A CONTRIBUTION TO THE TAXONOMIC STUDY OF INSULAR NEWFOUNDLAND CADDIS FLIES (TRICHOPTERA)

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A CONTRIBUTION TO THE TAXONOMIC STUDY OF INSULAR NEWFOUNDLAND CADDIS FLIES (TRICHOPTERA)

by

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ABSTRACT

Ninety-seven species of Trichoptera in 38 genera from 13 families are recorded from insular Newfoundland. Fifty-four of these are new records.

About 2000 adults were collected and identified by the author. In addition about 700 specimens from other collectors were identified by the author. Also included are the caddis fly collections of the Canada Agricultural Research Station, St. John's, totalling some 150 previously identified specimens.

All specimens were collected with "blacklight" fluorescent traps.

Keys are given to families, genera, and species known from Newfoundland. Illustrations are given of morphological differences separating families and genera. The male genitalia are the definitive species characteristic and all are figured except those of the Hydroptilidae. Female genitalia are drawn only if no published figures are available.

The geographical range in North America is given for each Newfoundland species, with particular emphasis on their known northeastern and eastern distributions.

The Newfoundland trichopteran fauna, although poorer in species, is apparently similar to the caddis fly fauna of northeastern North America.

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INTRODUCTION

Little has been published on insular Newfoundland Trichoptera. The earliest reference is to a limnephilid and another unidentified species in "Entomologia Terra Novae" (Gosse 1834-35).

Walker (1852) and McLachlan (1871) recorded *Platycentropus indistinctus* (Walker) and *Pycnopsyche guttifer* (Walker) respectively from Newfoundland.

The first significant paper dealing with Newfoundland Trichoptera (Banks 1908) lists 20 species from the Island, including 7 new species.

The second and latest paper on Newfoundland caddis flies (Wiggins 1961) records 31 species from the Island (21 being new records) and redescribes the rare phryganeid *Fabria complicata* Banks. Wiggins received most of the specimens from Dr. C. Lindroth, University of Lund, who visited Newfoundland as part of the Swedish expedition to the Island from 1949 to 1951. The rest of the Newfoundland material recorded by Wiggins was sent to him from various federal and provincial research agencies.

One other species has been recorded from the Island (Yamamoto & Wiggins 1964) bringing the number of published records for Newfoundland to 43 species.

The purpose of this study was to initiate a more complete taxonomic survey of Newfoundland Trichoptera and to compile comprehensive keys with detailed drawings of known species. It is hoped that this taxonomic study will facilitate further research on all aspects of the Island's caddis fly fauna.

It is well beyond the scope of this thesis to include a detailed account of trichopteran biology. Literature on the subject is very extensive and the major works are cited in the references.

The caddis fly adult is figured (Figs. 1, 2, 3) to illustrate the terminology of parts pertinent to the taxonomic keys. As the male genitalia are peculiar to Trichoptera and the definitive species characteristic, a general description follows. The 9th and 10th male abdominal segments are modified to form the sclerotized genital segments. The genitalia consist of three prominent structures: the aedeagus, the claspers, and the 10th tergite. The reader is referred to Figures 25 to 159 which illustrate these structures and their variability throughout the Trichoptera. The 10th tergite is a highly modified abdominal segment functioning probably to protect the other genital structures. Cerci may or may not be present on the 10th tergite. The aedeagus or penis is ventral to the 10th tergite between the claspers and is normally retracted. The aedeagus may or may not have lateral arms attached at the base. The paired claspers are lateral and ventral in their position and may be one- or two-segmented. The claspers function to clasp the female prior to and during mating.

METHODS AND MATERIALS

Collecting

Adults were collected with a 12 volt DC Porta-Lamp[1] with a 15 watt tube[2] which fluoresced predominately at the blue and ultra-violet parts of the spectrum (commonly called "blacklight"). The lamp illuminated a white sheet (2m x 2m) both being suspended from the drain rim of a vehicle. All collections commenced just after sunset and continued for 1½ to 2 hours, this being the peak period of adult activity.

Adult collections were made across the Island during the summer of 1973. Collection sites are indicated on Figures A & B.

Some of the collectors whose trichopteran material is included in the results also used "blacklight" traps, although their collections were not directed specifically at Trichoptera. These "blacklight" traps were manufactured by the following companies and used by the following persons: 12 volt trap, Survival Security Corporation, Lake City, Minnesota, Mr. R. Morris, research scientist, Canada Agricultural Research Station, St. John's; 110 volt trap, Electronic Equipment Company, Madison, Wisconsin, Prof. J. Phipps, Head, Biology Department, Memorial University; 110 volt General Electric trap, Mr. B. Jackson, resident naturalist, Oxen Pond Botanic Park.

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[1] Browning Arms Company, Montreal, Canada.

[2] General Electric Serial # F15TS-BL.

Mr. J. Maunder collected adults which were perched on the outside of his house situated near Kents Pond, St. John's.

All known collection sites including published records are indicated in Figures A & B.

All adults were preserved in 80% ethanol.

Larvae and pupae were collected outside St. John's (Figure C) and brought to the laboratory where they were reared in a simulated freshwater habitat (Mason & Lewis 1970). Emerged adults were preserved in 80% ethanol. It was impossible to establish the original collection sites of emerged adults as limited space in the laboratory stream made it difficult to keep larval and pupal specimens from different habitats separate. The original collection sites are indicated in Figure C.

Collection data on all species currently known from the Island are indicated in the results.

Identification

Identification of adults at the family and generic levels is based on general body morphology, while at the specific level the male genitalia are the definitive character. Generally, the female genitalia are not adequately described in the literature and are used here in identification only when they are well known.

Genitalia were prepared for examination by detaching the abdomen clearing it in cool (approx. 10°C) 15% KOH for 6-12 hours (depending on size), washing it in distilled water and then in 50% ethanol before replacing it with the rest of the specimen in 80% ethanol. This clears and loosens the genital segments so that they can be exposed for examination (Nimmo 1971, Ross 1944).

At first the wings were prepared for examination by a rather tedious process of mounting and bonding the wings between two microscope slides (Nimmo 1971). However, this procedure proved time consuming and was soon discarded in favour of simply placing the detached wing in glycerine.

When necessary other body structures, important in trichopteran morphology, were examined in ethanol.

Whenever possible the males and females were used in determining the family, genus and species. All identifications were verified by Dr. G. Wiggins, curator, and Mr. T. Yamamoto, assistant curator, Department of Entomology and Invertebrate Zoology, Royal Ontario Museum.

Keys

Keys are given only to those families, genera and species presently known to occur in Newfoundland. Published keys have been condensed and modified to include only Newfoundland species and reference is given to the original keys throughout. Where no published keys were available new keys have been made. Females are keyed only when identification is definite.

Reference is given to the published description of each species. However, where the published description of the genitalia is lacking, a description is given here.

Drawings

Drawings were made to scale using a stereomicroscope with a 20mm net micrometer in one of the eyepieces in conjunction with an enlarged square grid pencilled on drawing paper.

Genitalia were prepared for drawing by the following method: i, a

straight pin placed in the open anterior end of the abdomen; ii, the other end of the pin supported in permoplast in a dish; iii, the assemblage submerged in glycerine. This method holds the genitalia for drawing.

Male genitalia of all species are drawn except those of the Hydroptilidae (p.34). All male genitalia are drawn from the left side, with additional aspects illustrated when necessary. Female genitalia are only drawn when published figures are not available.

Wings are drawn from either permanent slides or temporary mounts in glycerine. Other body structures are drawn from specimens mounted in glycerine following the same procedure as for the genitalia.

All structures drawn were measured with the 20mm net micrometer. Lateral aspects of the male genitalia were measured to include the 9th segment to the tip of the 10th tergite or claspers. The length of the aedeagus was not included in this measurement as this structure is highly extensible.

Sources of material are noted in the results.

Distribution

Distribution in North America and in particular northeastern and eastern areas are noted for each Newfoundland species. These northeastern and eastern ranges are taken here to include the area east of the Great Plains.

Deposition of Material

Most specimens collected during this study are in the reference collection of the Biology Department of Memorial University. Selected specimens were deposited in the Royal Ontario Museum at the request of Dr. G. Wiggins, curator, Entomology and Invertebrate Zoology Department.

Specimens not in the author's collection are noted by the following abbreviations of the institutes in which they are deposited: ARS, Agricultural Research Station, St. John's, Newfoundland; CNC, Canadian National Collection, National Museum, Ottawa, Ontario; NSMS, Nova Scotia Museum of Science, Halifax, Nova Scotia; ROM, Royal Ontario Museum, Toronto, Ontario; ZIL, Zoological Institute, Lund, Sweden.

RESULTS

As a result of this study 97 species of caddis flies in 38 genera from 13 families are presently known from Newfoundland. Fifty-four species are new records for the Island.

The total number of adults examined in this study was 2950 of which 2002 were collected by the author and about 948 by other people.

A possible new Leptocerid species is included in the results as *Athripsodes sp.* and not as a new species for reasons mentioned in the text (p. 89).

The families are dealt with in order of their complexity as considered by Ross (1944).

A species list is given at the end of the results.

KEY TO THE FAMILIES OF ADULT TRICHOPTERA OF NEWFOUNDLAND
(modified from Ross 1944)

1. Small, hairy caddis flies, never over 6 mm in length ---------- Hydroptilidae, p. 34

   Larger, less hairy caddis flies, ranging from 6-40 mm in length ---------- 2

2. Ocelli present (Figs. 1, 2, 84) ---------- 3

   Ocelli absent ---------- 9

3. Maxillary palpi 3-segmented (Fig. 2) ------- male Limnephilidae, p. 50

   Maxillary palpi 4- or 5-segmented (Figs. 4, 5, 6, 10, 11) ---------- 4

4. Maxillary palpi 4-segmented (Fig. 4) -------- male Phryganeidae, p. 37

   Maxillary palpi 5-segmented (Figs. 5, 6, 10, 11) ---------- 5

5. Maxillary palpi with 5th segment 2 or 3 times as long as 4th (Fig. 5) ---------- Philopotamidae, p. 15

   Maxillary palpi with 5th segment not more than 1 and 1/3 times as long as 4th (Fig. 6) ---------- 6

6. Maxillary palpi with 2nd segment short, subequal to 1st (Fig. 6) ---------- 7

   Maxillary palpi with 2nd segment much longer than 1st (Fig. 4) ---------- 8

7. Front tibiae with a preapical spur (Fig. 7) ---- Rhyacophilidae, p. 11

   Front tibiae never with a preapical spur (Fig. 8) ---------- Glossosomatidae, p. 14

8. Front tibiae with 2 or more spurs (Fig. 9a); middle tibiae with 4 spurs (Fig. 9b) ---------- Phryganeidae, p. 37

   Front tibiae sometimes with 1 spur; middle tibiae with 2 or 3 spurs (Fig. 3) ---------- Limnephilidae, p. 50

9. Terminal segment of maxillary palpi much longer than preceding segments, with close cross striae which the other segments lack (Fig. 10) ---------- 10

Terminal segment of maxillary palpi similar in general structure to the 4th segment usually of the same length and without cross striae (Fig. 11) ---------- 11

10. Front tibiae without preapical spur (Fig. 12); hind wings with R almost or entirely normal in its course with 4 or all 5 branches distinct from Sc (Fig. 13); mesoscutum without warts (Fig. 14) ---------- Hydropsychidae, p. 29

Front tibiae with preapical spur (Fig. 15); hind wings with R much reduced, the stem either absent or fused with Sc and M (Fig. 16); mesoscutum with a pair of warts (Fig. 17) ---------- Polycentropodidae, p. 19

11. Middle tibiae without preapical spurs, and with a row of black spines (Fig. 18) ---------- 12

Middle tibiae with preapical spurs, and with or without a row of black spines (Fig. 19) ---------- 13

12. Hind wings with anterior margin cut away beyond middle with a row of hamuli along the straight basal portion of the margin (Fig. 20); mesonotum with scutal warts either small or absent (Fig. 21) ---------- Helicopsychidae, p. 96

Hind wings with anterior margin normal and without hamuli; mesonotum with scutal warts represented by a long irregular line of setate spots (Fig. 22); antennae always very long and slender ---------- Leptoceridae, p. 81

13. Middle femora each with a row of 6 to 10 spines on antero-ventral face (Fig. 19) ---------- Molannidae, p. 79

Middle femora each with 0 to 2 black spines on antero-ventral face ---------- 14

14. Middle tibiae with an irregular row of spines, and middle tarsi with a long double row of spines (Fig. 23); preapical spurs of tibiae hairless and short (Fig. 23) ---------- Brachycentridae, p. 95

Middle tibiae without spines, and middle tarsi with only a few scattered spines in addition to apical spines (Fig. 24); preapical spurs of tibiae hairy and long (Fig. 24) ---------- Lepidostomatidae, p. 91

Family RHYACOPHILIDAE

The Rhyacophilidae are considered the most primitive trichopteran family (Ross 1944, 1956), the adults having simple wing venation and unspecialized mouthparts, while the larvae are free-living and only construct cases for pupation. The Rhyacophilidae are represented in Newfoundland by 3 species of the genus *Rhyacophila*.

Genus *Rhyacophila* Pictet

Key to the adults of *Rhyacophila* (females of *R. melita* not included as identification is not definite and no published figures are available for comparison):

1. Genitalia with claspers and aedeagus (males) (Figs. 25-27) ---------- 2

   Genitalia cylindrical without claspers and aedeagus (females) ---------- 4

2. Dorsal portion of aedeagus with single spine at the base and with apex divided into a pair of bifid processes (Figs. 25a); 10th tergite short and beak like laterally (Figs. 25a, b) ---------- *melita* p. 12

   Dorsal portion of aedeagus and 10th tergite otherwise ---------- 3

3. Basal segment of claspers with ventral margin almost straight; apical segment of claspers not incised (Fig. 26) ---------- *fuscula*, p. 12

   Basal segment of claspers with ventral margin incised; apical segment of claspers incised to form a small dorsal lobe and a heavy ventral lobe (Fig. 27a) ---------- *acropedes*, p. 12

4. 8th sternite with apical portion deeply excavated, and the apical portion of the 8th tergite bimarginate (Ross 1944, Fig. 132) ---------- *fuscula*, p. 12

   8th sternite with apical portion not excavated, and the 8th tergite pinched to form a thin plate-like keel posteriorly (Nimmo 1971, Fig. 41) ---------- *acropedes*, p. 12

Rhyacophila melita Ross

New record for Newfoundland.

Localities collected: Lomond River, 13.VII.73, 1 M., 15 F.?;[3] Indian River, 17.VII.73, 16 F.? (Marshall).

Descriptive reference: Ross 1938, p. 104, M.

Male genitalia: Plate IV, Figs. 25a, b.

Female genitalia: No published figures available.

Geographical range: *R. melita* is found throughout northcentral and eastern North America with records from Michigan (Ross 1938, 1956), New Hampshire and New York (Flint, 1962).

Rhyacophila fuscula (Walker)

Previously recorded from Newfoundland: Wiggins 1961: Grand Bank, 2.VIII.51, 1 M. (C. Lindroth, ZIL).

Localities collected: Lomond River, 13.VII.73, 6 M., 4 F.; Aspen Brook, 16.VII.73, 1 M.; Junction Pond, 17.VII.73, 1 F. (Marshall).

Descriptive reference: Betten 1934, p. 130, M., F.

Male genitalia: Plate IV, Fig. 26.

Female genitalia: Ross 1944, Figs. 132D, E.

Geographical range: *R. fuscula* is widely distributed throughout northeastern and eastern North America with records from Maine, Michigan, New Brunswick, Newfoundland, New Hampshire, New York, North Carolina, Nova Scotia, Ontario, Pennsylvania, Quebec, Tennessee, Virginia and West Virginia (Ross 1944, Wiggins 1961).

Rhyacophila acropedes Banks

New record for Newfoundland.

Localities collected: Lomond River, 13.VII.73, 2 M., 2 F. (Marshall).

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[3] M. = Males; F. = Females.

Descriptive reference: Nimmo 1971, p. 23, M., F.

Male genitalia: Plate IV, Figs. 26a, b.

Female genitalia: Nimmo 1971, Fig. 41.

Geographical range: *R. acropedes* is Nearctic and transcontinental in distribution with northeastern and eastern records from Labrador, Maine, Michigan, New Hampshire and New York (Flint 1962, Nimmo 1971).

Family GLOSSOSOMATIDAE

The Glossosomatidae, once included in the Rhyacophylidae, are now considered a separate family (Ross 1956). Only one species of this family is known from Newfoundland.

Genus *Glossosoma* Curtis

Glossosoma nigrior Banks

New record for Newfoundland.

Localities collected: Emerged from laboratory stream: 1.VIII.72, 1 F.?; 13.VIII.72, 1 F.? (Marshall). Bauline Line, 8.VIII.72, 1 M.; River of Ponds Pond, 11.VII.73, 1 M.; Aspen Brook, 16.VII.73, 2 F. (Marshall).

Descriptive reference: Banks 1911, p. 355, M., F.

Male genitalia: Plate IV, Fig. 28.

Female genitalia: Plate IV, Figs. 29a, b.

Geographical range: *G. nigrior* is distributed throughout northeastern and eastern North America with records from Labrador, Michigan, New Hampshire, North Carolina and Quebec (Morse & Blickle 1953, Carpenter 1933, Leonard & Leonard 1949b, Wiggins 1961).

Family PHILOPOTAMIDAE

The Philopotamidae are represented in Newfoundland by two genera, *Dolophilodes* and *Chimarra*. These genera are to be separated by the following key (modified from Ross 1948):

1. Front tibiae with 2 apical spurs (Fig. 30) ------- *Dolophilodes*, p. 15
   Front tibiae with 1 apical spur (Fig. 31) ---------- *Chimarra*, p. 15

Genus *Dolophilodes* Ulmer

One species of *Dolophilodes* is known from Newfoundland.

Dolophilodes distinctus (Walker)

Previously recorded from Newfoundland: Wiggins 1961: St. John's, 5.VI.49, 1 M.; Grand Bank, 2.VIII.51, 2 M. (C. Lindroth, ZIL).

Localities collected: Emerged from laboratory stream, 28.VII.72, 1 M. (Marshall). St. John's, August 1972, 6 M., 5 F. (J. Phipps). Lomond River, 13.VII.73, 3 M., 11 F.; Indian River, 14.VII.73, 2 F. (Marshall).

Descriptive reference: Betten & Mosely 1940, p. 11, M., F., *Trentonius distinctus* (Walker); Ross 1948, p. 24, M., F.

Male genitalia: Plate IV, Figs. 32a, b.

Female genitalia: Plate IV, Fig. 33.

Geographical range: *D. distinctus* is widely distributed throughout central, eastern and northeastern North America, as far west as Minnesota. Records are from Indiana, Maine, Maryland, Michigan, Minnesota, New Brunswick, Newfoundland, North Carolina, Ontario, Pennsylvania, Tennessee and Virginia (Ross 1944, Wiggins 1961).

Genus *Chimarra* Stephens

Three species of *Chimarra* are known from Newfoundland. These

species may be separated by the following key (modified from Ross 1944):

1. Apex of abdomen with a pair of well differentiated claspers (males (Figs. 34-36) ---------- 2

   Apex of abdomen without claspers (females) ---------- 4

2. Claspers with upper portion short and pointed in lateral aspect with caudal face flat; ventro-mesal process of 9th sternite short and directed ventrad (Figs. 34a, b) ---------- *aterrima*, p. 16

   Claspers with upper portion elongated into a narrow lobe; ventro-mesal process of 9th sternite either long or short and directed caudad (Figs. 35, 36) ---------- 3

3. Ventro-mesal process of 9th sternite short and spatulate; aedeagus ending in a pair of semi-membranous lobes sclerotized at the sides (Fig. 35) ---------- *socia*, p. 17

   Ventro-mesal process of 9th sternite long and narrow; aedeagus ending in a heavy sclerotized hook (Fig. 36) ---------- *obscura*, p. 17

4. 9th tergite constricted sharply near apex (Ross 1944, Fig. 185) ---------- *socia*, p. 17

   9th tergite with lateral margins straight to the apex ---------- 5

5. 9th sternite produced into well defined lateral sclerotized "ears"; spermatheca with only a single, delicate, U-shaped sclerite (Ross 1944, Fig. 184) ---------- *obscura*, p. 17

   9th sternite without such lateral extensions; spermatheca with a purse-like sclerite having a semicircular clear area (Ross 1944, Fig. 186) ---------- *aterrima*, p. 16

Chimarra aterrima Hagen

New record for Newfoundland.

Localities collected:- St. John's: 22.VI.52, 9 M., 3 F. (Morris, ARS); August 1971, 1 F. (J. Phipps). Manuels Stream: 21.VI.72, 4 M., 2 F.; 29.VI.72, 2 M., 1 F.; 5.VII.72, 2 F. (Marshall). Emerged from laboratory stream: 12.IV.73, 1 M.; 26.V.73, 1 M. (Marshall). Rushy Pond,

15.VII.73, 1 F. (Marshall).

Descriptive reference: Betten 1934, p. 174, M., F.

Male genitalia: Plate V, Figs. 34a, b.

Female genitalia: Ross 1944, Fig. 186.

Geographical range: *C. aterrima* ranges through eastern, northeastern and central North America. Records are from Florida, Illinois, Indiana, Kentucky, Maine, Michigan, Minnesota, New Brunswick, New York, North Carolina, Nova Scotia, Ontario, Pennsylvania, Tennessee, Virginia, West Virginia and Wisconsin (Ross 1944).

Chimarra socia Hagen

New record for Newfoundland.

Localities collected: Indian River, 14.VII.73, 303 M., 124 F. (Marshall).

Descriptive reference: Betten 1934, p. 175, M.

Male genitalia: Plate V, Fig. 35.

Female genitalia: Ross 1944, Fig. 185.

Geographical range: *C. socia* ranges through eastern, northeastern and central North America. Records are from Indiana, Kentucky, Maine, Maryland, Michigan, New Brunswick, New York, Ohio, Ontario, Pennsylvania, Quebec, South Carolina, West Virginia and Wisconsin (Ross 1944).

Chimarra obscura (Walker)

New record for Newfoundland.

Localities collected: Aspen Brook, 16.VII.73, 1 F., Junction Pond, 17.VII.73, 2 M., 24 F.; Square Pond, 18.VII.73, 1 F. (Marshall).

Descriptive reference: Banks 1911, p. 358, M., *Wormaldia plutonis* Banks; Betten 1934, p. 175, M., *Chimarrha lucia* Betten.

Male genitalia: Plate V, Fig. 36.

Female genitalia: Ross 1944, Fig. 184.

Geographical range: *C. obscura* is widely distributed throughout North America with northeastern and eastern records from Indiana, Kentucky, Maine, Maryland, Michigan, New York, Ohio, Ontario, Pennsylvania, Tennessee and Virginia (Edwards 1966, Ross 1944).

Family POLYCENTROPODIDAE

The Polycentropodidae are well represented in Newfoundland with 13 species in 3 genera known from the Island. The larvae live in fast and slow moving waters, lakes and temporary pools where they construct fragile silken nets attached to the substrate or embedded in the sandy or muddy bottom.

