section 21, South Branch Au Sable River, June 17, 1948, C. L. Hess.

Allotype, female, same locality and collector as holotype, June 23, 1948.

Paratypes, same locality and collector as allotype, 3 males, 14 females, June 23, 1948; 3 females, June 27, 1948. The

type series is deposited in the University of Michigan Museum of Zoology except for a male and a female sent to the collection of the Illinois Natural History Survey and a male and a female in the private collection of the collector, Dr. C. L. Hess, in whose honor the species is named.

This species appears to be a member of the *pinatus* group and to have as its closest relative *A. rossi* Denning, a species described (Denning, 1941), from St. Louis County, Minnesota. Ross has courteously supplied a specimen of *rossi* from which drawings (Pl. I, Figs. 3, 4, 6) were prepared. A comparison of the male genitalia of the two species reveals, among other differences, that the apex of the clasper of *hessi* is much more strongly trilobed than is that of *rossi* in lateral view and that the heavily sclerotized plate and hook arising from the inner face of the clasper of *hessi* are represented in *rossi* by a low, undulant ridge. The rodlike lower element of the tenth tergite of *rossi* bears a pair of heavy lateral spines and a thin apical expansion directed ventromesad, which are absent in *hessi*. In relation to the over-all dimensions of the insect, the male abdominal terminalia appear to be larger in *hessi* than in *rossi*.

#### *Polycentropus sabulosus*, new species

MALE.—Length of body, 6 mm.; of forewing, 7 mm. General body color, dark brown; legs amber. Forewings dark brown with small pale spots on costal and apical margins. Hind wings dilute brown, semitransparent, both fore and hind wings narrowly transparent along crossveins *r-m*, *M*, *m-cu*, and distal end of *Cu*<sub>2</sub>. Vein *R*<sub>2</sub> present in both fore and hind wings. Male genitalia (Pl. II, Figs. 1–3) with some superficial resemblance to those of *P. cinereus* Hagen; ninth sternite wide laterally, narrow ventrally; ninth tergite largely membranous; tenth tergite represented by two chitinized rods strongly divaricate apically; cerci ovate, blunter apically than in *cinereus*; ental face of clasper with a knob-tipped lobe projecting mesad, tip of clasper excavated to present a broadly and shallowly furcate aspect in ventral view.

Holotype, male, Michigan, Crawford County, T. 26 N., R. 2 W., section 12, Au Sable River, June 1, 1948, J. W. Leonard and F. A. Leonard.

Paratypes, June 3, 1948, same locality and collectors as holotype, 2 males.

*Polycentropus sabulosus* appears to be most nearly related to *P. cinereus* Hagen, but differs in the genitalic characters and somewhat smaller size. Insects of this species appeared on the wing ten days earlier than did the first specimen of *cinereus* taken during daily collecting in the same locality.

*Banksiola canadensis* (Banks)

Described originally from Ontario (Banks, 1907), this species appears never to have been figured. We have taken four males in Michigan, as follows: Crawford County, Au Sable River, three males, June 27, July 4, July 25, 1948; Ogemaw County, Fontinalis Creek, one male, June 11, 1948. The male genitalia are illustrated in Plate II, Figures 4-6.

*Platycentropus plectrus* Ross

This species was described by Ross (1938) from two male specimens, one of which, the holotype, was collected along the Platte River in Benzie County, Michigan. We have been able to take one female in definite association with a male, from a site on the Au Sable River about seventy miles due east of the type locality.

The female closely resembles the male in size, form, and coloration, and in ambisexual characters of structure. Genitalia are shown in Plate III, Figure 3.

Allotype, female, Michigan, Crawford County, T. 26 N., R. 2 W., section 12, Au Sable River, August 23, 1948, J. W. Leonard and F. A. Leonard.

This specimen has been deposited in the collection of the Illinois Natural History Survey, which contains the holotype.

*Limnephilus rossi*, new species

MALE.—Length of body, 14 mm.; of forewing, 15 mm. General body color, varying shades of yellowish brown with

purplish washing on sides of abdomen. Antennae dark brown. Legs yellow with black spines; tibial spur formula 1-3-4, all spurs long, slender, yellow. Forewings (Pl. IV, Fig. 2) irrorate, dark brown and pale yellow; an extensive pale area from *R* to costal margin extending from wing base to the poorly-defined stigmatic area; a large, reniform, pale area crossing the apex of *M*, and another just apical to the chord.

Head dorsum largely naked except for warts anterior to lateral ocelli, each of which bears five or six long, curved, yellow bristles, and posterior warts which bear six or eight darker bristles. Following the rear margin of the compound eye, the gena bears a line of ten to twelve long, stout, black bristles and four or five shorter ones. Pronotal warts large, inflated, bearing numerous long, yellow bristles. Linear scutal warts of mesonotum about half as long as mesoscutum, each bearing five or six long, pale bristles.

Genitalia are illustrated in Plate IV, Figures 1-1*a*. The eighth tergite is strongly produced caudad on the mid-line and bifurcated to form two narrow, sharply pointed projections which overhang the terminalia. The ninth segment, broad ventrally, tapers to a thin point dorsally, the tergum membranous. The cerci, broadly concave in a transverse plane and subquadrate in caudal view, are partially separated by a weak, incomplete suture from the greatly reduced tenth tergite which is produced caudad on the mid-line into a pair of divaricate, retrorsely curved, sclerotized points. Claspers with a slender, parallel-sided caudal projection arising dorsally, remainder broad in lateral view but seen to be thin and platelike when viewed in caudal aspect. Aedeagus simple, each of its lateral arms developed apically into a broad, mitten-shaped structure which is closely covered with heavy setae.

Holotype, male, Michigan, Crawford County, T. 26 N., R. 2 W., section 12, Au Sable River, October 4, 1948, J. W. Leonard and F. A. Leonard.

Paratypes, Michigan, Montmorency County, T. 29 N., R. 2

E., section 35, Hunt Creek, September 17, 1940, 10 males; September 18, 1940, 3 males; October 6, 1940, 1 male, E. L. Cooper and J. W. Leonard.

On the basis of morphology, the relationships of *L. rossi* are obscure. The terminalia bear a slight, superficial resemblance to those of *L. merinthus* Ross, but the two species differ in almost all characters, including size. Obviously a component of the autumnal fauna, *rossi* was always taken by sweeping dry grass overhanging the edge of cold, spring-fed streams.

*Limnephilus ozburni* (Milne)

This species was described from Ontario, Manitoba, and Quebec (Milne, 1935), but has not hitherto been figured. Male and female genitalia are illustrated in Plate III, Figures 1, 1a, 2, 4, 5, 6. The specimens figured are from a series of seven males and fourteen females, which we captured along the Au Sable River in Crawford County, Michigan, between June 23 and July 5, 1948. In the unidentified collections of the University of Michigan Museum of Zoology we found one male from Gratiot County (July 1) and two males from Dickinson County (July 19 and 21).

*Athripsodes scopulosus*, new species

MALE.—Length of body, 9 mm.; of forewing, 11 mm. Head, antennae, legs, thoracic notum and abdomen medium brown, mesopleural and metapleural sclerites piceous. Wings grayish brown, very sparsely and faintly irrorate. Genitalia as shown in Plate V, Figures 1–3. Cerci ovate, basally fused and broadly joined to ninth tergite, apices subacuminate; dorsum of cerci bearing two asymmetrical finger-like lobes or processes directed caudad. Tenth tergite wide, extending caudad slightly beyond claspers, its apical margin reflexed upward, the lateral margins with a pair of closely-appressed sclerotized rods at about mid-length. Clasper with a long basal process, the apex of which is pointed and directed slightly mesad; apical segment terete, blunt-tipped, not

sharply differentiated from basal segment, mesal process about half as long as apical segment, straight, slender, bearing two or three strong setae apically. Aedeagus with a single, internal, sclerotized spine.