The genera, *Neureclipsis*, *Nyctiophylax* and *Polycentropus* are separated by the following key (modified from Ross 1944):

1. Hind wings with M 3-branched (Fig. 37) ---------- *Neureclipsis*, p. 19

   Hind wings with M 2-branched (Fig. 38) ---------- 2

2. Front and hind wings with R2 absent (Fig. 39) ---------- *Nyctiophylax*, p. 21

   Front or hind wings, or both with R2 present (Fig. 40) ---------- *Polycentropus*, p. 21

Genus *Neureclipsis* McLachlan

Two species of *Neureclipsis* are known from Newfoundland; they may be separated by the following key (modified from Ross 1944):

1. Genitalia with a distinct aedeagus (males) (Figs. 41, 42) ---------- 2

   Genitalia without an aedeagus (females) ---------- 3

2. Cerci short and lobe-like; 10th tergite short (Fig. 41) ---------- *crepuscularis*, p. 20

   Cerci consisting of long, heavily sclerotized filaments; 10th tergite long (Fig. 42) ---------- *bimaculatus*, p. 20

3. Apex of 8th sternite projecting only a short distance beyond the lateral lobes; lateral lobes of 8th sternite long and broad; rounded at the apex and with abundant setae (Ross 1944, Fig. 227) ---------- *crepuscularis*, p. 20

Apex of 8th sternite projecting well beyond the lateral lobes at least the length of the lobes; lateral lobes of the 8th sternite short and somewhat ovate (Ross 1944, Fig. 226) ---------- *bimaculatus*, p. 20

Neureclipsis crepuscularis (Walker)

New record for Newfoundland.

Localities collected: Indian River, 14.VII.73, 1 M., 10 F. (Marshall).

Descriptive reference: Ross 1944, p. 57, M., F.

Male genitalia: Plate V, Fig. 41.

Female genitalia: Ross 1944, Fig. 227.

Geographical range: *N. crepuscularis* ranges through northeastern, eastern and central North America. Records are from Arkansas, Illinois, Indiana, Kentucky, Michigan, Missouri, New Brunswick, New York, North Carolina, Nova Scotia, Ohio, Pennsylvania, Tennessee, Virginia and Wisconsin (Ross 1944).

Neureclipsis bimaculatus (Linnaeus)

New record for Newfoundland.

Localities collected: Junction Pond, 17.VII.73, 3 F. (Marshall).

Descriptive reference: Ross 1944, p. 57, M., F.

Male genitalia: Plate V, Fig. 42. Drawn from a ROM specimen, taken at The Pas, Manitoba, 7.VIII.54 by W. Krivda.

Female genitalia: Ross 1944, Fig. 226.

Geographical range: *N. bimaculatus* is Holarctic in distribution. In North America northeastern records occur from Maine, New Hampshire and Quebec (Blickle & Morse 1966, Morse & Blickle 1953, Ross 1944).

Genus *Nyctiophylax* Brauer

Only one species of *Nyctiophylax* is known from Newfoundland.

Nyctiophylax affinis (Banks)

New record for Newfoundland.

Localities collected: St. John's: Summer 1972, 5 F.?; July 1973, 1 F.? (J. Phipps). Oxen Pond (Botanic Park): Summer 1972, 1 F.?; 5.VII.73, 1 F.?; 8.VII.73, 6 M., 1 F.? (B. Jackson). Lomond River, 13.VII.73, 1 F.?; Rushy Pond, 15.VII.73, 2 M., 30 F.?; Aspen Brook, 16.VII.73, 2 M., 1 F.?; Junction Pond, 17.VII.73, 3 F.? (Marshall).

Descriptive reference: Ross 1944, p. 70, M., F., *Nyctiophylax vestitus* (Hagen); Morse 1972, p. 176, M.

Male genitalia: Plate V, Fig. 43.

Female genitalia: Ross 1944, Fig. 264. Definite identification of the females collected is uncertain. Ross (1944) lists *affinis* as a synonym of *vestitus*. Ross's figures of the female are cited here.

Geographical range: *N. affinis* is transcontinental in its North American distribution. Northeastern and eastern records are from Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Jersey, New York, North Carolina, Nova Scotia, Ohio, Ontario, Quebec, South Carolina and Tennessee (Morse 1972, Ross 1944).

Genus *Polycentropus* Curtis

The genus *Polycentropus* is well represented in Newfoundland, with 10 species known from the Island. They are separated by the following key (modified from Ross 1944) (Females of *P. aureolus* and *P. blicklei* are not included in this key as distinctive characteristics separating them have not been found and determination of the females collected is uncertain):

1. Genitalia with an aedeagus (males) (Figs. 44-53) ---------- 2

   Genitalia without an aedeagus (females) ---------- 11

2. 9th sternite produced into an apical projection (Fig. 44) ---------- 3

   9th sternite without such a projection (Fig. 46) ---------- 4

3. Apical projection of 9th sternite long and wide with meson slightly incised (Figs. 44a, b) ---------- *aureolus*, p. 24

   Apical projection of 9th sternite short and rounded covered with thick hairs (Figs. 45a, b) ---------- *weedi*, p. 24

4. Cerci with dorsal angle produced into a long down-curved, pointed, sclerotized process (Figs. 46-49) ---------- 5

   Cerci with dorsal angle not produced, or produced into a shorter, blunter process (Figs. 50-53) ---------- 8

5. Aedeagus short and straight, sometimes with a slight curve (Figs. 46, 47) ---------- 6

   Aedeagus longer and curved downwards (Figs. 48, 49) ---------- 7

6. Baso-dorsal lobe of claspers without a definite stalk and projecting well laterad of claspers (Figs. 46a, b, c) ---------- *confusus*, p. 25

   Baso-dorsal lobe of claspers short and wide, mesal point sharp, the entire lobe erect and not projecting laterad of claspers (Figs. 47a, b, c) ---------- *centralis*, p. 25

7. Aedeagus long and U-shaped, directed ventrad; cerci long and directed ventrad beyond aedeagus (Fig. 48) ---------- *maculatus*, p. 26

   Aedeagus shorter and directed more caudad; cerci shorter and directed more caudad (Fig. 49) ---------- *blicklei*, p. 26

8. Processes of 10th tergite long, sclerotized and arched (Figs. 50, 51) ---------- 9

Processes of 10th tergite either short or semi-membranous (Figs. 52, 53) ---------- 10

9. Apical segment of cerci long and tapering to a rounded apex (Fig. 50) ---------- *interruptus*, p. 27

Apical segment of cerci much shorter and with a rounded apex (Fig. 51) ---------- *flavus*, p. 27

10. 10th tergite with a pair of curved horn-like, sclerotized processes (Fig. 52) ---------- *remotus*, p. 28

10th tergite with semi-membranous lobes, without such sclerotized processes (Fig. 53) --------- *cinereus*, p. 28

11. Lateral lobes of 8th sternite joined mesally with the base of the elevated triangular plate (Wigging 1961, Fig. 4) ---------- *weedi*, p. 24

Lateral lobes of the 8th sternite free ---------- 12

12. Base of 8th sternite with an elevated triangular plate (Ross 1944, Fig. 250) ---------- *flavus*, p. 27

Base of the 8th sternite without such an elevated triangular plate ---------- 13

13. Lateral lobes of 8th sternite long ---------- 14

Lateral lobes of 8th sternite short and wide, almost quadrate ---------- 17

14. Base of 8th sternite with a definite narrow basal ledge between the lateral lobes (Ross 1944, Fig. 251) ---------- *interruptus*, p. 27

Base of the 8th sternite with such a ledge between the lateral lobes ---------- 15

15. Spermatheca with a wide base and long vasiform sclerotized structures; internal structure of 9th sternite with 2 short, rounded, nearly approximate lobes which are sclerotized only at the apex (Ross 1944, Fig. 253) ---------- *centralis*, p. 25

Spermatheca shaped differently; internal structure of 9th sternite with longer lobes which are farther apart ---------- 16

16. 9th sternite with parallel rugose sclerotized bands; lateral lobes of 8th sternite angulate and narrow (Ross 1944, Fig. 258) ---------- *masculatus*, p. 26

9th stermite without such sclerotized bands; lateral lobes of 8th sternite wider and mesally expanded (Ross 1944, Fig. 257) ---------- *confusus*, p. 25

17. 9th sternite with a pair of quadrate sclerotized plates pointed at the apex; spermatheca not heavily sclerotized (Ross 1944, Fig. 260) ---------- *remotus*, p. 28

9th sternite without such heavily sclerotized plates; spermatheca heavily sclerotized (Ross 1944, Fig. 261) ---------- *cinereus*, p. 28

Polycentropus aureolus (Banks)

New record for Newfoundland.

Localities collected: Aspen Brook, 16.VII.73, 2 M., 3 F.? (Marshall).

Descriptive reference: Banks 1930, p. 130, M., *Plectrocnemia aureola* n.sp.

Male genitalia: Plate V, Figs. 44a, b.

Female genitalia: No published figures are available and determination of females is uncertain.

Geographical range: *P. aureolus* is northeastern in its North American distribution, extending westward to Minnesota. Northeastern records include Maine, Michigan, New Hampshire and Nova Scotia (Banks 1930, Blickle & Morse 1966, Leonard & Leonard 1949b, Ross 1944).

Polycentropus weedi Blickle & Morse

Previously recorded from Newfoundland: Wiggins 1961: Flowers Cove, 25.VII.49, 2 M.; Eddies Cove West, 28.VII.49, 1 M.; Seldom, Fogo Island, 3.VII.51, 1 M. (C. Lindroth, ZIL).

Localities collected: St. John's, Summer 1972, 1 F. (J. Phipps). Lomond River, 13.VII.73, 1 M. (Marshall).

Descriptive reference: Blickle & Morse 1955, p. 95, M.; Wiggins 1961, p. 699, F.

Male genitalia: Plate V, Fig. 45.

Female genitalia: Wiggins 1961, Fig. 4.

Geographical range: *P. weedi* is found in northeastern North America with records from Labrador, Maine, Michigan, Newfoundland and New Hampshire (Blickle & Morse 1955, 1966; Leonard & Leonard 1949b Wiggins 1961).

Polycentropus confusus Hagen

New record for Newfoundland.

Localities collected: Aspen Brook, 16.VII.73, 1 M., 3 F. (Marshall).

Descriptive reference: Hagen 1861, p. 293, M., F.; Betten 1934, p. 218, M. F., *Plectrocnemia confusa* (Hagen).

Male genitalia: Plate VI, Figs. 46a, b.

Female genitalia: Ross 1944, Fig. 257.

Geographical range: *P. confusus* is found throughout central, eastern and northeastern North America. Records are from Arkansas, Maine, Michigan, Missouri, New Hampshire, New York, Ohio, Ontario, Quebec and Tennessee (Blickle & Morse 1966, Morse & Blickle 1953, Ross 1944).

Polycentropus centralis Banks

New record for Newfoundland.

Localities collected: Emerged from laboratory stream: 29.VI.72, 1 F.; 5.VII.72, 1 F. (Marshall). Manuels Stream, 5.VII.72, 1 F.; Lomond River, 13.VII.73, 4 M.; Indian River, 14.VII.73, 5 M., 3 F.; Rushy Pond, 15.VII.73, 1 F.; Aspen Brook, 16.VII.73, 1 M., 7 F. (Marshall).

Descriptive reference: Ross 1944, p. 65, M. F.

Male genitalia: Plate VI, Figs. 47a, b, c.

Female genitalia: Ross 1944, Fig. 253.

Geographical range: *P. centralis* is found mainly in central North America throughout the Ozarks and adjacent areas, with a northeastward extension into New York (Ross 1944). This new record for Newfoundland extends the northeastern range of the species.

Polycentropus maculatus Banks

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, 1 M. (O. Bryant).

Localities collected: Aspen Brook, 16.VII.73, 1 M., 3 F.? (Marshall).

Descriptive reference: Banks 1908a, p. 65, M., *Polycentropus maculatus* n.sp.; Ross 1944, p. 65, M., F.

Male genitalia: Plate VI, Fig. 48.

Female genitalia: Ross 1944, Fig. 258.

Geographical range: *P. maculatus* is found throughout northeastern and eastern North America with records from Maine, Newfoundland, New Hampshire, New York and Tennessee (Blickle & Morse 1966, Ross 1944).

Polycentropus blicklei Ross & Yamamoto

New record for Newfoundland.

Localities collected: Kents Pond, 5.VII.73, 1 M. (Marshall).

Descriptive reference: Ross & Yamamoto 1965, p. 243, M.

Male genitalia: Plate VI, Fig. 49.

Female genitalia: See p. 21.

Geographical range: *P. blicklei* ranges through northeastern North America with a southward extension into Mississippi. Records are available from New Hampshire (Ross & Yamamoto 1965).

Polycentropus interruptus (Banks)

New record for Newfoundland.

Localities collected: St. John's: 31.VII.71, 1 F.; Summer 1972, 2 F.; July 1973, 1 F. (J. Phipps). Junction Pond, 17.VII.73, 1 M., 17 F. (Marshall).

Descriptive reference: Ross 1944, p. 89, M., F.

Male genitalia: Plate VI, Fig. 50.

Female genitalia: Ross 1944, Fig. 251.

Geographical range: *P. interruptus* is extensive in its North American range with distribution concentrated in the northeast and extending westward to Illinois and Colorado. Northeastern records include Maine, Massachusetts, Michigan, New Hampshire, New York and Nova Scotia (Banks 1914, Ross 1944).

Polycentropus flavus (Banks)

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, 1 M. (O. Bryant), *Holocentropus flavus* Banks.

Localities collected: River of Ponds Pond, 11.VII.73, 1 M., 1 F.; Lomond River, 13.VII.73, 3 F.; Junction Pond, 17.VII.73, 2 M., 2 F. (Marshall).

Descriptive reference: Banks 1908, p. 66, M., *Holocentropus flavus* n.sp.; Ross 1944, p. 68, M. F.

Male genitalia: Plate V, Fig. 51.

Female genitalia: Ross 1944, Fig. 250.

Geographical range: *P. flavus* ranges through northeastern and central North America, with records from Maine, Newfoundland, New Hampshire, New York and Ontario (Blickle & Morse 1966, Morse & Blickle 1953, Ross 1944).

Polycentropus remotus Banks

New record from Newfoundland.

Localities collected: Trout Pond, White Pond, Summer 1968, ? M., ? F. (G. Sharp). St. John's: 31.VII.71, 1 F.; August 1972, 12 M., 55F. (J. Phipps). Rushy Pond, 15.VII.73, 2 F.; Aspen Brook, 16.VII.73, 1 M. (Marshall).

Descriptive reference: Ross 1944, p. 67, M., F.

Male genitalia: Plate VI, Fig. 52.

Female genitalia: Ross 1944, Fig. 260.

Geographical range: *P. remotus* is transcontinental in its North American distribution with northeastern records from Maine, New Hampshire and New York (Blickle & Morse 1966, Ross 1944).

Polycentropus cinereus Hagen

New record for Newfoundland.

Localities collected: Colinet, St. Mary's Bay, 25.VII.60, 1 M. (R. Morris, ARS). St. John's: August 1971, 1 F.; Summer 1972, 6 F. (J. Phipps). Oxen Pond (Botanic Park) 8.VII.73, 11 F. (B. Jackson). Kents Pond, 5.VII.73, 1 F,; River of Ponds Pond, 11.VII.73, 1 M,; Lomond River, 13.VII.73, 7 F.; Indian River, 14.VII.73, 1 F.; Rushy Pond, 15.VII.73, 2 M., 1 F.; Aspen Brook, 16.VII.73, 1 M., 1 F.; Junction Pond, 17.VII.73, 3 M., 6 F. (Marshall).

Descriptive reference: Ross 1944, p. 67, M., F.

Male genitalia: Plate VI, Fig. 53.

Female genitalia: Ross 1944, Fig. 261.

Geographical range: *P. cinereus* is transcontinental in its North American distribution, with northeastern records from Maine, Maryland, Michigan, New Brunswick, New Hampshire, New York, Nova Scotia, Ohio, Ontario and Pennsylvania (Ross 1944).

Family HYDROPSYCHIDAE

Adults of the family Hydropsychidae vary in size and morphological characteristics but all lack ocelli, scutal warts and preapical spurs on the front tibiae. The larvae are found in fast moving waters where they construct shelters of plant and stone fragments attached to the substrate by silk.

Five species of Hydropsychidae are known from Newfoundland. The two genera containing these species may be separated by the following key (modified from Ross 1944):

1. 2nd segment of maxillary palpi distinctly shorter than 3rd (Fig. 54) ---------- *Arctopsyche*, p. 29

   2nd segment of maxillary palpi as long as or longer than 3rd (Fig. 10) ---------- *Hydropsyche*, p. 30

Genus *Arctopsyche* McLachlan

One species of *Arctopsyche* is known from Newfoundland.

Arctopsyche ladogensis Kolenati

Previously recorded from Newfoundland: Wiggins 1961: St. John's, 5.VI.49, 1 M. (C. Lindroth, ZIL).

Localities collected: Hogans Pond, 8.VI.73, 6 M.; River of Ponds Pond, 11.VII.73, 2 M.; Indian River, 14.VII.73, 4 F.; Rushy Pond, 15.VII.73, 7 F.; Aspen Brook, 16.VII.73, 2 F. (Marshall).

Male genitalia: Plate VI, Fig. 55.

Female genitalia: Schmid 1968, Figs. 82, 83.

Geographical range: *A. ladogensis* is Holarctic in distribution with northeastern North American records from Michigan, Newfoundland, New Hampshire and Quebec (Leonard & Leonard 1949b, Ross 1944, Schmid 1968, Wiggins 1961).

Genus *Hydropsyche* Pictet

Four species of *Hydropsyche* are known from Newfoundland. The adults are present throughout the summer and are numerous in light trap collections. The following key separates these species (modified from Denning 1943 & Ross 1944):

1. Genitalia with aedeagus (males) (Figs. 56-59) ---------- 2

   Genitalia without an aedeagus (females) ---------- 5

2. Base of aedeagus curved to form a complete semicircle, apex of aedeagus truncate; aedeagus without a pair of ovoid dorsal sclerites near apex (Fig. 56) ---------- *betteni*, p. 31

   Base of aedeagus not curved more than 90°, apex of aedeagus not truncate; aedeagus with a pair of ovoid sclerites near apex (Figs. 57, 58, 59) ---------- 3

3. Dorso-lateral process of aedeagus with a group of small spicules at apex, and a prominent lateral spine with a round base before apex (Fig. 57) ---------- *sparna*, p. 32

   Dorso-lateral process of aedeagus with only a single spine at apex (Figs. 58, 59) ---------- 4

4. Spine of dorso-lateral process of aedeagus long and curved dorsad (Fig. 58) ---------- *recurvata*, p. 32

   Spine of dorso-lateral process of aedeagus short and directed caudad (Fig. 59) ---------- *slossonae*, p. 33

5. 8th tergite with ventral margin concave, the apico-lateral lobe bearing a wide compact brush of long setae; clasper receptacle appearing deeply invaginated, large and round from the dorsal aspect (Ross 1944, Fig. 385) ---------- *betteni*, p. 31

   Either ventral margin of 8th tergite with no apico-lateral lobe, or only a small brush of long setae; or, clasper receptacle much smaller and more slender (Ross 1944, Figs. 387C, F, G) ---------- 6

6. Clasper receptacle directed nearly anterad, diagonal to 9th segment, narrow and truncate at the tip (Ross 1944, Fig. 387C) ---------- *recurvata*, p. 32

Clasper receptacle directed dorsad or caudad ---------- 7

7. Clasper receptacle entrance with a sinuate over-hanging flange extending ventrad (Ross 1944, Fig. 387F) ---------- *sparna*, p. 32

Clasper receptacle entrance without such a flange, entrance reduced to a narrow slit (Ross 1944, Fig. 387G) ---------- *slossonae*, p. 33

Hydropsyche betteni Ross

New record for Newfoundland.

Localities collected: St. John's: 12.VII.53, 1 M. (R. Morris, ARS); 31.VII.71, 2 M.; 1.VIII.71, 7 F.; 4.VIII.71, 1 M., 11 F.; 9.VIII.71, 6 F.; August 1972, 1 M.; Summer 1972, 8 M., 18 F.; 7.VII.73, 11 F. (J. Phipps). Manuels Stream, 5.VIII.72, 1 M., 1 F.; Foxtrap Stream, 19.VII.72, 1 F. (Marshall). Emerged from laboratory stream: 16.VI.72, 2 M.; 20.VI.72, 1 F.; 24.VI.72, 4 M.; 26.VI.72, 1 M., 2 F.; 28.VI.72, 1 M.; 30.VI.72, 3 M., 1 F.; 4.VII.72, 2 F.; 5.VII.72, 1 M.; 6.VII.72, 1 M.; 9.VII.72, 1 F.; 10.VII.72, 2 F.; 11.VII.72, 1 M., 1 F.; 13.VII.72, 1 F.; 14.VII.72, 1 F.; 22.VII.72, 2 M., 1 F.; 24.VII.72, 2 F.; 25.VII.72, 1 F.; 28.VII.72, 1 M.; 30.VII.72, 2 M.; 1.VIII.72, 1 M., 1 F.; 4.VIII.72, 1 M., 1 F.; 7.VIII.72, 2 F.; 8.VIII.72, 1 M., 1 F.; 9.VIII.72, 1 M.; 11.VIII.72, 1 F.; 14.VIII.72, 1 F.; 15.VIII.72, 1 F.; 23.VIII.72, 1 F.; 21.III.73, 1 M.; 7.IV.73, 1 F.; 26.IV.73, 1 M., 1 F.; 30.IV.73, 1 F.; 11.VI.73, 2 F.; 16.VI.73, 1 M., 1 F.; 24.VI.73, 1 M., 1 F.; 27.VI.73, 1 F.; 10.VII.73, 1 F.; 16.VII.73, 1 F.; 12.VIII.73, 1 F. (Marshall).

Descriptive reference: Ross 1944, p. 99, M., F.

Male genitalia: Plate VI, Fig. 56.

Female genitalia: Ross 1944, Fig. 385.

Geographical range: *H. betteni* ranges through northeastern, eastern and central North America, with records from Georgia, Illinois, Indiana, Maine, Michigan, New Hampshire, New York, Ohio, Ontario, Tennessee and Wisconsin (Blickle & Morse 1966, Edwards 1966, Morse & Blickle 1953, Ross 1944).

Hydropsyche sparna Ross

New record for Newfoundland.

Localities collected: St. John's: 28.VII.54, 1 M. (R. Morris, ARS); 25.VI.70, 1 F.; 2.VII.70, 1 M.; 31.VII.71, 1 F.; 9.VIII.71, 1 F.; August 1972, 3 M., 1 F.; Summer 1972, 12 M., 3 F.; July 1973, 3 F. (J. Phipps). Emerged from laboratory stream: 3.VIII.72, 1 M.; 9.VIII.72, 1 M.; 26.V.73, 1 F.; 19.VI.73, 1 F. (Marshall). Norris Point Pond, 10.VII.73, 2 F.; Lomond River, 13.VII.73, 2 F.; Indian River, 14.VII.73, 3 M., 35 F.; Rushy Pond, 15.VII.73, 30 F.; Aspen Brook, 16.VI.73, 16 F. (Marshall).

Descriptive reference: Ross 1938, p. 150, M., F.

Male genitalia: Plate VII, Fig. 57.

Female genitalia: Ross 1944, Fig. 387F.

Geographical range: *H. sparna* ranges through northeastern, eastern and central North America. Records are from Georgia, Maine, Michigan, Minnesota, New Hampshire, New York, North Carolina, Nova Scotia, Ontario, South Carolina, Virginia and West Virginia (Blickle & Morse 1966, Morse & Blickle 1953, Ross 1944).

Hydropsyche recurvata Banks

New record for Newfoundland.

Localities collected: River of Ponds Pond, 11.VII.73, 9 M., 55 F.; Lomond River, 13.VII.73, 1 M.; Indian River, 14.VII.73, 1 M., 4 F. (Marshall).

Descriptive reference: Ross 1944, p. 99, M., F.

Male genitalia: Plate VII, Fig. 58.

Female genitalia: Ross 1944, Fig. 387C.

Geographical range: *H. recurvata* is Nearctic in its North American distribution extending in the west to Saskatchewan. Northeastern records occur from Maine, Michigan, New York, Ontario and Quebec (Blickle & Morse 1966, Ross 1944).

Hydropsyche slossonae Banks

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, "many specimens" (O. Bryant).

Localities collected: St. John's: 4.VIII.71, 3 F.; 9.VIII.71, 1 M., 2 F.; August 1972, 5 F.; Summer 1972, 11 M., 13 F.; July 1973, 2 F. (J. Phipps). Emerged from laboratory stream: 16.VII.72, 1 F.; 22.VII.72, 1 F.; 25.VII.72, 1 M. (Marshall). Lomond River, 13.VII.73, 1 M.; Indian River, 14.VII.73, 2 M., 2 F.; Aspen Brook, 16.VII.73, 5 M., 10 F. (Marshall).

Descriptive reference: Ross 1944, p. 99, M., F.

Male genitalia: Plate VII, Fig. 59.

Female genitalia: Ross 1944, Fig. 387G.

Geographical range: *H. slossonae* is widely distributed in North America ranging in the west to Saskatchewan. Northeastern and eastern records occur from Maine, Michigan, Newfoundland, New Hampshire, New York, North Carolina, Pennsylvania and Tennessee (Banks 1908, Blickle & Morse 1966, Edwards 1966, Ross 1944).

Family HYDROPTILIDAE

The Hydroptilidae are known as the "micro" caddis flies, the adults being 6 mm or less in length. Three species of the genera *Hydroptila* and *Oxyethira* are known from Newfoundland. These genera may be separated by the following key (modified from Ross 1944):

1. Ocelli absent ---------- *Hydroptila*, p. 34
2. Ocelli present ---------- *Oxyethira*, p. 35

Drawings of the genitalia were not made because of the difficulties encountered when working with such small specimens. Reference is given to published figures available.

Genus *Hydroptila* Dalman

One species of the genus *Hydroptila* is known from Newfoundland.

Hydroptila metoeca Blickle & Morse

New record for Newfoundland.

Localities collected: Stoney Brook, Trepassey, 26.VII.61, ? M. (C. P. Alexander). (All Hydroptilid collections made by C. P. Alexander are in the collection of Dr. D. Denning, Moragia, California).

Descriptive reference: Blickle & Morse 1954, p. 127, M.

Male genitalia: Blickle & Morse 1954, Figs. 8a, b, d, s.

Female genitalia: No published figures available for reference.

Geographical range: *H. metoeca* is known from central and northeastern North America, with records from Maine, Minnesota and New Hampshire (Blickle & Morse 1954, Etnier 1968, Morse & Blickle 1957).

Genus *Oxyethira* Eaton

Two species of *Oxyethira* are known from Newfoundland. They are separated by the following key (males only):

1. Apex of aedeagus with two sclerotized lobes; spiral filament encircling the aedeagus 1½ times; claspers fused mesally (Blickle & Morse 1954, Figs. 2A, B, C) ---------- *sida*, p. 35

   Apex of aedeagus with semi-membranous processes, spiral filament encircling the aedeagus only once; claspers diverging mesally (Denning 1947, Figs. 1, 1A, 1B) ---------- *obtatus*, p. 35

Oxyethira sida Blickle & Morse

New record for Newfoundland.

Localities collected: Stoney River, Trepassey, 26.VI.61, 3 M. (C. P. Alexander).

Descriptive reference: Blickle & Morse 1954, p. 121, M.

Male genitalia: Blickle & Morse 1954, Figs. 2A, B, C.

Female genitalia: No published figures available for reference.

Geographical range: *O. sida* is known from central and northeastern North America, with records from Maine, Minnesota and New Hampshire (Blickle 1964, Blickle & Morse 1954, Etnier 1965).

Oxyethira obtatus Denning

New record for Newfoundland.

Localities collected: Howley, 11.VII.49, 5 M., 2 F. (C. Lindroth, ZIL). Stoney River, Trepassey, 26.VI.61, 5 M. (C. P. Alexander).

Descriptive reference: Denning 1947, p. 171, M.

Male genitalia: Denning 1947, Figs. 1, 1A, 1B.

Female genitalia: No published figures available for reference.

Geographical range: *O. obtatus* is known from central and north-eastern North America with records from Maine, Minnesota and New Hampshire (Blickle 1964, Morse & Blickle 1957, Denning 1947).

Family PHRYGANEIDAE

The Phryganeidae are well represented in Newfoundland, with 14 species in 6 genera known from the Island. The following key separates the genera and the males and females of these genera (modified from Ross 1944):

1. Maxillary palpi 4-segmented; genitalia with an aedeagus (males) (Figs. 62-79) ---------- 2

   Maxillary palpi 5-segmented; genitalia without an aedeagus (females) ---------- 7

2. 9th sternite produced as a toothed shelf beyond the base of the claspers (Figs. 62a, 63a) ---------- *Ptilostomis*, p. 38

   9th sternite may or may not be produced beyond clasper base, but not as a toothed shelf (Figs. 64, 65a, 67a, 76a, 79a) ---------- 3

3. Claspers produced posterad into a short, slightly upturned point, but rounded and low dorsad with a spoon shaped appearance laterally (Fig. 64) ---------- *Phryganea*, p. 40

   Claspers produced dorsad into either a long process or into appendage-like blades (Figs. 65a, 67a, 76a, 79a) ---------- 4

4. Hind wings either banded with brown and dark yellow, or entirely brown ---------- *Oligostomis*, p. 41

   Hind wings with black spots or markings on a gray or clear background ---------- 5

5. 9th tergite forming a transverse somewhat hood-shaped area arising above the base of the 10th tergite and bearing a brush or pair of brushes of long setae (Figs. 67a-71a) ---------- *Agrypnia*, p. 42

   9th tergite continuous with outline of 10th tergite and usually not bearing a brush of long setae (Figs. 76a-79a) ---------- 6

6. Wings shiny with a conspicuous pattern of dark markings ---------- *Banksiola*, p. 46

Wings dull and tawny brown with only a fine faint irrorate pattern ---------- *Fabria*, p. 48

7. 9th sternite divided at apex into three long divergent processes (Ross 1944, Fig. 605) ---------- *Phryganea*, p. 40

   9th sternite either not divided into three points or these points are short ---------- 8

8. 9th sternite forming an extremely flat emarginate plate (Wiggins 1961, Fig. 2) ---------- *Fabria*, p. 48

   9th sternite not forming such a plate ---------- 9

9. 9th sternite with a semi-membranous apical orbicular lobe set off by a constricted neck (Figs. 73-75) ---------- *Agrypnia*, p. 42

   9th sternite not produced into such a lobe ---------- 10

10. 9th sternite almost triangular, tapering evenly to a narrow 3-lobed apex (Ross 1944, Figs. 586, 589) ---------- *Oligostomis*, p. 41

    9th sternite wide at apex (Ross 1944, Figs. 593, 601A) ---------- 11

11. R1 markedly sinuate in both front and hind wings (Fig. 60) ---------- *Banksiola*, p. 46

    R1 nearly straight in both front and hind wings (Fig. 61) ---------- *Ptilostomis*, p. 38

Genus *Ptilostomis* Kolenati

Two species of *Ptilostomis* are known from Newfoundland. They are separated by the following key (modified from Ross 1944):

1. Genitalia with an aedeagus (males) (Figs. 62, 63) ---------- 2

   Genitalia without an aedeagus (females) ---------- 3

2. 10th tergite with 2 pairs of long, outwardly curved spines arising from dorsal apex, and one pair of long spines arising from ventral apex (Figs. 62a, b) ---------- *semifasciata*, p. 39

   10th tergite without such spines at apex, rather with a long sclerotized spine extending laterally from base of tergite below the dorso-lateral arms (Figs. 63a, b) ---------- *ocellifera*, p. 39

3. Ventral process of spermatheca with a high triangular ventral keel (Ross 1944, Fig. 598) ---- *semifasciata*, p. 39

Ventral process of spermatheca with the anterior face slightly carinate at each lateral margin where it joins the base, but without such a keel (Ross 1944, Fig. 601) ---------- *ocellifera*, p. 39

Ptilostomis semifasciata (Say)

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, 1 M. (O. Bryant), *Neuronia semifasciata* Say. Wiggins 1961: Daniel's Harbour, 22-23.VI.49, 1 F.; South Branch, 3.VII.49, 1 F. (C. Lindroth, ZIL).

Localities collected: St. John's: 10.VII.69, 1 F.; July 1973, 1 M., 1 F. (J. Phipps). Kents Pond: 27.VI.73, 2 M.; 30.VI.73, 2 M.; 4.VII.73, 1 M.; 5.VII.73, 4 M. (Marshall). River of Ponds Pond, 11.VII.73, 1 M.; Junction Pond, 17.VII.73, 10 M., 2 F. (Marshall).

Descriptive reference: Ross 1944, p. 173, M., F.

Male genitalia: Plate VII. Figs. 62a, b.

Female genitalia: Ross 1944, Fig. 598.

Geographical range: *P. semifasciata* is transcontinental in its North American distribution. Northeastern and eastern records are known from Kentucky, Maine, Michigan, New Hampshire, Ohio and Quebec (Banks 1908, Blickle & Morse 1966, Leonard & Leonard 1949b, Morse & Blickle 1953, Ross 1944, Wiggins 1960b).

Ptilostomis ocellifera (Walker)

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, "four specimens of ordinary type," (O. Bryant), *Neuronia postica* Walker. Wiggins 1961: St. John's, 22.VII.19, 1 M.; Gander, 4.VII.49, 1 M. (CNC). Port aux Basques, 30.VI.49, 1 M., 1 F.; Eddies Cove West, 28.VII.49, 1 F.; Port au Choix, 5.VIII.49, 1 F.; Kitty's Brook, 18.VIII.49, 1 F. (C. Lindroth, ZIL). Donovans, 27.VII.54, 1 F.; Witless Bay Line, 1.VIII.54, 1 F. (D. C. Ferguson, NSMS).

Localities collected: Colinet, St. Mary's Bay, 15.VII.60, 1 F.; 2.VIII.60, 1 F.; 8.VIII.60, 1 M. (R. Morris, ARS). St. John's: 14.VII.69, 1 F.; 12.VII.73, 1 M., 1 F. (J. Phipps). Emerged from laboratory stream: 26.V.73, 1 F.; 7.VI.73, 1 F. (Marshall). Kents Pond: 27.VI.73, 1 M.; 4.VII.73, 2 M.; 5.VII.73, 1 F.; Junction Pond, 17.VII.73, 1 M., 2 F.; Square Pond, 18.VII.73, 1 F. (Marshall).

Descriptive reference: Ross 1944, p. 172, M., F.

Male genitalia: Plate VII, Figs. 63a, b.

Female genitalia: Ross 1944, Fig. 601.

Geographical range: *P. ocellifera* is transcontinental in its North American distribution, with records from Indiana, Maine, Michigan, Newfoundland, New Hampshire, New Jersey, New York, Nova Scotia, Ohio, Ontario, Pennsylvania, Quebec and Tennessee (Banks 1908, Blickle & Morse 1966, Edwards 1966, Morse & Blickle 1953, Ross 1944, Wiggins 1960b).

Genus *Phryganea* Linnaeus

One species of *Phryganea* is known from Newfoundland.

Phryganea cinerea Walker

Previously recorded from Newfoundland: Wiggins 1961: St. Anthony, 17.VII.51, 1 M. (CNC); Donovans, 27.VII.54, 1 F. (NSMS).

Localities collected: Colinet, St. Mary's Bay, 2.VII.60, 1 F.; 15.VII.60, 2 F.; 26.VII.60, 1 F.; 27.VII.60, 1 F. (R. Morris, ARS). St. John's: 2.VII.70, 1 M.; July 1973, 3 F. (J. Phipps). Kents Pond: 26.VI.73, 12 M., 14 F.; 6.VII.73, 4 F. (J. Maunder); 27.VI.73, 12 M.; 30.VI.73, 14 M., 8 F.; 4.VII.73, 18 M., 2 F.; 5.VII.73, 4 M., 3 F. (Marshall). Norris Point Pond, 10.VII.73, 25 M., 1 F.; Lomond River, 13.VII.73, 1 M.; Indian River, 14.VII.73, 3 F.; Rushy Pond, 15.VII.73, 5 M.; Junction Pond, 17.VII.73, 23 M.; Square Pond, 18.VII.73, 1 M. (Marshall).

Descriptive reference: Ross 1944, p. 175, M., F.

Male genitalia: Plate VII, Fig. 64.

Female genitalia: Ross 1944, Fig. 605.

Geographical range: *P. cinerea* is transcontinental and northern in its North American distribution. Northeastern records are known from Maine, Michigan, Newfoundland, New Hampshire, New York, Nova Scotia and Ontario (Banks 1930, Morse & Blickle 1953, Ross 1944, Wiggins 1961).

Genus *Oligostomis* Kolenati

Two species of *Oligostomis* are known from Newfoundland. They are separated by the following key (modified from Ross 1944):

1. Genitalia with an aedeagus (males) (Figs. 65, 66) ---------- 2

   Genitalia without an aedeagus (females) ---------- 3

2. 10th tergite forming a pair of long downwardly curved heavily sclerotized rods (Figs. 65a, b); 9th sternite with a pair of sharp mesal points (Fig. 65c) ---------- *pardalis*, p. 41

   10th tergite forming a single structure directed ventrad (Fig. 66a); 9th sternite with one or two rounded mesal points, never pointed (Fig. 66b) ----- *ocelligera*, p. 42

3. 9th sternite almost triangular with three apical processes short (Ross 1944, Fig. 586) ---------- *ocelligera*, p. 42

   9th sternite more rectangular with the three apical processes longer (Ross 1944, Fig. 589) ------- *pardalis*, p. 41

Oligostomis pardalis (Walker)

New record for Newfoundland.

Localities collected: St. John's, 8.VII.55, 1 F. (R. Morris, ARS).

Descriptive reference: Betten & Mosley 1940, p. 94, M., F., *Neuronia pardalis* Walker.

Male genitalia: Plate VII, Figs. 65a, b, c. Drawn from a ROM specimen, taken at Macdiarmid, Ontario, 10.VI.23, by N. K. Bigelow.

Female genitalia: Ross 1944, Fig. 589.

Geographical range: *O. pardalis* is found in northeastern North America, with records from New Hampshire, New York, Nova Scotia and Quebec (Ross 1944).

Oligostomis ocelligera (Walker)

Previously recorded from Newfoundland: Wiggins 1961: Holyrood, 10.VI.49, 1 M.; Grand Bruit, 14.VI.49, 1 M. (C. Lindroth, ZIL).

Localities collected: Logy Bay: 17.VI.70, 2 M.; 18.VI.70, 1 F. (J. Phipps). St. John's, 26.VII.71, 1 M. (J. Phipps).

Descriptive reference: Betten & Mosely 1940, p. 81, M., F., *Neuronia ocelligera* Walker.

Male genitalia: Plate VII, Figs. 66a, b.

Female genitalia: Ross 1944, Fig. 586.

Geographical range: *O. ocelligera* is found in central and northeastern North America, with records from Michigan, Newfoundland, New Hampshire, New Jersey, Nova Scotia and Quebec (Betten & Mosely 1940, Longridge & Hilsenhoff 1973, Morse & Blickle 1953, Wiggins 1961).

Genus *Agrypnia* Curtis

Five species of the genus *Agrypnia* are known from Newfoundland. These species are separated by the following key:

1. Genitalia with claspers (males) (Figs. 67-71) ---------- 2

   Genitalia without claspers (females) ---------- 6

2. Base of each clasper with a long sharp mesal projection, dorsal portion of clasper tapering into two short points with a longer blade-like portion extending beyond the points (Figs. 67a, b) ---------- *vestita*, p. 44

   Base of claspers without such mesal points, dorsal portion of claspers otherwise (Figs. 68-71a) ---------- 3

3. Claspers elongate, with only one lobe apically, ventral margin of apical lobe with a short, curved projection or hook directed caudad (Fig. 68) ---------- *deflata*, p. 44

   Claspers long, with apical portion divided into three lobes, without such a curved hook (Figs. 69-71a) ---------- 4

4. Apical lobes of claspers broad, with dorsal lobe much longer than the mesal and ventral lobes (Fig. 69) ---------- *improba*, p. 45

   Apical lobes of claspers thin and elongate, with dorsal and ventral lobes approximately the same length (Figs. 70, 71) ---------- 5

5. Dorsal and ventral lobes of clasper apex much longer than the mesal lobe (Fig. 70a); 10th tergite with a pair of prominent, long spines laterally (Figs. 70a, b) ---------- *macdunnoughi*, p. 45

   Dorsal and ventral lobes of clasper apex shorter, not much longer than mesal lobe (Fig. 71a); 10th tergite with a pair of short spines laterally (Figs. 71a, b) ---------- *colorata*, p. 46

6. Genital segments with pointed lateral projections (Figs. 72, 73) ---------- 7

   Genital segments without such lateral projections ---------- 9

7. Lateral projections of genital segments directed ventrad (Milne 1931, Figs. 13, 14) ---------- *colorata*, p. 46

   Lateral projections of genital segments directed caudad (Figs. 72, 73) ---------- 8

8. Lateral projections of the fused sternites of segments 8 and 9 broad and blunt (Fig. 72) ---------- *macdunnoughi*, p. 45

   Lateral projections of the fused sternites of segments 8 and 9 narrow and pointed (Fig. 73) ---------- *improba*, p. 45

9. Apical portion of 9th sternite wide and triangular; orbicular lobe narrow (Fig. 74) ---------- *deflata*, p. 44

   Apical portion of 9th sternite narrow and rectangular; orbicular lobe broad (Fig. 75) ---------- *vestita*, p. 44

Agrypnia vestita (Walker)

New record for Newfoundland.

Localities collected: Colinet, St. Mary's Bay, 26-29.VII.70, 7 F.; 1-2.VIII.60, 3 F.; 5.VIII.60, 1 F.; 8.VIII.60, 1 F.; 10.VII.60, 1 M., 1 F.; 12.VIII.60, 2 F.; 19.VIII.60, 1 F. (R. Morris, ARS). St. John's, 4.VIII.71, 1 F. (J. Phipps).

Descriptive reference: Ross 1944, p. 166, M., F.

Male genitalia: Plate VIII, Figs. 67a, b.

Female genitalia: Plate VIII, Fig. 74.

Geographical range: *A. vestita* is transcontinental in its North American distribution, with northeastern and eastern records from Alabama, Georgia, Indiana, Maine, Massachusetts, Michigan, New Hampshire, New York, Ohio and Quebec (Denning 1971, Leonard & Leonard 1949b, Morse & Blickle 1953, Nimmo 1966, Wiggins 1961).

Agrypnia deflata (Milne)

New record for Newfoundland.

Localities collected: Colinet, St. Mary's Bay, 19.VIII.60, 1 M. (R. Morris, ARS).

Descriptive reference: Milne 1931, p. 230, M., *Prophryganea deflata* n.sp.

Male genitalia: Plate VIII, Fig. 68. This figure was drawn from the ARS specimen, collection data as above.

Female genitalia: Plate VIII, Fig. 75. Drawn from a ROM specimen, collected at The Pas, Manitoba, 9.VIII.53, by W. Krivda.

Geographical range: *A. deflata* is known from western North America with records from Alberta and Saskatchewan (Milne 1931).

Agrypnia improba (Hagen)

Previously recorded from Newfoundland: Wiggins 1961: Tilting, Fogo Island, 1.VII.51, 1 F. (C. Lindroth, ZIL).

Localities collected: St. John's, 2.VII.70, 2 M. (J. Phipps). Kents Pond, 30.VI.73, 1 M.; Rushy Pond, 15.VII.73, 1 M., 4 F. (Marshall).

Descriptive reference: Hagen 1873, p. 417, M., *Phryganea improba* Hagen.

Male genitalia: Plate VIII, Fig. 69.

Female genitalia: Plate VIII, Fig. 73.

Geographical range: *A. improba* is transcontinental and northern in its North American distribution, with northeastern records from Maine, Michigan, Newfoundland and New Hampshire (Blickle & Morse 1966, Leonard & Leonard 1949b, Morse & Blickle 1953, Wiggins 1961).

Agrypnia macdunnoughi (Milne)

Previously recorded from Newfoundland: Wiggins 1961: Port aux Basques, 1.VII.49, 1 M. (C. Lindroth, ZIL).

Localities collected: Colinet, St. Mary's Bay: 15.VII.60, 1 M., 2 F.; 25.VII.60, 1 F.; 26.VII.60, 1 M., 1 F. (R. Morris, ARS). St. John's: 24.VII.54, 1 F.; 28.VII.55, 2 F. (R. Morris, ARS); 2.VI.70, 3 M., 1 F.; 25.VI.70, 1 M.; 23.VI.71, 1 M.; 4.VIII.71, 2 F.; July 1973, 1 M., 2 F. (J. Phipps). River of Ponds Pond, 11.VII.73, 1 M.; Indian River, 14.VII.73, 4 M.; Square Pond, 18.VII.73, 1 F. (Marshall).

Descriptive reference: Milne 1931, p. 230, M., *Prophryganea macdunnoughi* n.sp.

Male genitalia: Plate VIII, Figs. 70a, b.

Female genitalia: Plate VIII, Fig. 72 (Note: The sternites of segments 8 and 9 are fused, and the 9th and 10th segments are fused. Therefore the labelling should read: lateral projection of the fused sternites of the 8th and 9th segments; and lateral projection of the fused 9th and 10th segments).

Geographical range: *A. macdunnoughi* is transcontinental and northern in its North American distribution. The only northeastern records are from Labrador and Newfoundland (Wiggins 1961).

Agrypnia colorata Hagen

Previously recorded from Newfoundland: Wiggins 1961: St. Anthony, 16.VII.51, 5 F. (CNC).

Descriptive reference: Milne 1932, p. 230, M., F., *Prophryganea bradorata* n.sp.

Male genitalia: Plate VIII, Figs. 71a, b. Drawn from specimen lent by the ROM, collected at Indian House Lake, Quebec, 12.VII.54, by W. R. Richards.

Female genitalia: Milne 1931, Figs. 13, 14.

Geographical range: *A. colorata* is transcontinental and northern in distribution in North America. Northeastern records are from Michigan, Newfoundland and Quebec (Leonard & Leonard 1949b, Wiggins 1961).