Holotype, male, Michigan, Gogebic County, T. 45 N., R. 40 W., sections 12-13, Sucker Lake, June 17, 1948, L. R. Anderson.

Paratypes. Ross has referred to us two male pupae from the Beaverkill River, Beaverkill, New York, collected July 24, 1940 (Fischer). Dissection of the well-formed genitalia has convinced us that these pupae may be assigned to *A. scopulosus*. Figures of the pupal case and apical processes are provided (Pl. V, Figs. 4, 9).

This species appears to be most closely related to *A. annulicornis* (Stephens), but differs in various genitalic characters including the more strongly upturned apical margin of the tenth tergite, the longer, blunter, more declivent ventral process of the basal clasper segment, and a less inflated aedeagus base.

*Lepidostoma bryanti* (Banks)

Ross (1946), in assembling the scanty distributional records of *L. bryanti*, noted the absence in collections of positively associated females. During the summer of 1948, we took specimens of *bryanti* of both sexes in considerable numbers along the Au Sable River in Crawford County. A female, definitely associated with a male, is here designated as the allotype, and the spermatheca is figured (Pl. IV, Fig. 4). A drawing of the male terminalia is also provided for convenience of comparison (Pl. IV, Fig. 3).

Allotype, female, Michigan, Crawford County, T. 26 N., R. 2 W., section 12, June 3, 1948, J. W. Leonard and F. A. Leonard.

*Brachycentrus fuliginosus* Walker

Betten and Mosely (1940) illustrated and redescribed Walker's type of *B. fuliginosus*, a female. Denning (1941) figured and described as allotype a specimen he concluded

was the male of *Brachycentrus incanus* Hagen, a species sometimes considered synonymous with *fuliginosus*. We have specimens of *fuliginosus* from Michigan, as follows: Crawford County, South Branch Au Sable River, 1 female, May 30, 1948, C. L. Hess. Lake County, Pere Marquette River, 3 males, 10 females, June 9-10, 1947, J. W. Leonard and F. A. Leonard.

Ross made available to us his unpublished drawings of the male terminalia of *fuliginosus* (Pl. V, Figs. 5-8). Comparison of Ross's drawings (the characters as shown agree perfectly with those of our specimens) with Denning's (1941) figures of *incanus* leaves little doubt but that the two species are distinct.

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## PLATE I

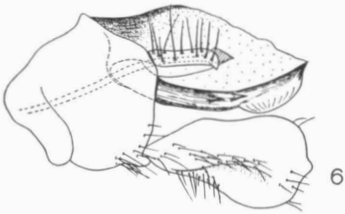
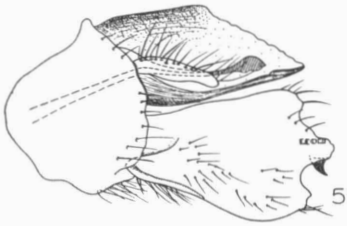
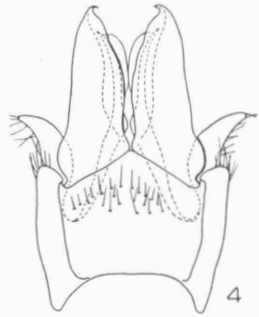
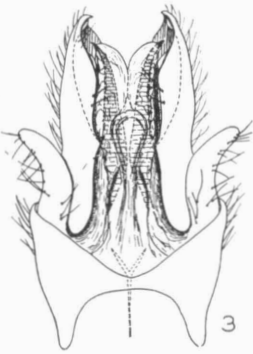
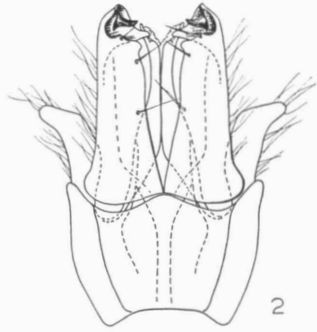
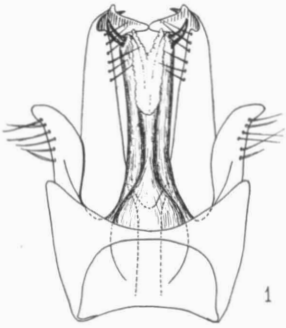
FIGS. 1, 2, 5. *Agapetus hessi* new species; dorsal, ventral, and lateral aspects of male genitalia.