Genus *Banksiola* Martynov

Three species of the genus *Banksiola* are known from Newfoundland. These species are separated by the following key:

1. Genitalia with an aedeagus (males) (Figs. 76-78) ---------- 2

   Genitalia without an aedeagus (females) ---------- 4

2. Left side of membranous apical portion of aedeagus bearing an extensile projection with many short bristles (Figs. 76a, b) ---------- *crotchi*, p. 47

   Apical portion of aedeagus without such a projection (Figs. 77, 78) ---------- 3

3. Dorsal portion of clasper produced into two long, curved processes (Fig. 77) ---------- *dossuaria*, p. 47

   Dorsal portion of clasper produced into one longer curved process with a much shorter pointed process beneath it (Fig. 78) ---------- *smithi*, p. 48

4. Subgenital plate sharply constricted off from the 8th sternite; apical margin of plate bearing a pair of pointed hairy lobes with a thin hairy plate between (Wiggins 1956, Fig. 10) ------ *crotchi*, p. 47

   Subgenital not sharply constricted off from the 8th sternite ---------- 5

5. Apical margin of subgenital plate bearing a median rounded lobe with a pointed lobe on either side (Wiggins 1956, Fig. 6) ---------- *dossuaria*, p. 47

   Apical margin of subgenital plate broad and serrate with a rounded triangular lobe on either side (Wiggins 1956, Figs. 4A, B) ---------- *smithi*, p. 48

Banksiola crotchi Banks

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, "one specimen" (O. Bryant), *Neuronia concatenata* Walker. Wiggins 1961: Donovans: 21.VII.54, 2 F.; 4.VIII.54, 1 M. (D. C. Ferguson, NSMS).

Localities collected: Colinet, St. Mary's Bay, 2.VIII.60, 1 M. (R. Morris, ARS). St. John's, 4.VIII.71, 1 F. (J. Phipps). Rushy Pond, 15.VII.73, 3 M., 8 F.; Junction Pond, 17.VII.73, 2 M., 4 F. (Marshall). Emerged from laboratory stream: 20.VII.73, 1 M.; 28.VII.73, 1 F. (Marshall).

Descriptive reference: Wiggins 1956, p. 7, M., F.

Male genitalia: Plate IX, Figs. 76a, b.

Female genitalia: Wiggins 1956, Fig. 10.

Geographical range: *B. crotchi* is transcontinental and northern in its North American distribution. Northeastern and eastern records are from Indiana, Maine, Massachusetts, Michigan, Newfoundland, New Hampshire, New York, Nova Scotia, Ontario, Pennsylvania and Quebec (Wiggins 1956).

Banksiola dossuaria (Say)

New record for Newfoundland.

Localities collected: Colinet: 1.VIII.60, 1 M.; 11.VIII.60, 1 M.; 22.VIII.60, 1 M.; 7.IX.60, 1 M. (R. Morris, ARS). St. John's: 12.VII.53, 1 F. (R. Morris, ARS); 1.VIII.71, 1 F.; 9.VIII.71, 1 F. (J. Phipps). Kents Pond, 4.VII.73, 1 M.; Rushy Pond, 15.VII.73, 2 F. (Marshall).

Descriptive reference: Wiggins 1956, p. 5, M. F.

Male genitalia: Plate IX, Fig. 77.

Female genitalia: Wiggins 1956, Fig. 6.

Geographical range: *B. dossuaria* is distributed in northeastern North America with records from Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Nova Scotia, Ontario, Quebec and Vermont (Wiggins 1956).

Banksiola smithi (Banks)

New record for Newfoundland.

Localities collected: Codroy Valley, 28.VII.62, 1 M. (D. C. Ferguson, NSMS).

Descriptive reference: Wiggins 1956, p. 3, M., F.

Male genitalia: Plate IX, Fig. 78. Drawn from a ROM specimen taken at Sudbury, Ontario, 14.VII.60, by J. C. Riotte.

Female genitalia: Wiggins 1956, Figs. 4A, B.

Geographical range: *B. smithi* is found in central and northeastern North America. Records are from Maine, Michigan, Minnesota, New Hampshire, New Jersey, New York, Ontario and Wisconsin (Etnier 1965, Longridge & Hilsenhoff 1973, Wiggins 1956).

Genus *Fabria* Milne

One species of the genus *Fabria* is known from Newfoundland.

Fabria complicata (Banks)

Previously recorded from Newfoundland: Wiggins 1961: Cinq Cerf

River, 16.VI.49, 2 M.; Grandys Brook, Burgeo, 24.VI.49, 1 F. (C. Lindroth, ZIL); Port aux Basques, 1.VIII.49, 1 M. (C. Lindroth, ROM).

Descriptive reference: Wiggins 1961, p. 696, M. F.

Male genitalia: Plate IX, Figs. 79a, b. Drawn from ROM specimen taken at Port aux Basques 1.VIII.49, by C. Lindroth.

Female genitalia: Wiggins 1961, Figs. 2a, b.

Geographical range: *F. complicata* has been recorded from Newfoundland, Ontario and Wisconsin (Longridge & Hilsenhoff 1973, Wiggins 1961).

Family LIMNEPHILIDAE

The Limnephilidae are well represented in Newfoundland with 35 species in 14 genera known from the Island. The genera are separated by the following key (modified from Nimmo 1971, Ross 1944, Schmid 1955):

1. R1 of front wings united with Sc by a crossvein terminated at edge of wing (Fig. 80) ---------- *Apatania*, p. 52

   R1 of front wings not united with Sc by such a crossvein (Figs. 1, 83, 84, 85, 87, 88) ---------- 2

2. Hind wings with M1+2 undivided (Fig. 81); head with a small pair of warts between lateral ocelli and posterior warts (Fig. 82) ---------- *Neophylax*, p. 52

   Hind wings with M1+2 separate (Figs. 1, 86); head without such a pair of warts (Fig. 1) ---------- 3

3. Front wings with post-apical margin rounded (Fig. 83); last tarsal segment without black spines ---------- *Pseudostenophylax*, p. 55

   Post-apical margin of front wings otherwise; last tarsal segment with at least one black spine ---------- 4

4. Male claspers 2-articulated (Fig. 99); female vaginal aperture on the 9th abdominal segment (Fig. 100) ---------- *Onocosmoeus*, p. 56

   Male and female genitalia otherwise ---------- 5

5. Front wings with apical abscissa of vein A2 atrophied (Fig. 84) ---------- *Platycentropus*, p. 56

   Front wings with vein A2 complete (Fig. 1) ---------- 6

6. Apex of front wings scalloped and posterior corner sharp (Fig. 85) ---------- *Nemotaulius*, p. 58

   Apex of front wings either evenly rounded or incised without scalloped condition (Figs. 1, 87, 88) ---------- 7

7. Dorsal portion of 9th segment of males well developed (Figs. 105, 106) ---------- 8

Dorsal portion of 9th segment of males narrow and recessed into the 8th segment (Figs. 109-122) ---------- 9

8. Wing span less than 20 mm; front wings weakly irrorate ---------- *Arctopora*, p. 59

Wing span more than 25 mm; front wings strongly irrorate ---------- *Lenarchus*, p. 59

9. Sc of hind wings directed anterad distally (Fig. 1) ---------- *Limnephilus*, p. 60

Sc of hind wings not directed anterad distally (Fig. 86) ---------- 10

10. Front wings reddish brown in colour and uniformly irrorate, or with regularly spaced minute brown patches ---------- *Anabolia*, p. 72

Colour of front wings otherwise ---------- 11

11. Front wings with a short rounded stigma bordered below by R1, and with R2 also curved parallel with it and more curved apically, never with a longitudinal silvery line (Fig. 87) ---------- *Glyphopsyche*, p. 73

Front wing either with a longitudinal silvery line (Fig. 88), or with stigma longer if well marked, and R2 less sharply curved or straight ---------- 12

12. Front wings with R1 sinuate and upcurved at apex to delimit a stigmatic area (Fig. 88); R2 close to and parallel with R1 from base of stigma (Fig. 88); front wings long and narrow; last tarsal segment never with black spines ---------- *Psychoglypha*, p. 74

R2 of front wings following R1 but not from base of stigma (Fig. 89a); last tarsal segment with 1 or 2 black spines ---------- 13

13. Sc and R1 of hind wings joined by crossvein near apex (Fig. 90) ---------- *Hydatophylax*, p. 74

Sc and R1 of hind wings not joined by such a crossvein (Fig. 89b) ---------- *Pycnopsyche*, p. 75

Genus *Apatania* Kolenati

One species of the genus *Apatania* is known from Newfoundland.

Apatania stigmatella (Zetterstedt)

Previously recorded from Newfoundland: Banks 1908: Grand Lake, 9 July 1906, "many specimens" (O. Bryant).

Descriptive reference: Nimmo 1971, p. 67, M. F.

Male genitalia: Plate X, Fig. 91. Drawn from a ROM specimen collected at Georgetown, Ontario, 24.V.69, by R. Michaels.

Female genitalia: Nimmo 1971, Figs. 214, 215.

Geographical range: *A. stigmatella* is Holarctic in distribution. In northeastern North America the species has been recorded from Maine, Newfoundland, Ontario and Quebec (Banks 1908, Blickle & Morse 1966, Nimmo 1971).

Genus *Neophylax* McLachlan

Four species of *Neophylax* are known from Newfoundland. These species are separated by the following key:

1. Genitalia with an aedeagus (males) (Figs. 92-95) ---------- 2

   Genitalia without an aedeagus (females) ---------- 5

2. 10th tergite with dorsal lobe broad and apical portion truncate (Fig. 92a); apical point of clasper directed mesad, clasper base reduced (Figs. 92a, b) ---------- *nacatus*, p. 53

   10th tergite with dorsal lobe not as broad and apical portion rounded; apical point of clasper otherwise, clasper base prominent (Figs. 93-95) ---------- 3

3. Dorsal portion of clasper produced into a broad curved lobe, with apical point directed ventrad (Fig. 93a), clasper base bilobed (Fig. 93b) ---------- *ornatus*, p. 53

Dorsal portion of clasper not produced into such a lobe, with apical point otherwise; clasper base not bilobed (Figs. 94, 95) ---------- 4

4. Clasper base produced into a short sclerotized mesal point (Fig. 94b); dorsal portion of clasper with apical point erect and directed anterad and caudad (Fig. 94a) ---------- *oligius*, p. 54

Clasper base with a broad sclerotized hump (Fig. 95b); dorsal portion of clasper with apical point directed mesad and ventrad (Fig. 95a) ---------- *aniqua*, p. 54

5. Subgenital plate with lateral margins bearing a pair of sclerotized lobes (Fig. 96) ---------- *ornatus*, p. 53

Subgenital plate with lateral margins rounded, without such sclerotized lobes (Fig. 97) ---------- *aniqua*, p. 54; *oligius*, p. 54

N. nacatus has not been included in the female key as no specimens or published figures were available for comparison. No distinctive characteristics were found to separate females of *N. aniqua* and *N. oligius*.

Neophylax nacatus Denning

New record for Newfoundland.

Localities collected: Emerged from laboratory stream, 12.IX.72, 1 M. (Marshall).

Descriptive reference: Denning 1941, p. 198, M.

Male genitalia: Plate X, Figs. 92a, b.

Geographical range: *N. nacatus* ranges through northeastern and eastern North America, with records from Massachusetts, New Hampshire, North Carolina, Vermont and Virginia (Carpenter 1933, Denning 1941).

Neophylax ornatus Banks

New record for Newfoundland.

Localities collected: Norris Point Pond, 10.VII.73, 1 M. (Marshall).

Descriptive reference: Banks 1920, p. 346, M. Since Banks did not describe the male genitalia of *ornatus*, they are described as follows: 10th tergite with apical portion of dorsal lobe rounded; clasper with dorsal portion produced into a broad curved lobe, and with apical point directed ventrad; clasper base bilobed; aedeagus tubular and simple.

Male genitalia: Plate X, Figs. 93a, b.

Female genitalia: Plate X, Fig. 96. Drawn from a ROM specimen collected at Leskard, Ontario, 16.VI.53, by G. B. Wiggins.

Geographical range: *N. ornatus* has been recorded from New Hampshire and Nova Scotia (Morse & Blickle 1953, Schmid 1955).

Neophylax oligius Ross

Previously recorded from Newfoundland: Wiggins 1961:, St. John's: 7-9.IX.52, 1 M.; 16.IX.53, 1 M. (A. Fleming, ROM).

Localities collected: Emerged from laboratory stream: 18.VIII.72, 1 M.; 21.VIII.72, 3 M.; 23.VIII.72, 5 M., 1 F.; 25.VIII.72, 2 M.; 26.VIII.72, 1 M.; 28.VIII.72, 1 M., 1 F.; 30.VIII.72, 2 F.; 31.VIII.72, 7 M., 4 F.; 1.IX.72, 2 M.; 7.IX.72, 2 M., 1 F.; 12.IX.72, 2 F.; 14.IX.72, 3 M., 1 F.; 19.IX.72, 1 M. 2 F.; 10.VII.73, 1 F.; 20.VII.73, 1 F.; 21.VII.73, 1 F.; 12.VIII.73, 1 M.; 19.VIII.73, 1 M.; 30.VIII.73, 1 M., 2 F. (Marshall).

Descriptive reference: Ross 1938, p. 168, M., F.

Male genitalia: Plate X, Figs. 94a, b.

Female genitalia: Not figured, see p. 53.

Geographical range: *N. oligius* ranges through northeastern and central North America with records from Maine, Michigan, Minnesota, Newfoundland, New Hampshire, New York and Wisconsin (Blickle & Morse 1966, Morse & Blickle 1953, Ross 1944, Schmid 1955).

Neophylax aniqua Ross

New record for Newfoundland.

Localities collected: Emerged from laboratory stream: 7.IX.72,

1 M.; 14.IX.72, 1 M.; 19.IX.72, 1 M.; 21.IX.72, 2 F.; 25.IX.72, 1 F. (Marshall).

Descriptive reference: Ross 1947, p. 153, M.

Male genitalia: Plate X, Figs. 95a, b.

Female genitalia: Plate X, Fig. 97.

Geographical range: *N. aniqua* has been recorded from New Hampshire and Quebec, Morse & Blickle 1953, Ross 1947).

Genus *Pseudostenophylax* Martynov

One species of *Pseudostenophylax* is known from Newfoundland.

Pseudostenophylax sparsus (Banks)

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, number of specimens collected not recorded (O. Bryant).

Localities collected: St. John's, 2.VII.70, 1 M. (J. Phipps). Indian River, 14.VII.73, 1 M. (Marshall).

Descriptive reference: Banks 1908, p. 63, *Halesus sparsus* n.sp., M. Banks did not describe the male genitalia; they are described as follows: 8th tergite bilobed with many short dark spines; cerci elongate and lobed; 10th tergite divided, with bases developed into distinct shoulders, and apical processes narrow, upturned and heavily sclerotized; aedeagus with two large sclerotized appendages having their ends turned inward and bearing many spines; clasper elongate with dorsal portion pointed.

Male genitalia: Plate XI, Figs. 98a, b.

Female genitalia: No published figures available for reference; no specimen available for drawing.

Geographical range: *P. sparsus* ranges through northeastern, eastern and central North America with records from Illinois, Maine, Newfoundland, New Hampshire, New York, Tennessee and Virginia (Banks 1908, Blickle and Morse 1966, Morse & Blickle 1953, Schmid 1955).

Genus *Onocosmoecus* Banks

One one species of the genus *Onocosmoecus* is known to occur in Newfoundland.

Onocosmoecus quadrinotatus (Banks)

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, number of specimens collected not noted (O. Bryant).

Localities collected: Colinet, St. Mary's Bay, 22.VIII.60, 1 M. (R. Morris, ARS).

Descriptive reference: Banks 1908, p. 62, *Anabolia quadrinotatus* n.sp., M.; Banks 1943, p. 363, *Dicosmoecus quadrinotatus* Banks, M.

Male genitalia: Plate XI, Fig. 99. Drawn from the ARS specimen, with collection data as above.

Female genitalia: Plate XI, Fig. 100. Drawn from a specimen lent by the ROM, collected at Leskard, Ontario, 12.X.53 by G. B. Wiggins.

Geographical range: *O. quadrinotatus* ranges through northeastern and central North America, with records from Maine, Massachusetts, Michigan, Newfoundland, New Hampshire, Nova Scotia, Ontario and Wisconsin (Banks 1908, 1943, Blickle & Morse 1966, Flint 1960, Longridge & Hilsenhoff 1973).

Genus *Platycentropus* Ulmer

Two species of the genus *Platycentropus* are known from Newfoundland. They are separated by the following key:

1. Genitalia with an aedeagus (males) (Figs. 101, 102) ---------- 2

   Genitalia without an aedeagus (females) ---------- 3

2. 10th tergite recessed between cerci and consisting of an upper heavily sclerotized portion directed ventrad, and two lower heavily sclerotized portions directed dorsad; cerci short and rounded (Figs. 101a, b) ---------- *indistinctus*, p. 57

10th tergite prominent forming a pair of long heavily sclerotized pointed processes with dorsal surface serrated; cerci longer and rectangular with inner surfaces serrated (Figs. 102a, b) ---------- *radiatus*, p. 57

3. 10th segment with a deeply incised, sclerotized anal aperture apically, aperture having a triangular appearance ventrally (Ross 1944, Fig. 642C) ---------- *radiatus*, p. 57

10th segment with an oval anal aperture on the ventral surface (Fig. 103) ---------- *indistinctus*, p. 57

Platycentropus indistinctus (Walker)

Previously recorded from Newfoundland: Walker 1852: "a. Newfoundland. Presented by W. C. St. John, Esq." Banks 1908: Grand Lake, July 1906, "three specimens" (O. Bryant), *Halesus indistinctus* Walker. Wiggins 1961: Hare Bay, 21.VI.49, 1 M.; Grandys Brook, Burgeo, 24.VI.49, 1 M.; Port aux Basques, 28.VI.49, 2 M. (C. Lindroth, ZIL).

Localities collected: Colinet, St. Mary's Bay, 10.VIII.61, 1 M. (R. Morris, ARS). Logy Bay, 27.VII.69, 1 F. (J. Phipps). St. John's: 2.VIII.70, 1 M.; July 1973, 1 M. (J. Phipps).

Descriptive reference: Betten 1934, p. 357, M.; Betten and Mosely 1940, p. 159, M.

Male genitalia: Plate XI, Figs. 101a, b.

Female genitalia: Plate XI, Fig. 103.

Geographical range: *P. indistinctus* ranges through northeastern and central North America, with records from Maine, Massachusetts, Michigan, Minnesota, Newfoundland, New Hampshire and New York (Blickle & Morse 1966, Flint 1960, Leonard & Leonard 1949b, Schmid 1955, Wiggins 1961).

Platycentropus radiatus (Say)

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, "several specimens" (O. Bryant), *Platycentropus maculipennis* Kolenati.

Localities collected: Colinet, St. Mary's Bay: 5.VIII.60, 1 M.; 7.VIII.60, 1 F.; 12.VIII.60, 2 F.; 17.VIII.60, 1 M. (R. Morris, ARS). St. John's: 24.VII.54, 1 M.; 15.VII.60, 1 M. (R. Morris, ARS), 1.VIII.71, 1 F.; 4.VIII.71, 1 M., 1 F.; 9.VIII.71, 1 F.; 14.VIII.71, 1 F. (J. Phipps). Oxen Pond, Botanic Park, Summer 1972, 2 M. (B. Jackson). Emerged from laboratory stream: 26.V.73, 1 F.; 11.VI.73, 1 F.; 16.VII.73, 3 M.; 18.VII.73, 1 M.; 21.VII.73, 1 F.; 28.VII.73, 2 M.; 4.VIII.73, 1 F. (Marshall).

Descriptive reference: Ross 1944, p. 181, M., F.

Male genitalia: Plate XI, Figs. 102a, b, c.

Female genitalia: Ross 1944, Fig. 642C.

Geographical range: *P. radiatus* ranges through northeastern, eastern and central North America as far west as Manitoba. Records occur from Georgia, Illinois, Maine, Manitoba, Massachusetts, Michigan, Minnesota, Newfoundland, New Hampshire, New Jersey, New York, North Carolina, Ontario, Pennsylvania and Wisconsin (Blickle & Morse 1966, Flint 1960, Ross 1944).

Genus *Nemotaulius* Banks

The one North American species of *Nemotaulius* is known from Newfoundland.

Nemotaulius hostilis (Hagen)

Previously recorded from Newfoundland: Wiggins 1961: Cinq Cerf River: 16-17.VI.49, 2 F. (C. Lindroth, ZIL).

Localities collected: St. John's, 28.VII.55, 2 M. (R. Morris, ARS). Colinet, St. Mary's Bay: 15.VII.60, 2 F.; 1.VIII.60, 1 F.; 4.VIII.61, 1 M. (R. Morris, ARS). St. John's: 29.VI.70, 1 F.; 9.VII.71, 1 F.; 7.VII.73, 1 F. (J. Phipps). Foxtrap Stream, 20.VI.73, 1 M.; River of Ponds Pond, 11.VII.73, 4 M., 3 F. (Marshall).

Descriptive reference: Nimmo 1971, p. 124, M., F.; Schmid 1952, p. 229, M., F.

Male genitalia: Plate XI, Fig. 104.

Female genitalia: Nimmo 1971, Figs. 454, 455.

Geographical range: *N. hostilis* occurs throughout northern North America with northeastern records from Maine, Massachusetts, Michigan, Newfoundland, New Hampshire, New York and Quebec (Blickle & Morse 1966, Flint 1960, Leonard & Leonard 1949b, Morse & Blickle 1953, Nimmo 1966, 1971, Wiggins 1961).

Genus *Arctopora* Thomson

One species of the genus *Arctopora* is known to occur in Newfoundland.

Arctopora pulchella (Banks)

Previously recorded from Newfoundland: Banks 1908: Grand Lake, 28.VII.1906, "several" (O. Bryant), *Limnephilus pulchellus* n.sp.

Descriptive reference: Nimmo 1971, p. 134, M., F.

Male genitalia: Plate XI, Figs. 105a, b, c. Drawn from a ROM specimen taken at Devon Park, The Pas, Manitoba, 11.VII.53, by W. Krivda.

Female genitalia: Nimmo 1971, Figs. 493, 494.

Geographical range: *A. pulchella* is transcontinental in its North American distribution, with northeastern records from Maine, Michigan, Newfoundland, New Hampshire, New York, Ontario and Quebec (Flint 1960, Nimmo 1971, Robert 1960, Sibley 1926).

Genus *Lenarchus* Martynov

One species of *Lenarchus* is known from Newfoundland.

Lenarchus crassus (Banks)

New record for Newfoundland.

Localities collected: River of Ponds Pond, 11.VII.73, 1 M. (Marshall).

Descriptive reference: Nimmo 1971, p. 136, M.

Male genitalia: Plate XII, Fig. 106.

Female genitalia: No published figures available for reference.

Geographical range: *L. crassus* is distributed in widely separate localities in western and eastern North America with northeastern records from Massachusetts, New Hampshire and Quebec (Nimmo 1971, Schmid 1952b).

Genus *Limnephilus* Leach

Fourteen species of *Limnephilus* are known from Newfoundland. These species are separated by the following key (modified from Nimmo 1971, Ross 1944, Ross & Merkley 1952):

1. Genitalia with an aedeagus (males) (Figs. 109-124) ---------- 2

   Genitalia without an aedeagus (females ---------- 15

2. 1st tarsal segment of front legs either as long as the 2nd (Fig. 107), or much longer than the 2nd, usually 1½ times longer (Fig. 3) ---------- 3

   1st tarsal segment of front appendages ½ the length of the 2nd (Fig. 108 ---------- 14

3. Posterior margin of 8th tergite with spines or setae (Figs. 109a-116a) ---------- 4

   Posterior margin of 8th tergite without spines or setae (Figs. 119, 120a) ---------- 13

4. Posterior margin of 8th tergite not produced posterad or ventrad (Fig. 109a); 10th tergite short and directed posteromesad to mesal teeth of cerci (Fig. 109b) ---------- *hyalinus*, p. 64

   Posterior margin of 8th tergite produced posterad or ventrad (Figs. 110a-116a); 10th tergite otherwise ---------- 5

5. Posterior margin of 8th tergite as a bulbous spiny lobe produced posterad to membranous connection of 9th segment (Figs. 110a-116a) ----------6

Posterior margin of 8th tergite not produced posterad, not bulbous or very spiny (Figs. 117a, 118) ---------- 12

6. Mesal face of cercus with one or more heavily sclerotized teeth (Figs. 110b-114b) ---------- 7

Mesal face of cercus without such teeth (Fig. 116b) ---------- 11

7. Teeth basad of distal edge of cercus in a single dorso-ventral row (Figs. 110b-112b) ---------- 8

Teeth of cerci otherwise ---------- 10

8. Lateral arms of aedeagus distally merged with at least partly membranous extensible ventro-lateral lobes (Fig. 110a); 10th tergite forming long thin blades with apexes directed towards distal teeth of cerci (Figs. 110a, b) ------ *sublunatus*, p. 65

Lateral arms of aedeagus with ventro-lateral lobes sclerotized, not membranous nor extensible (Figs. 111a, 112a) ---------- 9

9. Clasper apex heavily sclerotized with dorsally directed tooth (Fig. 11a); 10th tergite with apexes hooked and directed postero-ventrad (Figs. 111a, b) ---------- *externus*, p. 65

Clasper apex blunt, without such a tooth (Fig. 112a); 10th tergite tapered and directed postero-dorsad, not hooked (Figs. 112a, b) ---------- *indivisus*, p. 66

10. Posterior margin of 8th tergite directed ventrad between cerci (Fig. 113a); 10th tergite forming tapering blades with dorsal margins dentate, and directed postero-dorsad (Figs. 113a, b) ---------- *sericeus*, p. 66

10th tergite directed dorso-anterad, tapering abruptly at apexes into a short hooked spine (Figs. 114a, b); posterior margin of 8th tergite directed posterad above genitalia (Fig. 114a) ---------- *perpusillus*, p. 67

11. 10th tergite long tapering evenly to apexes, curved dorsad and heavily sclerotized; cerci short, almost square in lateral aspect (Fig. 115) ---------- *argenteus*, p. 67

10th tergite and cerci long, slender, tapered, sclerotized, and directed postero-dorsad (Figs. 116a, b) ---------- *nebulosus*, p. 67

12. 10th tergite small, short, sclerotized lobes with square apexes directed postero-laterad (Figs. 117a, b); cerci massive and long, arched dorsad (Figs. 117a, b); lateral arms of aedeagus bilobed distally (Fig. 117a) ---------- *rhombicus*, p. 68

    10th tergite large, triangular with apex heavily sclerotized and directed posterad; cerci long, narrow, tapering gradually to apexes and directed posterad; lateral arms of aedeagus simple distally (Fig. 118) ---------- *moestus*, p. 68

13. Cerci large and bilobed with apexes heavily sclerotized; clasper with high narrow base and short blunt dorsal process; 10th tergite short, heavily sclerotized and directed postero-dorsad (Fig. 119) ---------- *ornatus*, p. 69

    Cerci large, long and arched dorsad, not bilobed (Fig. 120a); clasper massive with dorsal margin dentate and heavily sclerotized; 10th tergite long, with wide base tapering to rounded apex (Figs. 120a, b) ---------- *kennicotti*, p. 70

14. Lateral arms of aedeagus with wide base tapering abruptly to dorsad curved sclerotized rods; clasper forming inconspicuous sclerite merging with posterior margin of 9th segment (Fig. 120) ---------- *ademus*, p. 70

    Lateral arms of aedeagus long, filiform and sclerotized, with apexes bearing a row of short setae; clasper distinct from posterior margin of 9th segment, with dorsal portions produced posterad (Fig. 122) ---------- *submonilifer*, p. 71

15. 10th tergite with cerci (Fig. 122; Ross 1944, Figs. 662, 663, 666; Nimmo 1971, Figs. 268, 303, 325, 331, 336, 373, 388, 431) ---------- 16

    10th tergite without cerci (Nimmo 1971, Figs. 394, 419) ---------- 27

16. Cerci forming slight swellings at base of 10th tergite (Fig. 123) ---------- 17

    Cerci forming distinct processes dorsad or laterad to 10th tergite, or with lobes of 10th tergite laterad to cerci (Ross 1944, Figs. 663, 666; Nimmo 1971, Figs. 268, 303, 325, 331, 336, 373, 388, 431) ---------- 18

17. 10th tergite forming simple long tube with lateral margins concave (Ross 1944, Fig. 662) ---------- *submonilifer*, p. 71

10th tergite forming a shorter stout tube (Fig. 123) ---------- *ademus*, p. 70

18. 10th tergite with dorsal process a long thin heavily sclerotized blade slightly cleft at apex (Nimmo 1971, Figs. 330, 331) ---------- *sericeus*, p. 66

10th tergite otherwise ---------- 19

19. 10th tergite distinct from 9th segment either by distinct suture line, or abrupt decrease in size, or both; 10th tergite may or may not be recessed into 9th segment (Ross 1944, Figs. 663, 667; Nimmo 1971, Figs. 268, 325, 332, 336, 389) ---------- 20

10th tergite fused to 9th segment without suture lines or abrupt decrease in size, with or without slight recess (Ross 1944, Fig. 666; Nimmo 1971, Figs. 302, 374) ---------- 25

20. 9th segment with ventro-lateral lobes distinct from rest of segment by sutures (Nimmo 1971, Figs. 324, 431) ---------- 21

9th segment with or without ventro-lateral lobes; if present they form an integral part of segment and are not separated by sutures (Nimmo 1971, Figs. 268, 336, 388; Ross 1944, Fig. 663) ---------- 22

21. Cerci broad and triangular, dorso-laterad to 10th tergite (Nimmo 1971, Figs. 324, 325) ---------- *externus*, p. 65

Cerci broad at base, abruptly tapering near apexes, dorsad to 10th tergite (Nimmo 1971, Figs. 431, 432) ---------- *rhombicus*, p. 68

22. 9th segment constricted laterally by strap which joins dorsal and ventral portions of segment (Nimmo 1971, Figs. 268, 388) ---------- 23

9th segment not constricted laterally by strap (Nimmo 1971, Figs. 313, 336) ---------- 24

23. Cerci long, narrow, with short fine setae at apexes, divergent from 10th tergite (Nimmo 1971, Figs. 268, 269) ---------- *sublunatus*, p. 65

Cerci short, squat, rectangular lobes appressed to dorsad surface of 10th tergite (Nimmo 1971, Figs. 388, 389) ---------- *perpusillus*, p. 67

24. Cerci long, thin, and tapering apically, dorsad to 10th tergite (Ross 1944, Fig. 663) ---------- *ornatus*, p. 69

Cerci short, wide and triangular, dorso-laterad to 10th tergite (Nimmo 1971, Figs. 335, 336) ------- *nebulosus*, p. 67

25. Ventro-lateral lobes of 9th segment not distinguished from dorsal portion by suture (Ross 1944, Fig. 666) ---------- *moestus*, p. 68

Ventro-lateral lobes of 9th segment separated from dorsal portion by suture or membrane (Nimmo 1971, Figs. 302, 374) ---------- 26

26. 10th tergite deeply cleft dorsally and located between tapering cerci (Nimmo 1971, Figs. 302, 303) ---------- *indivisus*, p. 66

10th tergite with dorso-laterad rectangular lobes laterad to long thin cerci, with small ventral lobe (Nimmo 1971, Figs. 373, 374) ---------- *hyalinus*, p. 64

27. 10th tergite massive and dorsal, completely cleft mesally, with meso-dorsad hooks distally (Nimmo 1971, Figs. 419, 420) ---------- *kennicotti*, p. 70

10th tergite small and heavily sclerotized, deeply cleft mesally, tapering posterad in lateral aspect (Nimmo 1971, Figs. 393, 394) -------- *argenteus*, p. 67

Limnephilus hyalinus Hagen

Previously recorded from Newfoundland: Wiggins 1961: Deer Lake, 18.VIII.49, 1 M.; Goobies, 15.VIII.51, 6 M., 3 F. (C. Lindroth, ZIL).

Descriptive reference: Nimmo 1971, p. 109, M., F.

Male genitalia: Plate XII, Figs. 109a, b. Drawn from ROM specimen taken at Algonquin Provincial Park, Lake Manitou, Ontario, August 1965, by G. B. Wiggins.

Female genitalia: Nimmo 1971, Figs. 373, 374.

Geographical range: *L. hyalinus* is transcontinental and northern in its North American distribution. Northeastern records are from Maine,

Michigan, Newfoundland, New Hampshire, New York, Ontario and Quebec (Blickle & Morse 1966, Leonard & Leonard 1949b, Morse & Blickle 1953, Nimmo 1966, Wiggins 1961).

Limnephilus sublunatus Provancher

Previously recorded from Newfoundland: Wiggins 1961: Deer Lake, 18.VIII.49, 2 M., 3 F. (C. Lindroth, ZIL).

Descriptive reference: Nimmo 1971, p. 89, M., F.

Male genitalia: Plate XII, Figs. 110a, b. Drawn from a ROM specimen taken at Belfountain, Ontario, 21.VIII.52, by G. B. Wiggins.

Female genitalia: Nimmo 1971, Figs. 268, 269.

Geographical range: *L. sublunatus* ranges through eastern and western North America. Northeastern records are from Maine, Newfoundland, New Hampshire, New York, Ontario and Quebec (Banks 1943, Blickle & Morse 1966, Nimmo 1971).

Limnephilus externus Hagen

Previously recorded from Newfoundland: Wiggins 1961: St. John's, 7-9.IX.53, 1 M.; 16.IX.53, 2 F.; Donovans, 23.IX.53, 1 F. (A. Fleming, ROM).

Localities collected: Colinet, St. Mary's Bay: 21.IX.60, 2 M.; 24.IX.60, 1 M.; 27-28.IX.60, 2 M.; 30.IX.60, 1 F.; 18-19.X.60, 2 M. (R. Morris, ARS). St. John's: 15.III.68, 1 M.; 2.V.70, 1 F.; Summer 1971, 6 M., 4 F.; 9.X.71, 1 M. (J. Phipps). Emerged from laboratory stream: 4.IX.72, 1 M.; 18.X.72, 1 M., 1 F.; 23.X.72, 1 M.; 31.X.72, 1 M., 1 F.; 1.XI.72, 1 M.; 19.VIII.73, 1 F.; 30.VIII.73, 1 F. (Marshall).

Descriptive reference: Nimmo 1971, p. 99, M., F.

Male genitalia: Plate XII, Figs. 11a, b.

Female genitalia: Nimmo 1971, Figs. 324, 325.

Geographical range: *L. externus* is distributed throughout the Holarctic, with northeastern North American records from Maine,

Michigan, Newfoundland and Nova Scotia (Banks 1943, Blickle & Morse 1966, Leonard & Leonard 1949b).

Limnephilus indivisus Walker

New record for Newfoundland.

Localities collected: ?, 18.VII.52, 1 M. (?, ARS). Kents Pond, 30.VI.73, 1 M. (Marshall).

Descriptive reference: Nimmo 1971, p. 95, M., F.

Male genitalia: Plate XII, Figs. 112a, b.

Female genitalia: Nimmo 1971, Figs. 302, 303.

Geographical range: *L. indivisus* is transcontinental in its North American distribution. Northeastern records are from Maine, Massachusetts, New Hampshire, New York, Nova Scotia, Ontario and Quebec (Betten 1934, Blickle & Morse 1966, Leonard & Leonard 1949b, Morse & Blickle 1953, Nimmo 1971).

Limnephilus sericeus (Say)

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, "three specimens" (O. Bryant); *Limnephilus despectus* Walker.

Localities collected: St. John's: 19.VI.53, 1 F.; 12.VII.53, 1 M.; 10.VII.55, 1 F. (R. Morris, ARS); 7.VII.73, 2 M. (J. Phipps). Emerged from laboratory stream, 30.VI.72, 1 F. (Marshall). Kents Pond, 30.VI.73, 1 F.; Sandy Lake, 9.VII.73, 1 M.; Lomond River, 13.VII.73, 1 M. (Marshall).

Descriptive reference: Nimmo 1971, p. 100, M., F.

Male genitalia: Plate XII, Figs. 113a, b.

Female genitalia: Nimmo 1971, Figs. 330, 331.

Geographical range: *L. sericeus* is transcontinental in its North American distribution. Northeastern records are from Maine, Michigan, Newfoundland, New Hampshire, New York, Ontario, Pennsylvania and Quebec (Flint 1960, Nimmo 1971).

Limnephilus perpusillus Walker

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, "one specimen" (O. Bryant), *Colpotaulius perpusillus* Walker.

Descriptive reference: Nimmo 1971, p. 112, M., F.

Male genitalia: Plate XII, Figs. 114a, b. Drawn from a specimen lent by the ROM, taken at Kendal, Ontario, 1.VII.58, by G. B. Wiggins.

Female genitalia: Nimmo 1971, Figs. 388, 389.

Geographical range: *L. perpusillus* extends through northern and central North America; however, the only northeastern records are from Newfoundland, Nova Scotia and Ontario (Banks 1907, Nimmo 1971).

Limnephilus argenteus Banks

New record for Newfoundland.

Localities collected: St. John's: 29.VI.70, 1 M.; 2.VII.70, 1 M., 1 F.; Summer 1971, 1 F. (J. Phipps). Kents Pond: 21.VI.73, 1 M. (J. Maunder); 27.VI.73, 1 F.; 30.VI.73, 1 M., 1 F.; 5.VII.73, 1 F. (Marshall). River of Ponds Pond, 11.VII.73, 1 M., 1 F. (Marshall).

Descriptive reference: Nimmo 1971, p. 113, M., F.

Male genitalia: Plate XIII, Fig. 115.

Female genitalia: Nimmo 1971, Figs. 393, 394.

Geographical range: Previous to this Newfoundland record, *L. argenteus* was known to extend from Alaska to Ontario and Illinois in North America (Nimmo 1971).

Limnephilus nebulosus Kirby

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, "many specimens" (O. Bryant). Wiggins 1961: Cinq Cerf River, 16-17.VI.49, 1 M.; Twillingate, 8.VII.51, 1 M. (C. Lindroth, ZIL).

Localities collected: Kents Pond: 30.VI.73, 2 F.; 4.VII.73, 1 M.

(Marshall). St. John's, 7.VII.73, 3 F. (J. Phipps). Junction Pond, 17.VII.73, 3 F. (Marshall).

Descriptive reference: Nimmo 1971, p. 102, M., F., *Limnephilus femoralis* Kolenati.

Male genitalia: Plate XIII, Figs. 116a, b.

Female genitalia: Nimmo 1971, Figs. 335, 336.

Geographical range: *L. nebulosus* is Holarctic in its distribution, with its North American range extending from Alaska to Newfoundland (Nimmo 1971, Wiggins 1961).

Limnephilus rhombicus Linnaeus

Previously recorded from Newfoundland: Wiggins 1961: Post aux Basques, 28.VI.49, 1 M. (C. Lindroth, ZIL).

Localities collected: St. John's: 22.VII.71, 1 F.; 1.VIII.71, 1 F. (J. Phipps). Emerged from laboratory stream: 19.VI.72, 1 F.; 22.IV.73, 1 F. (Marshall). Kents Pond: 26.VI.73, 1 M. (J. Maunder); 30.VI.73, 1 F. (Marshall). Rushy Pond, 15.VII.73, 1 F. (Marshall). Oxen Pond, Botanic Park, August 1973, 1 F. (B. Jackson).

Descriptive reference: Nimmo 1971, p. 118, M., F.

Male genitalia: Plate XIII, Figs. 117a, b.

Female genitalia: Nimmo 1971, Figs. 431, 432.

Geographical range: *L. rhombicus* is Holarctic in its distribution, with northeastern North American records from Maine, Michigan, Newfoundland, New York, Ontario and Quebec (Nimmo 1971).

Limnephilus moestus Banks

Previously recorded from Newfoundland: Banks 1908: Grand Lake, 28.VII.1906, "many specimens" (O. Bryant), *Limnephilus moestus* n.sp. Wiggins 1961: Pushthrough, 22-24.VI.49, 1 M.; Rose Blanche, 27.VI.49, 1 M.; Gaff Topsail, 19.VIII.49, 1 F.; Gambo, 26.VIII.49, 1 F.; Springdale, 20.VI.51, 1 F.; Tilting, Fogo Island, 1.VII.51, 1 F.; Seldom,

Fogo Island, 3.VII.51, 1 M.; Port Rexton, 30-31.VII.51, 6 F. (C. Lindroth, ZIL).

Localities collected: St. John's: 11.VII.53, 1 M., 1 F.; 20.VII.54, 1 M. (R. Morris, ARS); 20.XII.69, 1 F.; 25.VI.70, 1 F.; 2.VII.70, 7 M., 5 F.; 5.VII.70, 1 M.; 26.VI.71, 1 F.; 1.VIII.71, 1 F.; 9.VIII.71, 1 F.; Summer 1972, 1 M., 10 F.; July 1973, 1 M., 14 F. (J. Phipps). Colinet: 15.VII.60, 1 M., 2 F.; 26.VII.60, 1 F.; 2.VIII.60, 1 M.; 3.VIII.60, 1 M.; 27.VIII.60, 3 M., 1 F. (R. Morris, ARS). Oxen Pond, Botanic Park, Summer 1972, 1 F. (B. Jackson). Foxtrap, 20.VI.73, 2 M.; Sandy Lake, 9.VIII.73, 1 M.; Norris Point Pond, 10.VII.73, 1 M.; River of Ponds Pond, 11.VII.73, 1 F.; Lomond River, 13.VII.73, 2 M. (Marshall).

Descriptive reference: Nimmo 1971, p. 104, M., F.

Male genitalia: Plate XIII. Fig. 118.

Female genitalia: Ross 1944, Fig. 666.

Geographical range: *L. moestus* is distributed throughout the northern and montane areas of North America, with northeastern records from Maine, Michigan, Newfoundland, New Hampshire, Nova Scotia, Ontario and Quebec (Blickle & Morse 1966, Leonard & Leonard 1949b, Morse & Blickle 1953, Ross 1944).

Limnephilus ornatus Banks

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, "several specimens" (O. Bryant). Wiggins 1961: St. John's, 5.VI.49, 1 M.; Cinq Cerf River, 17.VI.49, 1 M.; Rencontre West, 17.VI.49, 1 M., 2 F.; Fogo, Fogo Island, 2.VII.51, 1 M.; Twillingate, 8.VII.51, 1 F. (C. Lindroth, ZIL); Mount Pearl: 14.IV.53, 1 F.; 9.VII.53, 1 F. (A. Fleming, ROM).

Localities collected: St. John's: 24.VI.53, 1 M.; 11.VII.53, 1 F.; 12.VII.53, 1 M.; 28.VII.54, 1 M.; 28.VI.55, 1 M.; 8.VI.55, 1 M. (R. Morris, ARS); 25.VI.70, 1 M., 4 F.; 26.VI.70, 2 M., 1 F.; 28.VI.70, 2 F.; 29.VI.70, 1 M., 3 F.; 2.VII.70, 1 M., 4 F.; 5.VII.70, 2 F.; 3.VIII.70, 1 F.; 3.VIII.71, 1 F.; 4.VIII.71, 2 M., 1 F.; Summer 1971, 1 M., 3 F.;

Summer 1972, 1 M.; 1.VII.73, 1 F.; 7.VII.73, 8 M., 23 F.; 15.VII.73, 2 M., 20 F. (J. Phipps). Colinet, St. Mary's Bay: 19.VIII.60, 1 M.; 26.VIII.60, 1 F.; 20.VI.61, 2 M.; 23.VI.61, 1 M.; 26.VI.61, 2 M.; 28-29.VI.61, 2 M; 4.VII.61, 1 M. (R. Morris, ARS). Oxen Pond, Botanic Park, Summer 1972, 1 F. (B. Jackson). Emerged from laboratory stream, 12.IV.73, 1 F. (Marshall). Kents Pond: 30.VI.73, 5 M.; 4.VII.73, 2 M., 8 F.; 5.VII.73, 1 M., 3 F. (Marshall). River of Ponds Pond, 11.VII.73, 1 F. (Marshall). Found among fresh bought local spinach, 21.VI.73, 1 F. (M. Metcafe).

Descriptive reference: Nimmo 1971, p. 97, M., F.

Male genitalia: Plate XIII, Fig. 119.

Female genitalia: Ross 1944, Fig. 663.

Geographical range: *L. ornatus* ranges throughout the Holarctic with northeastern North American records from Maine, Massachusetts, Michigan, Newfoundland, New Hampshire, New York, Nova Scotia, Ontario and Quebec (Banks 1930, Nimmo 1966, Wiggins 1961).

Limnephilus kennicotti Banks

Previously recorded from Newfoundland: Wiggins 1961: Tilting, Fogo Island, 1.VII.51, 4 F.; Twillingate, 8.VII.51, 1 F.; Port Rexton, 31.VII.51, 1 M. (C. Lindroth, ZIL).

Localities collected: River of Ponds Pond, 11.VII.73, 1 M. (Marshall).

Descriptive reference: Nimmo 1971, p. 116, M., F.

Male genitalia: Plate XIII, Figs. 120a, b.

Female genitalia: Nimmo 1971, Figs. 419, 420.

Geographical range: *L. kennicotti* is widely distributed over northern North America from British Columbia to Newfoundland (Nimmo 1971).

Limnephilus ademus Ross

Previously recorded from Newfoundland: Wiggins 1961: Gambo, 26.VIII.49, 2 M., 2 F.; Badger, 22-25.VI.51, 1 F.; Lewisporte, 26-27.VI.51,

1 M., 1 F.; 15.VIII.51, 1 F. (C. Lindroth, ZIL).

Localities collected: Emerged from laboratory stream: 28.VI.72, 1 F.; 3.VIII.72, 2 F.; 4.VII.72, 1 F.; 5.VII.72, 2 M., 1 F.; 6.VII.72, 1 F.; 9.VII.72, 1 F.; 10.VII.72, 2 M. (Marshall).

Descriptive reference: Ross 1941, p. 18, M.

Male genitalia: Plate XIII, Fig. 121.

Female genitalia: Plate XIV, Fig. 123.

Geographical range: The only North American records of *L. ademus* are from New Brunswick and Newfoundland (Wiggins 1961).

Limnephilus submonilifer Walker

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, "four specimens" (O. Bryant). Wiggins 1961: Gander, 2.VI.49, 1 F.; Holyrood, 10.VI.49, 1 F.; Gambo, 25.VIII.49, 2 F.; Tilting, Fogo Island, June 29 - July 1, 1951, 2 M., 3 F.; Grand Bank, 1.VIII.51, 1 M.; Terrenceville, 13-14.VIII.51, 1 M., 1 F.; Bonavista, 19.VI.53, 2 M., 3 F. (C. Lindroth); St. John's, 3.IX.53, 1 F.; Mount Pearl, August 17 - September 17, 1953, 17 M., 14 F. (A. Fleming, ROM).