FIGS. 3, 4, 6. *Agapetus rossi* Denning; dorsal, ventral, and lateral aspects of male genitalia.

FIG. 7. *Agapetus hessi*, new species; lateral aspect of evaginated apex of female abdomen.



PLATE I



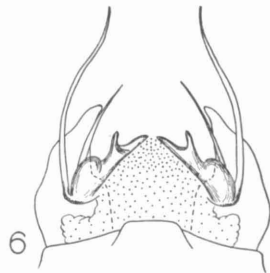
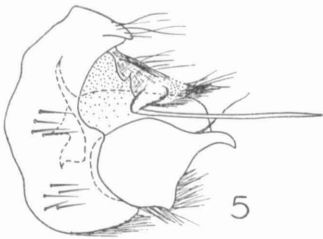
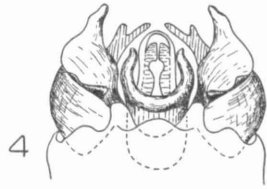
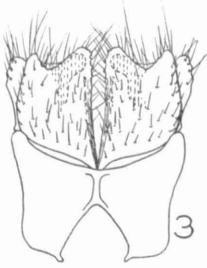
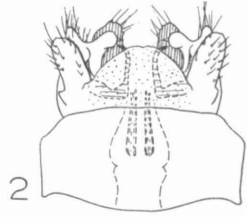
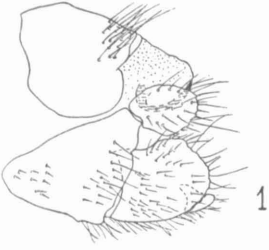
*Leonard and Leonard*

PLATE II

FIGS. 1-3. *Polycentropus sabulosus*, new species; lateral, dorsal, and ventral aspects of male genitalia.

FIGS. 4-6. *Banksiola canadensis* (Banks); ventral, lateral, and dorsal aspects of male genitalia.

PLATE II



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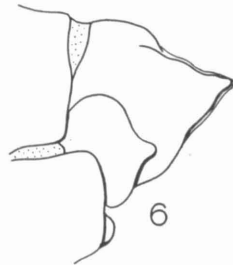
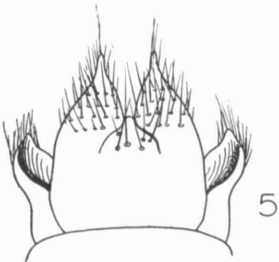
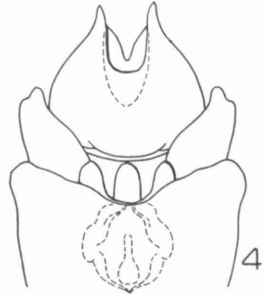
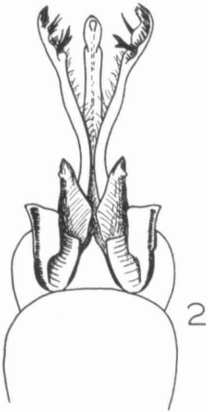
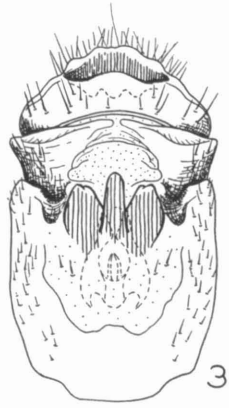
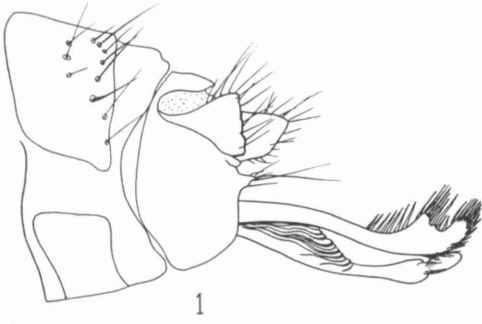
PLATE III

FIGS. 1-2. *Limnephilus ozburni* (Milne); lateral and dorsal aspects of male genitalia and enlarged view of ental aspect of left lateral appendage of penis.