Localities collected: St. John's: 24.VI.53, 1 F.; 8.VII.55, 1 M., 1 F. (R. Morris, ARS). Colinet, St. Mary's Bay: 7.VI.60, 1 M.; 27.IX.60, 1 F.; 28.IX.60, 1 M.; 30.IX.60, 1 M. (R. Morris, ARS). Emerged from laboratory stream: 19.VI.72, 1 M., 1 F.; 21.VI.72, 1 F.; 24.VI.72, 1 F.; 26.VI.72, 1 F.; 3.VII.72, 1 F. (Marshall). Thomas Pond, 28.VI.73, 1 F. (Marshall).

Descriptive reference: Ross 1944, p. 192, M., F.

Male genitalia: Plate XIII, Fig. 122.

Female genitalia: Ross 1944, Fig. 662.

Geographical range: *L. submonilifer* ranges throughout northern, eastern and central North America, with northeastern records from Indiana, Maine, Maryland, Massachusetts, Michigan, Newfoundland, New Hampshire, New York, Nova Scotia, Ohio, Ontario, Quebec and Rhode Island (Banks 1930, Ross 1944, Wiggins 1961).

Genus *Anabolia* Stephens

Two species of *Anabolia* are known from Newfoundland. They are separated by the following key (modified from Ross 1944):

1. Genitalia with an aedeagus (males) (Figs. 124, 125) ---------- 2

   Genitalia without an aedeagus (females) ---------- 3

2. Cercus long, tapering towards apex and curved slightly ventrad (Figs. 124a, b); clasper apex directed posterad (Fig. 124a) ---------- *sordida*, p. 72

   Cercus shorter, broader, tapering to point at apex, not curved ventrad (Figs. 125a, b); clasper apex curved dorsad (Fig. 125a) ---------- *bimaculata*, p. 73

3. Cercus with large bulbous base which narrows to a small short apex (Schmid 1950a, Figs. 93, 94, 95) ---------- *bimaculata*, p. 73

   Cercus with small base tapering to a long thin apex (Schmid 1950a, Figs. 100, 101, 102) ---------- *sordida*, p. 72

Anabolia sordida Hagen

New record for Newfoundland.

Localities collected: Colinet, St. Mary's Bay, 15.VIII.60, 1 M. (R. Morris, ARS).

Descriptive reference: Ross 1944, p. 189, M., F., *Limnephilus sordidus* (Hagen); Schmid 1950a, p. 330, M., F.

Male genitalia: Plate XIV, Figs. 124a, b. Drawn from the ARS specimen, collection data as above.

Female genitalia: Schmid 1950a, Figs. 100, 101, 102.

Geographical range: *A. sordida* ranges through the central and eastern Nearctic region. Previous northeastern records are from Maine only (Blickle & Morse 1966, Schmid 1950a).

Anabolia bimaculata Walker

New record for Newfoundland.

Localities collected: St. John's, 1.X.69, 1 F. (J. Phipps). Emerged from laboratory stream: 5.VII.72, 1 F.; 10.VII.72, 1 F.; 13.VII.72, 1 M.; 16.VII.72, 2 M.; 7.VIII.72, 1 M., 1 F.; 8.VIII.72, 1 F.; 11.VIII.72, 1 M.; 28.VI.73, 2 M.; 30.VIII.73, 1 F. (Marshall). Oxen Pond, Botanic Park, August 1973, 1 M. (B. Jackson).

Descriptive reference: Betten & Mosely 1940, p. 142, M.; Schmid 1950a, p. 328, M., F.

Male genitalia: Plate XIV, Figs. 125a, b.

Female genitalia: Schmid 1950a, Figs. 93, 94, 95.

Geographical range: *A. bimaculata* is distributed throughout the Nearctic region as far south as New Mexico. Northeastern records are from Maine, Michigan, New Hampshire, New York, Nova Scotia and Ontario (Banks 1930, Flint 1960, Morse & Blickle 1953, Nimmo 1971, Schmid 1950a).

Genus *Glyphopsyche* Banks

One species of *Glyphopsyche* is known from Newfoundland.

Glyphopsyche irrorata (Fabricius)

New record for Newfoundland.

Localities collected: Colinet, St. Mary's Bay: 24.IX.60, 2 F.; 14.X.60, 1 M.; 18.X.60, 1 F.; 27-28.VI.61, 2 M.; 19.X.61, 1 F. (R. Morris, ARS). Mobile Big Pond, May 1969, 1 F. (J. Phipps). St. John's: 6.V.69, 1 F.; 2.V.70, 1 F. (J. Phipps). Hogans Pond: 30.V.73, 1 F.; 8.VI.73, 1 M., 1 F.; Foxtrap Stream, 8.VI.73, 2 F. (Marshall).

Descriptive reference: Nimmo 1971, p. 149, M., F.

Male genitalia: Plate XIV, Fig. 126.

Female genitalia: Nimmo 1971, Figs. 555, 556.

Geographical range: *G. irrorata* is transcontinental in northern North America, with northeastern records from Maine, Michigan, New Hampshire, New York, Ontario and Quebec (Corbet et al 1966, Flint 1960, Schmid 1952a).

Genus *Psychoglypha* Ross

One species of *Psychoglypha* is known from Newfoundland.

Psychoglypha subborealis (Banks)

New record for Newfoundland.

Localities collected: St. John's: 8.XI.69, 1 M.; 4.VIII.71, 1 F. (J. Phipps). Emerged from laboratory stream: 24.XI.72, 1 M., 1 F.; 6.XII.72, 1 M.; 14.XII.72, 1 M., 1 F. (Marshall).

Descriptive reference: Nimmo 1971, p. 153, M., F., *Psychoglypha alaskensis* (Banks). Schmid 1952c, p. 118, M., F., *Psychoglypha alascensis* Banks.

Male genitalia: Plate XIV, Fig. 127.

Female genitalia: Nimmo 1971, Figs. 576, 577.

Geographical range: *P. subborealis* is distributed over northern North America, with northeastern records from Maine, Michigan, New Hampshire, New York and Ontario (Denning 1970, Flint 1960).

Genus *Hydatophylax* Wallengren

One species of *Hydatophylax* is known from Newfoundland.

Hydatophylax argus (Harris)

New record for Newfoundland.

Localities collected: St. John's: 29.VI.70, 3 M.; 5.VII.73, 1 F. (J. Phipps). Emerged from laboratory stream: 24.VI.72, 3 M., 1 F.

(Marshall). Oxen Pond, Summer 1972, 1 M. (B. Jackson). Indian River, 14.VII.73, 1 F. (Marshall).

Descriptive reference: Schmid 1950b, p. 272, M., F.; Betten 1934, p. 317, M., F., *Astenophylax argus* Harris.

Male genitalia: Plate XIV, Figs. 128a, b.

Female genitalia: Schmid 1950b, Figs. 13, 14, 15.

Geographical range: *H. argus* ranges through northeastern, eastern and central North America, with records from Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, North Carolina, South Carolina, Tennessee and Wisconsin (Betten 1934, Blickle & Morse 1966, Edwards 1966, Etnier 1965, Flint 1960, Leonard & Leonard 1949b, Morse & Blickle 1953).

Genus *Pycnopsyche* Banks

Four species of *Pycnopsyche* are known from Newfoundland. These species are separated by the following key (modified from Betten 1950):

1. Genitalia with an aedeagus (males) (Figs. 129-132) ---------- 2

   Genitalia without an aedeagus (females) ---------- 5

2. Lateral margins of 8th tergite produced into rounded lobes densely covered with short black spines (Figs. 129, 130) ---------- 3

   Lateral margins of 8th tergite not produced into such rounded spined lobes (Figs. 131, 132) ---------- 4

3. Lateral arms of aedeagus each terminated by several long stylets (Fig. 129a); clasper tapering to blunt pointed apex (Fig. 129b) ---------- *guttifer*, p. 76

   Lateral arms of aedeagus each terminated by one long stylet (Fig. 130a); clasper apex rectangular with slight indentation mesally (Fig. 130b) ---------- *scabripennis*, p. 77

4. 10th tergite long and slender with apex curved ventrad, and extended well beyond clasper apexes (Fig. 131); clasper apex

short, not extending beyond 10th tergite (Fig. 131) ---------- *limbata*, p. 77

10th tergite short, not extending beyond clasper apexes (Fig. 132a); clasper apex long produced dorsad beyond 10th tergite (Figs. 132a, b) ---------- *lepida*, p. 78

5. 10th tergite with cerci extending posterad from dorsal margin (Betten 1950, Figs. 88, 89, 90) ---------- *lepida*, p. 78

10th tergite without cerci ---------- 6

6. 10th tergite with lips of anal aperture equally extended (Betten 1950, Figs. 39, 40, 41) ---------- *guttifer*, p. 76

Lips of anal aperture otherwise ---------- 7

7. Lower lip of anal aperture broadly U-shaped; 10th tergite terminating in sharp point dorsally (Betten 1950, Figs. 22, 23, 24) ---------- *limbata*, p. 77

10th tergite blunt dorsally in lateral aspect; lower lip of anal aperture not broadly U-shaped (Betten 1950, Figs. 45, 46, 47) ---------- *scabripennis*, p. 77

Pycnopsyche guttifer (Walker)

Previously recorded from Newfoundland: Wiggins 1961: Kitty's Brook, 17.VIII.49, 1 M. (C. Lindroth, ZIL); St. John's, 29.VIII.53, 1 M.; 8.IX.53, 1 F.; 14.IX.53, 1 F.; 16.IX.53, 1 F. (A. Fleming, ROM).

Localities collected: Emerged from laboratory stream: 15.VIII.72, 1 F.; 16.VIII.72, 1 M., 1 F.; 21.VIII.72, 5 M.; 22.VIII.72, 1 M., 2 F.; 23.VIII.72, 1 M., 1 F.; 24.VIII.72, 1 F.; 25.VIII.72, 2 F.; 26.VIII.72, 3 M., 3 F.; 28.VIII.72, 1 M., 5 F.; 29.VIII.72, 2 F.; 30.VIII.72, 1 M., 1 F.; 31.VIII.72, 1 F.; 1.IX.72, 2 M.; 14.IX.72, 3 F.; 19.IX.72, 2 F.; 16.VII.73, 1 F. (Marshall).

Descriptive reference: Nimmo—1971, p. 146, M., F.

Male genitalia: Plate XIV, Figs. 129a, b.

Female genitalia: Betten 1950, Figs. 39, 40, 41.

Geographical range: *P. guttifer* is transcontinental in its North American distribution, with northeastern and eastern records from Georgia, Maine, Massachusetts, Michigan, Newfoundland, New Hampshire, New York, North Carolina, Nova Scotia, Ontario, Pennsylvania, Quebec and Tennessee (Betten 1950, Flint 1960, Nimmo 1971).

Pycnopsyche scabripennis (Rambur)

New record for Newfoundland.

Localities collected: St. John's, 8.VIII.50, 1 M. (R. Morris, ARS).

Descriptive reference: Betten 1934, p. 345, M., *Stenophylax scabripennis* Rambur; Betten 1950, p. 521, M., F.

Male genitalia: Plate XIV, Figs. 130a, b. Drawn from the ARS specimen, collection data as above.

Female genitalia: Betten 1950, Figs. 45, 46, 47.

Geographical range: *P. scabripennis* ranges through northern, eastern and central North America. Records are from Georgia, Maine, Maryland, Michigan, New Hampshire, New Jersey, New York, North Carolina, Nova Scotia, Pennsylvania, Quebec, Virginia, West Virginia and Wisconsin. (Banks 1930, Betten 1950, Blickle & Morse 1966, Hyland 1948, Longridge & Hilsenhoff 1973, Morse & Blickle 1953, Ross 1941).

Pycnopsyche limbata (McLachlan)

Previously recorded from Newfoundland: McLachlan 1871: St. John's, ?, 2 M. (G. F. Mathew), *Stenophylax limbatus* n.sp. Wiggins 1961: Donovans, 23.IX.53, 1 M. (A. Fleming, ROM).

Localities collected: Colinet, St. Mary's Bay: 22.VIII.60, 1 M.; 23.VIII.60, 2 M.; 7.IX.60, 1 M. (R. Morris, ARS). Emerged from laboratory stream: 5.VI.73, 1 F.; 30.VIII.73, 1 M. (Marshall).

Descriptive reference: McLachlan 1871, p. 108, M.; Betten 1950, p. 520, M.

Male genitalia: Plate XV. Fig. 131.

Female genitalia: Betten 1950, Figs. 22, 23, 24.

Geographical range: *P. limbata* ranges through northeastern and central North America, with records from Maine, Newfoundland, New Hampshire, Nova Scotia, Ontario, Quebec, Rhode Island and Wisconsin (Betten 1950, Blickle & Morse 1966, Longridge & Hilsenhoff 1973, Morse & Blickle 1953).

Pycnopsyche lepida (Hagen)

Previously recorded from Newfoundland: Wiggins 1961: Glenwood, 23.VII.49, 1 M. (C. Lindroth, ZIL).

Localities collected: Emerged from laboratory stream, 28.VIII.72, 1 M. (Marshall). Norris Point Pond, 10.VII.73, 1 M.; Indian River, 14.VII.73, 1 F. (Marshall).

Descriptive reference: Betten & Mosely 1940, p. 153, M., F., *Allegophylax lepidus* (Hagen).

Male genitalia: Plate XV, Figs. 132a, b.

Female genitalia: Betten 1950, Figs. 88, 89, 90.

Geographical range: *P. lepida* ranges through northeastern, eastern and central North America, with records from Georgia, Maine, Massachusetts, Michigan, Minnesota, Newfoundland, New Hampshire, New Jersey, New York, North Carolina, Ontario, Pennsylvania, Quebec, Virginia and West Virginia (Betten 1950, Blickle & Morse 1966, Etnier 1965, Flint 1960, Morse & Blickle 1953).

Family MOLANNIDAE

Two species of Molannidae are known from Newfoundland. These species belong to the genus *Molanna* Curtis and may be separated by the following key (only the males are keyed as no distinguishing characteristics were found to separate the females. The one female specimen of *M. uniophila* was in very poor condition; however, a figure of the female genitalia of *M. blenda* is included (Fig. 135)):

1. Clasper elongate with rounded apex directed postro-dorsad (Fig. 133a); mesal process of clasper base large and flared (Fig. 133b); cercus elongate with definite dorsal and ventral lobes (Fig. 133a) ---------- *uniophila*, p. 79

   Clasper shorter with rounded apex directed postero-mesad (Fig. 134a); mesal process of clasper base small and rectangular (Fig. 134b); cercus short and truncate without such definite lobes (Fig. 134a) ---------- *blenda*, p. 80

Molanna uniophila Vorhies

New record for Newfoundland.

Localities collected: Norris Point Pond, 11.VII.73, 3 M.; Rushy Pond, 15.VII.73, 5 M.; Junction Pond, 17.VII.73, 17 M., 1 F.; Square Pond, 18.VII.73, 12 M. (Marshall).

Descriptive reference: Ross 1944, p. 206, M., F.

Male genitalia: Plate XV, Figs. 133a, b.

Female genitalia: No published figures available; specimen collected in poor condition.

Geographical range: *M. uniophila* ranges through northeastern, eastern and central North America. Records occur from Illinois, Michigan, Minnesota, New Brunswick, New Hampshire, New York, North Carolina, Ohio, Ontario, Pennsylvania, Quebec, Virginia and Wisconsin (Marshall 1939, Morse & Blickle 1953, Ross 1944, Sherberger & Wallace 1971). Edwards (1966) recorded 3 larvae from Tennessee.

Molanna blenda Sibley

New record for Newfoundland.

Localities collected: Foxtrap Stream, 5.VII.72, 1 F. (Marshall). Emerged from laboratory stream: 30.VII.72, 1 F.; 19.VI.73, 1 F.; 1.VII.73, 2 M.; 2.VII.73, 1 M.; 4.VII.73, 1 F.; 5.VII.73, 1 M.; 10.VII.73, 2 F.; 16.VII.73, 1 F.; 20.VII.73, 1 F.; 24.VII.73, 1 F.; 19.VIII.73, 1 F. (Marshall). St. John's, July 1973, 1 F. (J. Phipps).

Descriptive reference: Ross 1944, p. 208, M.

Male genitalia: Plate XV, Figs. 134a, b.

Female genitalia: Plate XV, Fig. 135.

Geographical range: *M. blenda* ranges through northeastern, eastern and central North America. Records are available from Georgia, Illinois, Michigan, Minnesota, New Hampshire, New York, Tennessee and Wisconsin (Edwards 1966, Etnier 1968, Leonard & Leonard 1949b, Morse & Blickle 1953, Sherberger & Wallace 1971).

Family LEPTOCERIDAE

Leptocerid adults are recognized by their slender form and very long antennae. Ten species of Leptoceridae are known from Newfoundland. These species belong to 4 genera which may be separated by the following key (modified from Ross 1944):

1. Front wings with stem of M atrophied, leaving only two main veins between R1 and Cu1 (Fig. 136) ---------- *Triaenodes*, p. 81

   Front wings with stem of M present, so that three main veins are between R1 and Cu1 (Figs. 137, 138) ---------- 2

2. Front wings with M not branched (Fig. 137) ---------- *Oecetis*, p. 82

   Front wings with M branched (Fig. 138) ---------- 3

3. Epicranial stem distinct and short, lateral sutures absent or indistinct; dorsal triangle of head large (Fig. 139) ---------- *Mystacides*, p. 84

   Epicranial stem absent or indistinct, lateral sutures well marked; dorsal triangle small (Fig. 140) ---------- *Athripsodes*, p. 85

Genus *Triaenodes* McLachlan

Only one species of *Triaenodes* is known from Newfoundland.

Triaenodes injusta (Hagen)

New record for Newfoundland.

Localities collected: Oxen Pond, Botanic Park: Summer 1972, 5 F.; 8.VII.73, 12 M., 1 F. (B. Jackson). St. John's: 7.VII.73, 2 M., 1 F.; July 1973, 1 F. (J. Phipps). Kents Pond: 4.VII.73, 2 M., 3 F.; 5.VII.73, 6 M., 6 F. (Marshall); 6.VII.73, 3 F. (J. Maunder). Rushy Pond, 15.VII.73, 9 F.; Junction Pond, 17.VII.73, 1 F. (Marshall).

Descriptive reference: Ross 1944, p. 252, M., F.

Male genitalia: Plate XVI, Figs. 141a, b.

Female genitalia: Ross 1944, Fig. 855A.

Geographical range: *T. injusta* ranges throughout northeastern, eastern and central North America. Records are from Maine, Michigan, Minnesota, New Brunswick, New Hampshire, New York, Ontario, Quebec and Tennessee (Banks 1900, Betten 1934, Blickle & Morse 1966, Corbet et al 1966, Edwards 1966, Leonard & Leonard 1949b, Marshall 1939, Morse & Blickle 1953, Ross 1959).

Genus *Oecetis* McLachlan

Three species of the *Oecetis* are known from Newfoundland. These species are separated by the following key (modified from Ross 1944):

1. Genitalia with an aedeagus (males) (Figs. 142-144) ---------- 2

   Genitalia without an aedeagus (females) ---------- 4

2. 10th tergite forming a pair of blade-like processes, wide at the base and tapering to narrow, downcurved apexes; aedeagus short and narrow with apex directed ventrad (Fig. 142) ---------- *osteni*, p. 83

   10th tergite forming a single short or long mesal projection; aedeagus much larger (Figs. 143, 144) ---------- 3

3. Aedeagus almost circular, with short ventral beak, and with an internal semi-circular sclerotized rod directed ventrad (Fig. 143) ---------- *inconspicua*, p. 83

   Aedeagus with large bulbous base which narrows to a ventral spatula-like beak, apex of aedeagus extruding membranous folds with several internal sclerotized rods (Fig. 144) ---------- *persimilis*, p. 84

4. Spermatheca attached to a large many lobed sclerotized internal structure with a pair of long rods directed anterad (Ross 1944, Fig. 825) ---------- *persimilis*, p. 84

   Spermatheca otherwise ---------- 5

5. 8th sternite with purse-shaped sclerotized area, with spermatheca located centrally within the 9th segment (Ross 1944, Fig. 826) ---------- *osteni*, p. 83

8th sternite with posterior margins folded laterad and shelf-like, spermatheca located toward margin of 8th and 9th segments (Ross 1944, Fig. 831) ---------- *inconspicua*, p. 83

Oecetis osteni Milne

New record for Newfoundland.

Localities collected: Howley, 11.VII.49, 1 M., ? F. (C. Lindroth, ZIL). Rushy Pond, 15.VII.73, 1 F.; Junction Pond, 17.VII.73, 2 F. (Marshall).

Descriptive reference: Ross 1944, p. 241, M., F.

Male genitalia: Plate XVI. Fig. 142. Drawn from a specimen lent by the ROM, taken at Mayville, New York, 23.VI.57, by E. Bay.

Female genitalia: Ross 1944, Fig. 826.

Geographical range: *O. osteni* ranges through northeastern, central and eastern North America. Records are from Illinois, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Ontario, Pennsylvania, Quebec, Virginia and Wisconsin (Blickle & Morse 1966, Hyland 1948, Ross 1944).

Oecetis inconspicua (Walker)

New record for Newfoundland.

Localities collected: Colinet, St. Mary's Bay: 15.VII.60, 3 M.; 27.VII.60, 2 M.; 1.VIII.60, 1 M., 1 F.; 3.VIII.60, 3 M.; 5.VIII.60, 1 M.; 8.VIII.60, 1 F.; 10.VIII.60, 2 M.; 30.IX.60, 1 M. (R. Morris, ARS). St. John's: August 1972, 2 M., 7 F.; Summer 1972, 1 M., 6 F.; 7.VII.73, 3 M., 5 F. (J. Phipps). Oxen Pond, Botanic Park: Summer 1972, 1 M., 1 F.; August 1973, 1 F. (B. Jackson). Kents Pond: 4.VII.73, 4 M.; 5.VII.73, 3 M., 6 F. (Marshall); 6.VII.73, 3 M., 1 F. (J. Maunder). Norris Point Pond, 10.VII.73, 6 M., 3 F.; Lomond River, 13.VIII.73, 8 F.; Indian River,

14.VII.73, 1 F.; Rushy Pond, 15.VII.73, 67 M., 38 F.; Junction Pond, 17.VII.73, 2 M., 25 F.; Square Pond, 18.VII.73, 1 F. (Marshall).

Descriptive reference: Ross 1944, p. 242, M., F.

Male genitalia: Plate XVI, Fig. 143.

Female genitalia: Ross 1944, Fig. 831.

Geographical range: *O. inconspicua* is transcontinental in its North American distribution. Northeastern and eastern records occur from Georgia, Indiana, Maine, Massachusetts, New Brunswick, New Hampshire, New York, Nova Scotia, Ohio, Ontario, Pennsylvania, Quebec, Tennessee and Virginia (Edwards 1966, Ross 1944).

Oecetis persimilis (Banks)

New record for Newfoundland.

Localities collected: Aspen Brook, 16.VII.73, 1 F. (Marshall).

Descriptive reference: Ross 1944, p. 243, M., F.

Male genitalia: Plate XVI, Fig. 144. Drawn from specimen lent by the ROM, collected at Chutes Provincial Park, 7.VI.70, by ROM field party.

Female genitalia: Ross 1944, Fig. 825.

Geographical range: *O. persimilis* ranges through central, northeastern and eastern North America. Records occur from Illinois, Georgia, Maine, Maryland, Michigan, Minnesota, New Hampshire, Ohio, Ontario, Tennessee, Virginia and Wisconsin (Blickle & Morse 1966, Edwards 1966, Leonard & Leonard 1949b, Marshall 1939, Morse & Blickle 1953, Ross 1944).

Genus *Mystacides* Berthold

Only one species of the genus *Mystacides* is known to occur in Newfoundland.

Mystacides sepulchralis (Walker)

Previously recorded from Newfoundland: Yamamoto & Wiggins 1964: Spruce Brook, 27-29.VII.14, 2 M. (?, ROM); Pistolet Bay, 19.VIII.49, 2 M. (C. Lindroth, ZIL); St. John's, 13.VII.53, 1 M., 1 F. (R. Morris, ARS); Colinet, St. Mary's Bay: 15.VII.60, 2 M. (R. Morris, ARS). Buchans, 19.VII.61, 1 M., 1 F. (?); Halls Bay Rd., 21.VII.61, 1 M. (?); Lewisporte, 10.VIII.61, many M. (?).

Localities collected: Emerged from laboratory stream: 28.VII.72, 1 F.; 25.IX.72, 1 M.; 29.VI.73, 1 M. (Marshall). St. John's, July 1973, 1 F. (J. Phipps). Kents Pond, 30.VI.73, 1 M.; 4.VII.73, 1 F.; Norris Point Pond, 10.VII.73, 2 M.; Aspen Brook, 16.VII.73, 1 F.; Square Pond, 18.VII.73, 3 M. (Marshall).

Descriptive reference: Yamamoto & Wiggins 1964, p. 1109, M., F.

Male genitalia: Plate XVI, Figs. 145a, b.

Female genitalia: Yamamoto & Wiggins 1964, Figs. 15a, b, c.

Geographical range: *M. sepulchralis* is distributed throughout northern North America, being widespread in central and eastern regions. Records from the northeast and east include Connecticut, Georgia, Indiana, Maine, Massachusetts, Michigan, New Brunswick, Newfoundland, New Hampshire, New Jersey, New York, Nova Scotia, Ohio, Ontario, Pennsylvania, Quebec, Tennessee, Vermont, Virginia and West Virginia (Yamamoto & Wiggins 1964).

Genus *Athripsodes* Billberg

Five species of *Athripsodes* are known from Newfoundland. They are separated by the following key (modified from Ross 1944):

1. Genitalia with an aedeagus (males) (Figs. 146-150) ---------- 2

   Genitalia without an aedeagus (females) ---------- 6

2. 10th tergite with a pair of long sclerotized lateral arms (Figs. 146a) ---------- *alagmus*, p. 87

   10th tergite without such a pair of lateral arms (Figs. 147a-150a) ---------- 3

3. Clasper with short mesal process, never much longer than width of dorsal portion of clasper; clasper with mesal lobe just below mesal process (Figs. 147, 148) ---------- 4

   Mesal process longer than width of dorsal portion of clasper; clasper with or without a mesal lobe below mesal process (Figs. 149, 150) ---------- 5

4. Aedeagus large with wide base and a single internal spine; clasper base produced into a spur (Figs. 147a, b) ---------- *annulicornis*, p. 87

   Aedeagus small with narrow base, and two internal spines; clasper base not produced into a spur (Figs. 148a, b) ---------- *dilutus*, p. 88

5. Clasper with dorsal portion bent almost at right angles to base; mesal process of clasper as long as or longer than dorsal portion (Figs. 149a, b) ---------- *angustus*, p. 88

   Clasper with dorsal portion straight, only slightly angled to base; mesal process of clasper much shorter than dorsal portion (Figs. 150a, b) ---------- *cancellatus*, p. 89

6. Spermatheca with wide lateral expansions (Ross 1944, Fig. 801B) ---------- *angustus*, p. 88

   Spermatheca with lateral expansions absent ---------- 7

7. 9th sternite with a pair of digitate apico-mesal lobes (Ross 1944, Figs. 792A, 793B) ---------- *alagmus*, p. 87

   9th sternite without such lobes or at most short points ---------- 8

8. 9th sternite with lateral margins marked by an internal shelf directed mesad (Ross 1944, Fig. 798A) ---------- *cancellatus*, p. 89

   Lateral margins of 9th sternite not marked by such an internal shelf; spermatheca attached to sclerotized processes which extend anterad into the 7th segment (Ross 1944, Figs. 799A, B) ---------- *annulicornis*, p. 87

Athripsodes alagmus Ross

New record for Newfoundland.

Localities collected: St. John's: 31.VII.71, 2 M., 2 F.; 1.VIII.71, 2 F.; August 1972, 10 M., 58 F.; Summer 1972, 12 M., 18 F. (J. Phipps).

Descriptive reference: Ross 1944, p. 229, M., F.

Male genitalia: Plate XVI, Figs. 146a, b.

Female genitalia: Ross 1944, Fig. 793B.

Geographical range: *A. alagmus* ranges through central and northeastern North America, with records from Illinois, Maine, Michigan, Minnesota, New Hampshire, New York, Quebec and Wisconsin (Blickle & Morse 1966, Corbet et al 1966, Morse & Blickle 1953, Ross 1944).

Athripsodes annulicornis (Stephens)

New record for Newfoundland.

Localities collected: Lomond River, 13.VII.73, 7 M., 51 F.; Rushy Pond, 15.VII.73, 7 M., 46 F. (Marshall).

Descriptive reference: Milne 1934-36, p. 15, M., *Athripsodes perplexus nordus* Milne. Milne does not describe the male genitalia; they are described as follows: Cerci short; 10th tergite long, with wide base tapering to narrow apex; claspers long, with bases produced into sclerotized spurs, dorsal portion of claspers directed posterad, with small mesal process, clasper stem with mesal lobe; aedeagus elongate with enlarged base and one internal spine.

Male genitalia: Plate XVI, Figs. 147a, b.

Female genitalia: Ross 1944, Figs. 799A, C.

Geographical range: *A. annulicornis* is Holarctic in distribution, with northeastern North American records from Maine, Michigan, New Hampshire, New York, Ontario and Quebec (Blickle & Morse 1966, Corbet et al 1966, Leonard & Leonard 1949b, Morse & Blickle 1953, Ross 1944).

Athripsodes dilutus (Hagen)

New record for Newfoundland.

Localities collected: Rushy Pond, 15.VII.73, 1 F.; Aspen Brook, 16.VII.73, 1 M., 16 F.; Junction Pond, 17.VII.73, 1 M., 2 F. (Marshall).

Descriptive reference: Ross 1944, p. 231, M., F.

Male genitalia: Plate XVI, Figs. 148a, b.

Female genitalia: Ross 1944, Fig. 796A.

Geographical range: *A. dilutus* is distributed over most of northeastern North America extending westward to Minnesota, and south to Georgia. Northeastern and eastern records include Georgia, Indiana, Maine, Michigan, New Hampshire, New York, Ohio, Ontario, Pennsylvania and Quebec (Blickle & Morse 1966, Hyland 1948, Leonard & Leonard 1949b, Morse & Blickle 1953, Ross 1944).

Athripsodes angustus (Banks)

New record for Newfoundland.

Localities collected: Colinet, St. Mary's Bay, 27.VII.60, 1 M. (R. Morris, ARS). St. John's, August 1972, 1 M., 2 F. (J. Phipps). Rushy Pond, 15.VII.73, 1 F.; Aspen Brook, 16.VII.73, 1 F. (Marshall).

Descriptive reference: Ross 1944, p. 231, M., F.

Male genitalia: Plate XVII, Figs. 149a, b.

Female genitalia: Ross 1944, Fig. 801B.

Geographical range: *A. angustus* ranges through the northeastern and eastern regions of North America with records from Maine, Michigan, New Hampshire, New York, Ohio, Ontario, Pennsylvania, Quebec and Tennessee. It extends westward to Minnesota and southwestward into Oklahoma (Edwards 1966, Morse & Blickle 1953, Ross 1944).

Athripsodes cancellatus (Betten)

New record for Newfoundland.

Localities collected: Howley, 11.VII.49, 1 M. (C. Lindroth, ZIL). Oxen Pond, Botanic Park, Summer 1972, 1 F. (B. Jackson). Junction Pond, 17.VII.73, 1 F. (Marshall).

Descriptive reference: Ross 1944, p. 233, M., F.

Male genitalia: Plate XVII, Figs. 150a, b. Drawn from a ROM specimen, taken at Canora, Saskatchewan, 12.VII.54, by Brooks & Wallis.

Female genitalia: Ross 1944, Fig. 798A.

Geographical range: *A. cancellatus* is transcontinental in its North American distribution, from British Columbia to Newfoundland, and extending southward into Georgia, Mississippi, Arkansas and Oklahoma. Northeastern and eastern records include Georgia, Indiana, Kentucky, Maine, Michigan, Mississippi, New Hampshire, New York, Ohio, Ontario, Pennsylvania, Quebec and Tennessee (Blickle & Morse 1966, Leonard & Leonard 1949b, Marshall 1939, Morse & Blickle 1953, Ross 1944, Ross & Spencer 1952).

Athripsodes sp.

Localities collected: Rushy Pond, 15.VII.73, 1 M.; Aspen Brook, 16.VII.73, 1 M. (Marshall).

Male genitalia: Plate XVII, Figs. 151a, b. Drawn from specimen taken at Aspen Brook.

This species appears to be intermediate between *A. ruthae* Flint 1965 (Figs. 8A, B), and *A. scopulosus* Leonard & Leonard 1949a (Figs. 1-3). The two specimens are similar to *ruthae* in having the mesal lobe of the clasper slender and slightly curved, the mesal process of the clasper short, and the aedeagus the same size. They are similar to *scopulosus* in having the dorsal portion of the clasper only slightly angled from the

stem and directed dorso-posterad, unlike *ruthae* which has the dorsal portion bent at right angles to the stem and directed posterad. This species differs from both *ruthae* and *scopulosus* in that the clasper base is elongate, as long as, if not longer than the dorsal portion of the clasper. However, the length of the clasper base might be a variable characteristic as its length varies in these two specimens. Also this species lacks the pair of membranous lobes between the cerci found in *scopulosus*, and lacks the slender rod of the ventral margin of the 10th tergite found in *ruthae*. Until more specimens are collected and further detailed study and comparisons are made no definite determination is possible.

Family LEPIDOSTOMATIDAE

Five species of Lepidostomatidae are known from Newfoundland. These species belong to the genus *Lepidostoma* Rambur and may be separated by the following key (modified from Ross 1946, Flint & Wiggins 1961):

1. Maxillary palpi 1- to 3-segmented (males) ---------- 2

   Maxillary palpi 5-segmented (females) ---------- 6

2. 6th, 7th, 8th and 9th tergites each with a pair of large ovate warts bearing long tufts of hair (these hair tufts may often be broken off in preserved specimens); 10th tergite forming a pair of sclerotized pointed hook-like mesal processes, and a pair of shorter sclerotized lateral processes (Figs. 152a, b) ---------- *vernalis*, p. 92

   6th, 7th, 8th and 9th tergites each with much smaller scattered warts bearing hairs; 10th tergite otherwise (Figs. 153-156) ---------- 3

3. Dorsal process of clasper as long as the ventral portion and overlying it; dorsal process expanded apically into sub-ovate lobe (Figs. 153a, b) ---------- *swannanoa*, p. 93

   Dorsal process of clasper shorter and more finger-like (Figs. 154-156) ---------- 4

4. Clasper with a small finger-like basal process and a short mesal process at apex (Fig. 154b); 10th tergite forming a pair of simple long sclerotized arms, curved ventrad, without spurs or sclerotized teeth (Figs. 154a) ---------- *togatum*, p. 93

   Clasper without basal and mesal processes; 10th tergite usually with spurs or sclerotized teeth, and not forming a pair of long ventrad curved arms (Figs. 155, 156) ---------- 5

5. Lobes of 10th tergite each with a pair of dorsad curved teeth at apex (Figs. 155a, b); clasper tapering to pointed apex (Figs. 155a, c) ------ *bryanti*, p. 94

   Lobes of 10th tergite tapering to narrow short tip, without such teeth at apex (Figs. 156a, b); clasper tapering to semi-truncate apex (Figs. 156a, c) ---------- *strophis*, p. 94

6. Spermatheca somewhat elongate with lateral bands divided by a longitudinal dark line darkening laterally (Flint & Wiggins 1961, Fig. 20) ---------- *vernalis*, p. 92

Spermatheca more conical or oval in shape, with lateral bands otherwise ---------- 7

7. Spermatheca more conical in shape ---------- 8

Spermatheca more oval in shape ---------- 9

8. Spermatheca with lateral margins slightly flared so that spermatheca appears diamond shaped (Ross 1946, Fig. 23B) ---------- *swannanoa*, p. 93

Spermatheca with lateral margins much more flared and flattened antero-posterad (Ross 1946, Figs. 20A, B) ---------- *togatum*, p. 93

9. Spermatheca an elongated oval, with ventral margins forming definite flanges (Ross 1946, Fig. 24B) ---------- *strophis*, p. 94

Spermatheca a more rounded oval with ventral margins not forming such definite flanges (Leonard & Leonard 1949a, Fig. 4) ---------- *bryanti*, p. 94

Lepidostoma vernalis (Banks)

Previously recorded from Newfoundland: Wiggins 1961: Port aux Basques, 28.VI.49, 1 M., 1 F. (C. Lindroth, ZIL).

Localities collected: Kents Pond, 5.VII.73, 1 M.; River of Ponds Pond, 11.VII.73, 1 M. (Marshall).

Descriptive reference: Flint & Wiggins 1961, p. 281, M., F.

Male genitalia: Plate XVII. Figs. 152a, b.

Female genitalia: Flint & Wiggins 1961, Fig. 20.

Geographical range: *L. vernalis* is found in northeastern North America with records from Massachusetts, Michigan, Newfoundland, New Hampshire, New York and Ontario (Flint & Wiggins 1961).

Lepidostoma swannanoa Ross

Previously recorded from Newfoundland: Wiggins 1961: Grandy Brook, Burgeo, 22.VI.49, 4 M., 2 F. (C. Lindroth, ZIL).

Localities collected: Lomond River, 13.VII.73, 1 M., 21 F.?; Indian River, 14.VII.73, 3 M., 8 F.?; Aspen Brook, 16.VII.73, 19 F.? (Marshall).

Descriptive reference: Ross 1939, p. 69, M., F.

Male genitalia: Plate XVII, Figs. 153a, b.

Female genitalia: Ross 1946 Fig. 23B, *L. ontario* Ross. Ross(1946) points out that *L. swannanoa* is very similar to *L. ontario* differing only in variable details. Specimens collected were verified by Dr. Wiggins (ROM) as *L. swannanoa*.

Geographical range: *L. swannanoa* is northeastern in its North American distribution with records from Massachusetts, Newfoundland, New Hampshire, New York and North Carolina (Denning 1954, Ross 1946).

Lepidostoma togatum (Hagen)

Previously recorded from Newfoundland: Banks 1908: Grand Lake, July 1906, "four specimens" (O. Bryant), *Lepidostoma togata* Hagen.

Localities collected: Norris Point Pond, 10.VII.73, 85 F.; River of Ponds Pond, 11.VII.73, 2 M.; Lomond River, 13.VII.73, 1 M., 1 F.; Indian River, 14.VII.73, 2 F.; Rushy Pond, 15.VII.73, 2 F.; Aspen Brook, 16.VII.73, 3 F.; Junction Pond, 17.VII.73, 5 F.; Square Pond, 18.VII.73, 1 M., 5 F. (Marshall).

Descriptive reference: Betten 1934, p. 409, M., F.; Ross 1946, p. 271, M., F.

Male genitalia: Plate XVII, Figs. 154a, b.

Female genitalia: Ross 1946, Figs. 20A, B.

Geographical range: *L. togatum* is widely distributed throughout central and eastern North America as far west as Alberta. Northeastern and eastern records include Connecticut, Georgia, Kentucky, Maine,

Michigan, Newfoundland, New Hampshire, New York, North Carolina, Nova Scotia, Ontario, Pennsylvania, Quebec and Tennessee (Banks 1908, Denning 1954, Morse & Blickle 1953, Ross 1946).

Lepidostoma bryanti (Banks)

Previously recorded from Newfoundland: Banks 1908, Grand Lake, July 1906, "four males, one female" (O. Bryant), *Alepomyia bryanti* n.sp.

Localities collected: Norris Point Pond, 10.VII.73, 1 M.; Lomond River, 13.VII.73, 2 M., 5 F.; Rushy Pond, 15.VII.73, 3 M., 47 F.; Junction Pond, 17.VII.73, 1 F.; Square Pond, 18.VII.73, 1 M. (Marshall). Emerged from laboratory stream, 19.VIII.73, 1 F. (Marshall).

Descriptive reference: Vorhies 1909, p. 685, M., *Lepidostoma wisconsinensis* Vorhies.

Male genitalia: Plate XVII, Figs. 155a, b, c.

Female genitalia: Leonard & Leonard 1949a, Fig. 4.

Geographical range: *L. bryanti* ranges through northeastern and central North America, with records from Maine, Michigan, Minnesota, Newfoundland, New Hampshire, New York, Pennsylvania and Wisconsin (Blickle & Morse 1966, Etnier 1965, Leonard & Leonard 1949a, Morse & Blickle 1953, Ross 1946).

Lepidostoma strophis Ross

New record for Newfoundland.

Localities collected: Emerged from laboratory stream: 26.VII.72, 1 F.; 21.IX.72, 1 M.; 9.X.72, 1 F.; 16.X.72, 1 M.; 31.X.72, 1 M. (Marshall).

Descriptive reference: Ross 1938, p. 177, M.

Male genitalia: Plate XVII, Figs. 156a, b, c.

Female genitalia: Ross 1946, Fig. 24B.

Geographical range: *L. strophis* is transcontinental in its North American distribution, with northeastern records from Maine and Michigan (Ross 1946).

Family BRACHYCENTRIDAE

One species of the family Brachycentridae is known from Newfoundland.

Genus *Micrasema* McLachlan

Micrasema wataga Ross

New record for Newfoundland.

Localities collected: St. John's: 31.VII.71, 1 F.?; 1.VIII.71, 5 F.?; August 1972, 8 F.?; Summer 1972, 3 M., 6 F.?; 7.VII.73, ~~1 M.~~ (J. Phipps).

Descriptive reference: Ross 1938, p. 178, M., F.

Male genitalia: Plate XVIII, Figs. 157a, b.

Female genitalia: Plate XVIII, Fig. 158. Identification of the females is uncertain and no published figures are available for comparison. A figure of the genitalia is included here to facilitate future taxonomic work.

Geographical range: *M. wataga* ranges through northeastern, eastern and central North America, with records from Arkansas, Maine, Minnesota, New Hampshire, North Carolina and Tennessee (Blickle & Morse 1966, Etnier 1965, Morse & Blickle 1953, Ross 1938, Unzicker et al 1970).

Family HELICOPSYCHIDAE

Adult Helicopsychids are distinguished by the structure of their hind wings (Fig. 20), and the coiled snail-like case constructed by the larvae is unique to the family.

One species of the family Helicopsychidae is known from Newfoundland.

Genus *Helicopsyche* Siebold

Helicopsyche borealis Hagen

New record for Newfoundland.

Localities collected: Rushy Pond, 15.VII.73, 2 M.; Aspen Brook, 16.VII.73, 1 F.; Square Pond, 18.VII.73, 4 M. (Marshall).

Descriptive reference: Ross 1944, p. 266, M., F.

Male genitalia: Plate XVIII, Figs. 159a, b, c.

Female genitalia: Plate XVIII, Fig. 160.

Geographical range: *H. borealis* is transcontinental in its North American distribution ranging from Mexico to Newfoundland and Oregon. Northeastern and eastern records include Georgia, Indiana, Kentucky, Maine, Michigan, New Brunswick, New Hampshire, New York, Nova Scotia, Ohio, Ontario, Pennsylvania, Quebec, Tennessee, Virginia and West Virginia (Blickle & Morse 1966, Corbet et al 1966, Edwards 1966, Ross 1944).

SPECIES LIST OF NEWFOUNDLAND TRICHOPTERA

Family RHYACOPHILIDAE

Genus *Rhyacophila* Pictet 1834

melita Ross 1938

fuscula (Walker) 1852

acropedes Banks 1914

Family GLOSSOSOMATIDAE

Genus *Glossosoma* Curtis 1834

nigrior Banks 1911

Family PHILOPOTAMIDAE

Genus *Dolophilodes* Ulmer 1909

distinctus (Walker) 1852

Genus *Chimarra*

aterrima Hagen 1861

socia Hagen 1861

obscura (Walker) 1852

Family POLYCENTROPODIDAE

Genus *Neureclipsis* McLachlan 1864

crepuscularis (Walker) 1852

bimaculatus (Linnaeus) 1758

Genus *Nyctiophylax* Brauer 1865

affinis (Banks) 1897

Genus *Polycentropus* Curtis 1835

aureolus (Banks) 1930

weedi (Blickle & Morse) 1955

confusus Hagen 1861

centralis Banks 1914

maculatus Banks 1908

blicklei Ross & Yamamoto 1965

interruptus (Banks) 1914

flavus (Banks) 1908

remotus Banks 1911
cinereus Hagen 1861

Family HYDROPSYCHIDAE

Genus *Arctopsyche* McLachlan 1868
lodogensis Kolenati 1859
Genus *Hydropsyche* Pictet 1834
betteni Ross 1938
sparna Ross 1938
recurvata Banks 1914
slossonae Banks 1905

Family HYDROPTILIDAE

Genus *Hydroptila* Dalman 1819
metoeca Blickle & Morse 1954
Genus *Oxyethira* Eaton 1873
sida Blickle & Morse 1954
obtatus Denning 1947

Family PHRYGANEIDAE

Genus *Ptilostomis* Kolenati 1859
semifasciata (Say) 1828
ocellifera (Walker) 1852
Genus *Phryganea* Linnaeus 1758
cinerea Walker 1852
Genus *Oligostomis* Kolenati 1848
pardalis (Walker) 1852
ocelligera (Walker) 1852
Genus *Agrypnia* Curtis 1835
vestita (Walker) 1852
deflata (Milne) 1931
improba (Hagen) 1873
macdunnoughi (Milne) 1931
colorata Hagen 1873
Genus *Banksiola* Martynov 1924
crotchi Banks 1944
dossuaria (Say) 1824
smithi (Banks) 1914

Genus *Fabria* Milne 1934

complicata (Banks) 1924

Family LIMNEPHILIDAE

Genus *Apatania* Kolenati 1848

stigmatella (Zetterstedt) 1840

Genus *Neophylax* McLachlan 1871

nacatus Denning 1941

ornatus Banks 1920

oligius Ross 1938

aniqua Ross 1947

Genus *Pseudostenophylax* Martynov 1909

sparsus (Banks) 1908

Genus *Onocosmoecus* Banks 1943

quadrinotatus Banks 1908

Genus *Platycentropus* Ulmer 1905

indistinctus (Walker) 1852

radiatus (Say) 1824

Genus *Nemotaulius* Banks 1906

hostilis (Hagen) 1864

Genus *Arctopora* Thomson 1891

pulchella (Banks) 1908

Genus *Lenarchus* Martynov 1914

crassus (Banks) 1920

Genus *Limnephilus* Leach 1815

hyalinus Hagen 1861

sublunatus Provancher 1877

externus Hagen 1861

indivisus Walker 1852

sericeus (Say) 1824

perpusillus Walker 1852

argenteus Banks 1914

nebulosus Kirby 1837

rhombicus Linnaeus 1758

moestus Banks 1908

ornatus Banks 1897

kennicotti Banks 1920
ademus Ross 1941
submonilifer Walker 1852
Genus *Anabolia* Stephens 1837
sordida Hagen 1861
bimaculata Walker 1852
Genus *Glyphopsyche* Banks 1904
irrorata (Fabricius) 1781
Genus *Psychoglypha* Ross 1944
subborealis (Banks) 1924
Genus *Hydatophylax* Wallengren 1891
argus (Harris) 1869
Genus *Pycnopsyche* Banks 1905
guttifer (Walker) 1852
scabripennis (Rambur) 1842
limbata (McLachlan) 1871
lepida (Hagen) 1861

Family MOLANNIDAE
Genus *Molanna* Curtis 1834
uniophila Vorhies 1909
blenda Sibley 1926

Family LEPTOCERIDAE
Genus *Triaenodes* McLachlan 1865
injusta (Hagen) 1861
Genus *Oecetis* McLachlan 1877
osteni Milne 1934
inconspicua (Walker) 1852
persimilis (Banks) 1907
Genus *Mystacides* Berthold 1827
sepulchralis (Walker) 1852
Genus *Athripsodes* Billberg 1820
alagmus Ross 1938
annulicornis Stephens 1836
dilutus (Hagen) 1861

angustus (Banks) 1914
cancellatus Betten 1934

Family LEPIDOSTOMATIDAE

Genus *Lepidostoma* Rambur 1842
vernalis (Banks) 1897
swannanoa Ross 1939
togatum (Hagen) 1861
bryanti (Banks) 1908
strophis Ross 1938

Family BRACHYCENTRIDAE

Genus *micrasema* McLachlan 1876
wataga Ross 1938

Family HELICOPSYCHIDAE

Genus *Helicopsyche* Siebold
borealis Hagen 1861

DISCUSSION AND CONCLUSION

Newfoundland's fauna is poor in comparison with that of the adjacent North American continent. This is because postglacial isolation of the Island has prevented any great influx of fauna from the mainland (Lindroth 1963). However, the total of 97 trichopteran species recorded from Newfoundland is probably well below the actual numbers present. Of the collections referred to in this study, only about one-third have been directed specifically at Trichoptera; therefore, considering the abundance and variety of freshwater habitats in Newfoundland, it is reasonable to conclude that more extensive collecting would reveal many more species.