FIG. 3. *Platycentropus plectrus* Ross; ventral aspect of female genitalia.

FIGS. 4-6. *Limnephilus ozburni* (Milne); ventral, dorsal, and lateral aspects of female genitalia.

PLATE III



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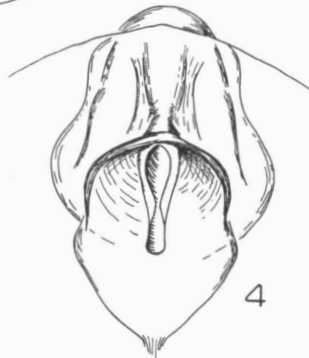
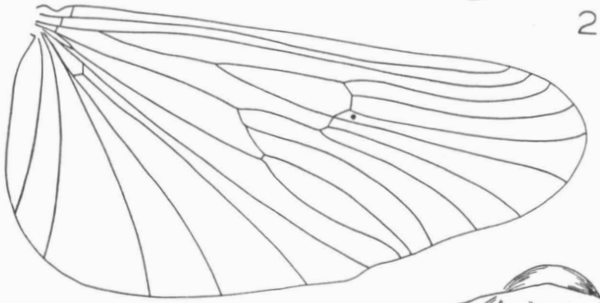
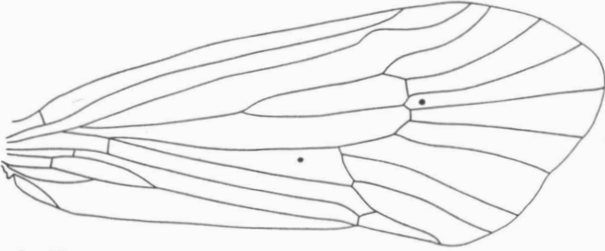
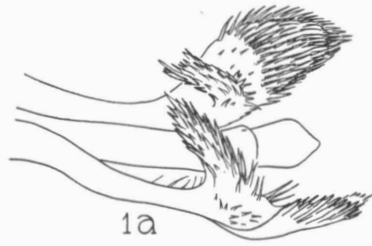
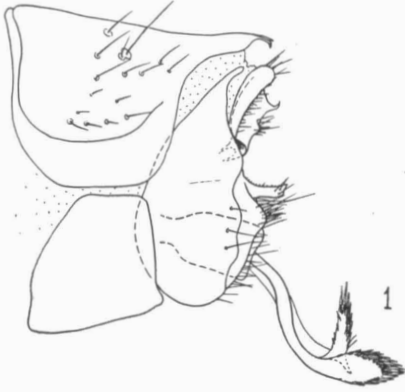
PLATE IV

FIGS. 1-2. *Limnephilus rossi*, new species; lateral aspect of male genitalia, enlarged dorso-oblique view of penis, and venation.

FIG. 3. *Lepidostoma bryanti* (Banks); lateral aspect of male genitalia.

FIG. 4. *Lepidostoma bryanti* (Banks); ventral aspect of female spermatheca.

PLATE IV



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PLATE V

FIGS. 1-3. *Athripsodes scopulosus*, new species; lateral and caudal aspect of male genitalia and enlarged view of penis.

FIGS. 4, 9. *Athripsodes scopulosus*, new species; apical processes of pupa and pupal case.

FIGS. 5-8. *Brachycentrus fuliginosus* Walker; male, dorsal aspect of cerci, lateral aspect of cerci and claspers, caudo-ventral aspect of left clasper, dorsal aspect of tenth tergite.

Figures 5-8 by H. H. Ross.



PLATE V