The presence in Newfoundland of possible new species raises two interesting points. First, there is the possibility that trichopteran species endemic to Newfoundland exist. This is unlikely because the relatively short time that has elapsed since the last Pleistocene glaciation has been insufficient for the evolution of endemic Newfoundland species (Lindroth 1963). Second, it is more reasonable to suggest that any new species which may be recorded from Newfoundland will also occur on the mainland and merely represent a species new to science and not endemic to Newfoundland.

As far as is known the trichopteran fauna of Newfoundland is similar to that of northeastern North America. However, it must be emphasized that neither the origins, the complete distribution, nor the European influence on the trichopteran fauna has been studied in detail for the Island. It is pertinent to point out here that studies such as those by

Lindroth (1957, 1963) indicate the importance of the European influence on Newfoundland fauna and flora. Therefore further extensive collecting and comparative studies may reveal more European similarities than are readily apparent in this study.

Apart from taxonomic work the possibilities for further study on Newfoundland Trichoptera are unlimited. Many workers including Hynes (1970), Macan (1962), Minshall (1968), Slack (1936b), Sleight (1913), Sprules (1947) and Winterbourn (1971) have indicated the importance of combined studies on trichopteran life histories and their trophic relations in the freshwater food web. Such studies are, to date, completely lacking from Newfoundland.

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FIGURES AND PLATES

KEY TO FIGURES A & B

Published Collection Sites

✚ McLachlan 1871
St. John's

✱ Banks 1908
Grand Lake

■ Wiggins 1961
1. St. John's
2. Donovans
3. Mount Pearl
4. Witless Bay Line
5. Holyrood
6. Goobies
7. Terrenceville
8. Grand Bank
9. Pushthrough
10. Hare Bay
11. Rencontre West
12. Grandys Brook, Burgeo
13. Cinq Cerf River
14. Grand Bruit
15. Rose Blanche
16. Port aux Basques
17. South Branch
18. Daniels Harbour
19. Port au Choix
20. Eddies Cove West
21. Flowers Cove
22. St. Anthony
23. Deer Lake
24. Howley
25. Kittys Brook
26. Gaff Topsail
27. Badger
28. Springdale
29. Lewisporte
30. Twillingate South, Twillingate Island
31. Fogo, Fogo Island
32. Tilting, Fogo Island
33. Seldom, Fogo Island
34. Glenwood
35. Gander
36. Gambo
37. Bonavista
38. Port Rexton

⧓ Yamamoto & Wiggins 1964
1. St. John's
2. Colinet
3. Lewisporte
4. Buchans
5. Halls Bay Road
6. Spruce Brook
7. Pistolet Bay

Unpublished Collection Sites

▲ R. Morris 1950-61
1. St. John's
2. Colinet

● Marshall 1972-73, J. Phipps 1968-73, B. Jackson 1972-73 & J. Maunder 1973
1. Bauline Line
2. Logy Bay
3. St. John's
4. Kents Pond
5. Oxen Pond
6. Hogans Pond
7. Manuels River
8. Thomas Pond
9. Dog Pond Stream
10. Mobile Big Pond
11. Square Pond
12. Junction Pond
13. Rushy Pond
14. Aspen Brook
15. Indian River
16. Sandy Lake
17. Lomond River
18. Norris Point Pond
19. River of Ponds Pond

▼ Miscellaneous
C. Lindroth 1949
1. Howley

C. Alexander 1961
2. Stoney Brook, Trepassey

D. Ferguson 1962
3. Doyles, Codroy Valley

G. Sharp 1968
4. Trout River
5. White Point Pond

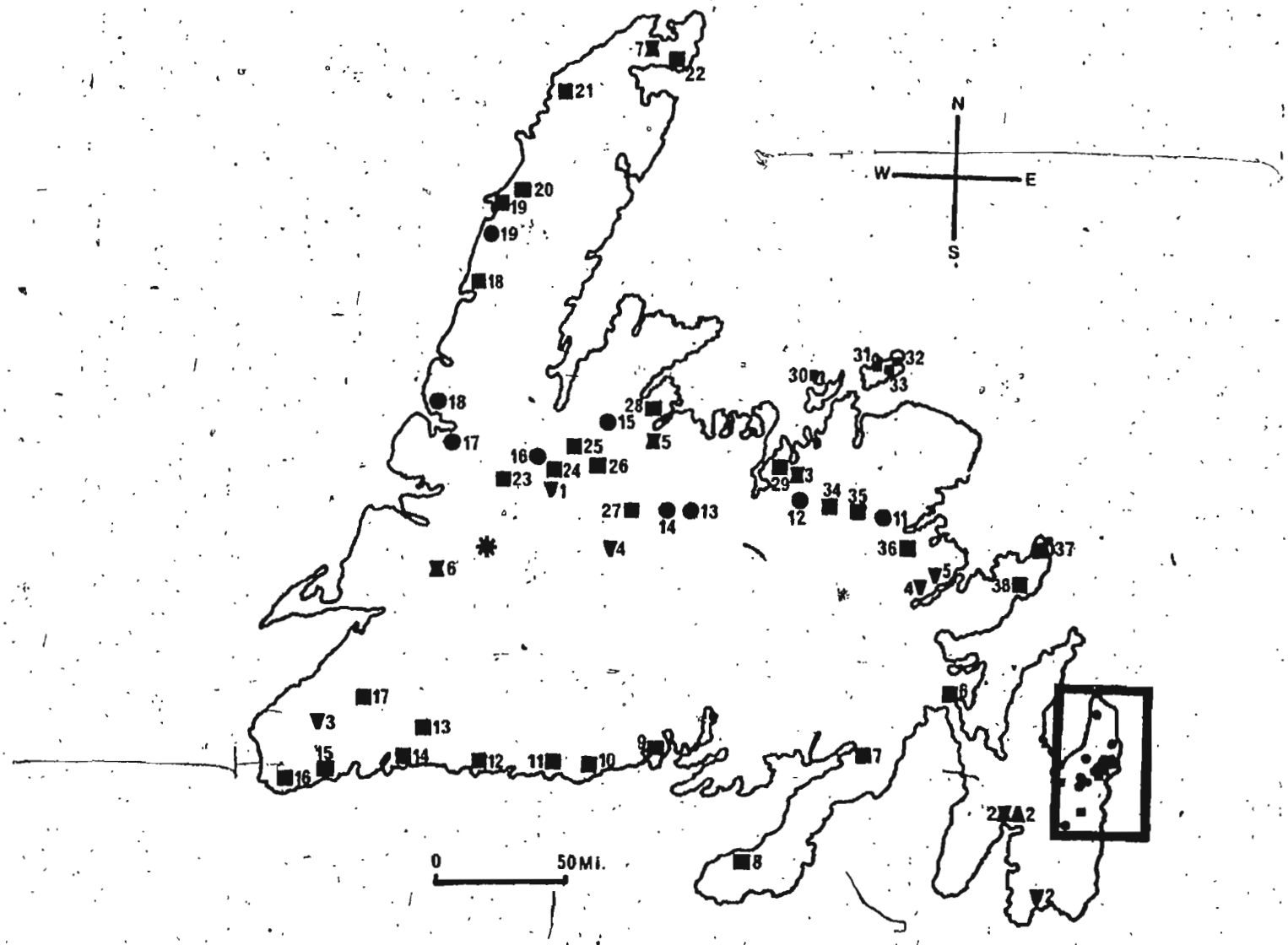


Fig. A. Trichopteran adult collections from Newfoundland

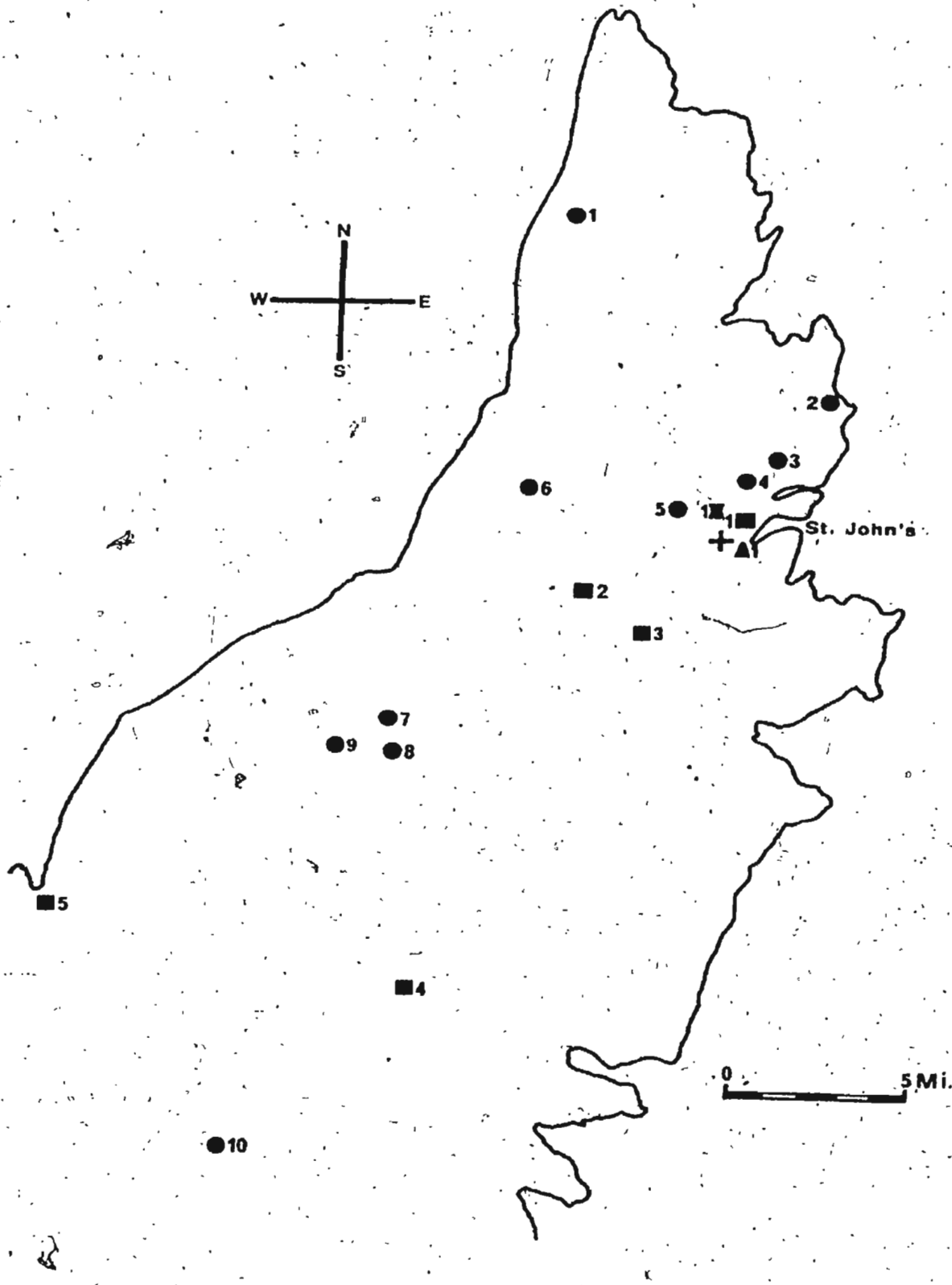


Fig. B. Trichopteran adult collections from the Avalon Peninsula (enlarged from Fig. A)

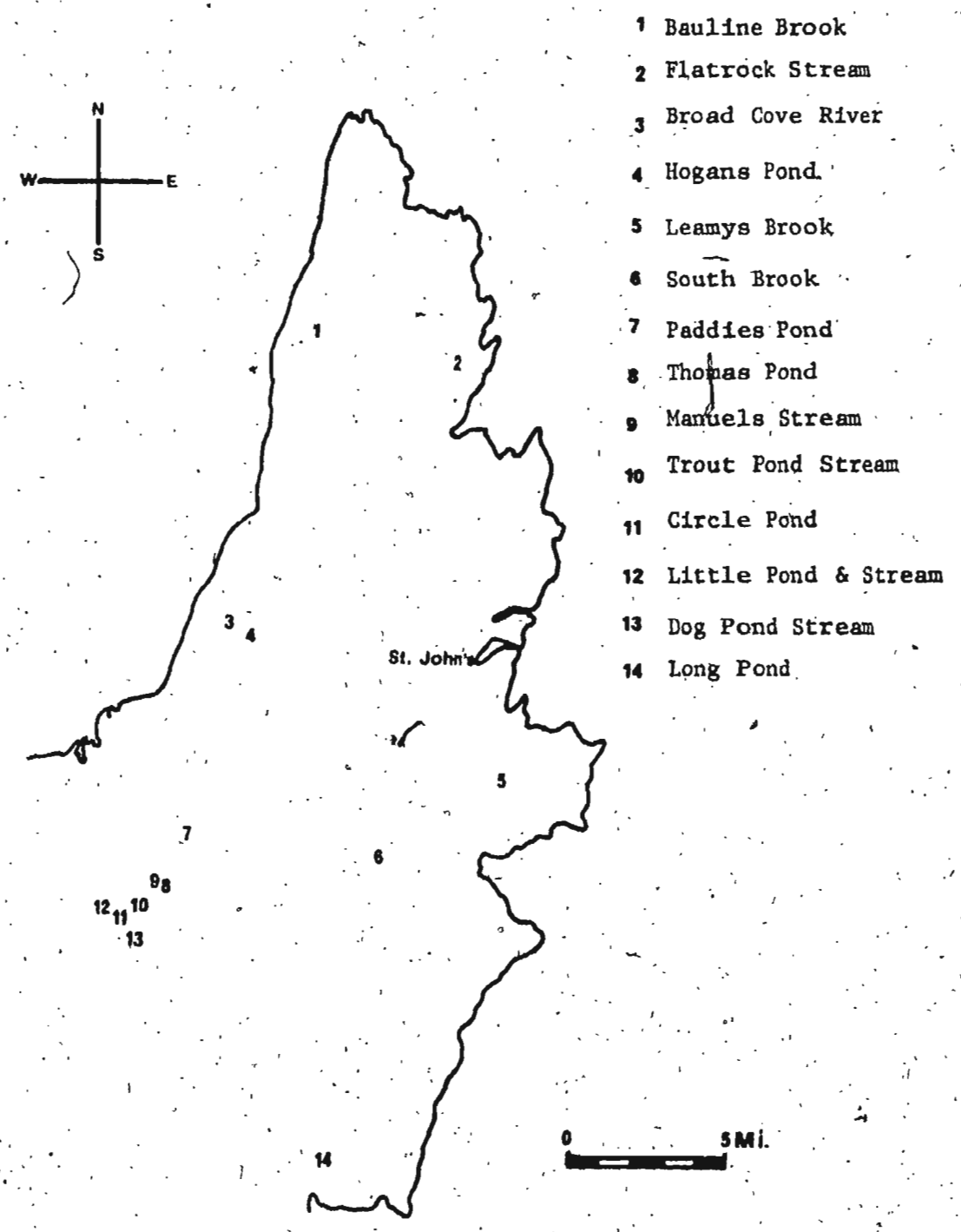


Fig. C. Collections of caddis larvae and pupae on the Avalon Peninsula 1972-73

PLATE I

Fig. 1. *Limnephilus ornatus*, male: dorsal aspect illustrating terminology of parts (length 15.5 mm).

Fig. 2. *L. ornatus*, male: lateral aspect of thoracic appendages (1st appendage 12.5 mm; 2nd appendage 14.5 mm; 3rd appendage 190 mm).

Fig. 3. *L. ornatus*, male: frontal aspect of head (width 2.4 mm).

PLATE I

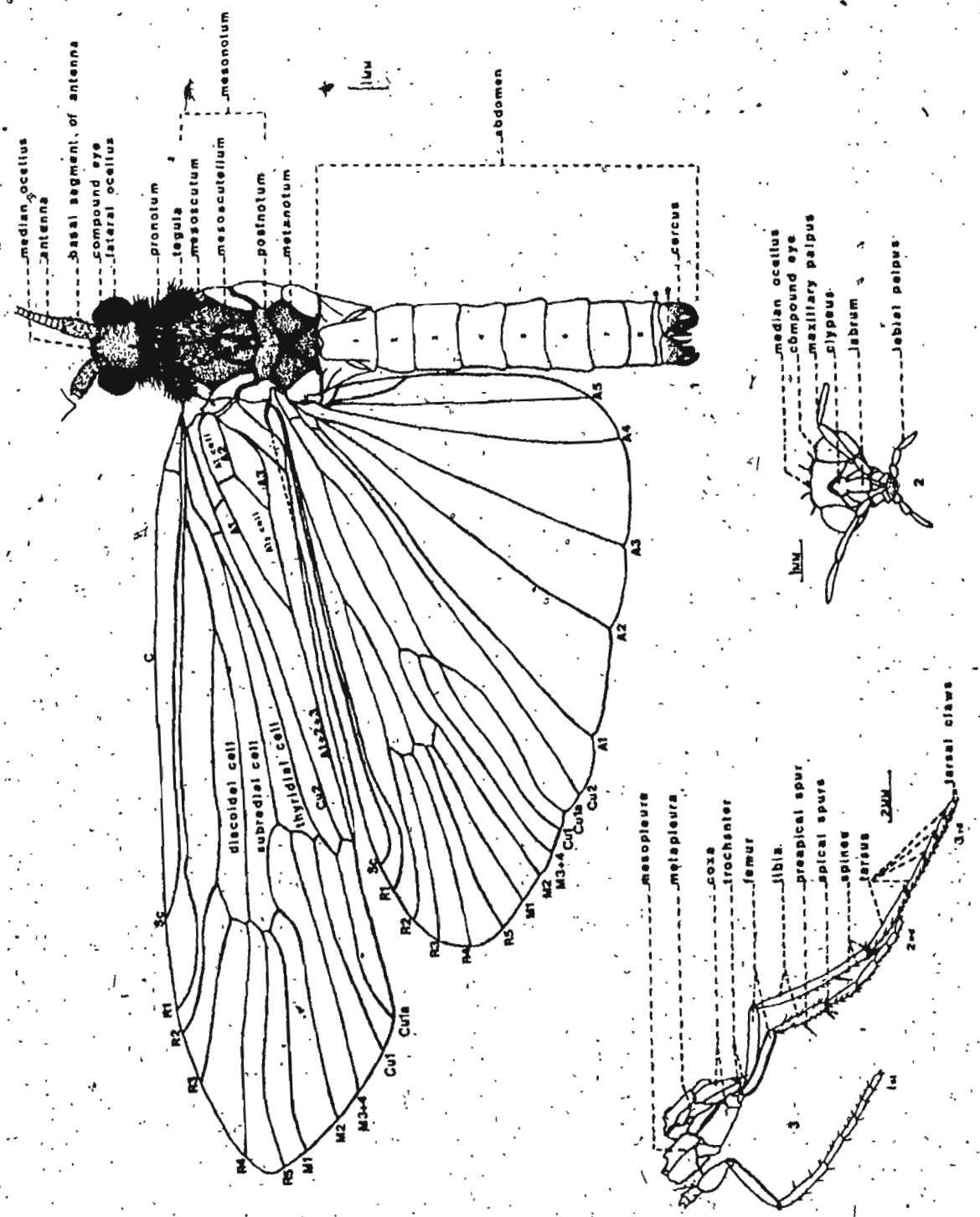

median ocellus
antenna
basal segment of antenna
compound eye
lateral ocellus
pronotum
tegula
mesonotum
mesoscutum
mesoscutellum
postnotum
metanotum
abdomen
cercus
1mm
C
Sc
R1
R2
R3
R4
R5
M1
M2
M3+4
Cu1
Cu1a
Cu2
A1
A2
A3
A4
A5
discoidal cell
subradial cell
thyridial cell
A1+2
A3 cell
A4 cell
median ocellus
compound eye
maxillary palpus
clypeus
labrum
labial palpus
2
1mm
mesopleura
metapleura
coxa
trochanter
femur
tibia
preapical spur
apical spurs
spines
tarsus
2mm
tarsal claws
3rd
2nd
1st
3

PLATE II

Fig. 4. *Phryganea cinerea*, male: maxillary palpus (1.9 mm).

Fig. 5. *Chimarra aterrima*, female: maxillary palpus (1.6 mm).

Fig. 6. *Rhyacophila fuscula*, male: maxillary palpus (2.6 mm).

Fig. 7. *R. fuscula*, female: anterior tibia (1.6 mm).

Fig. 8. *Glossosoma nigrior*, male: anterior tibia (.9 mm).

Fig. 9. *Phryganea cinerea*, female: a) anterior tibia (1.6 mm); b) middle tibia (2.5 mm).

Fig. 10. *Hydropsyche betteni*, female: maxillary palpus (3.3 mm).

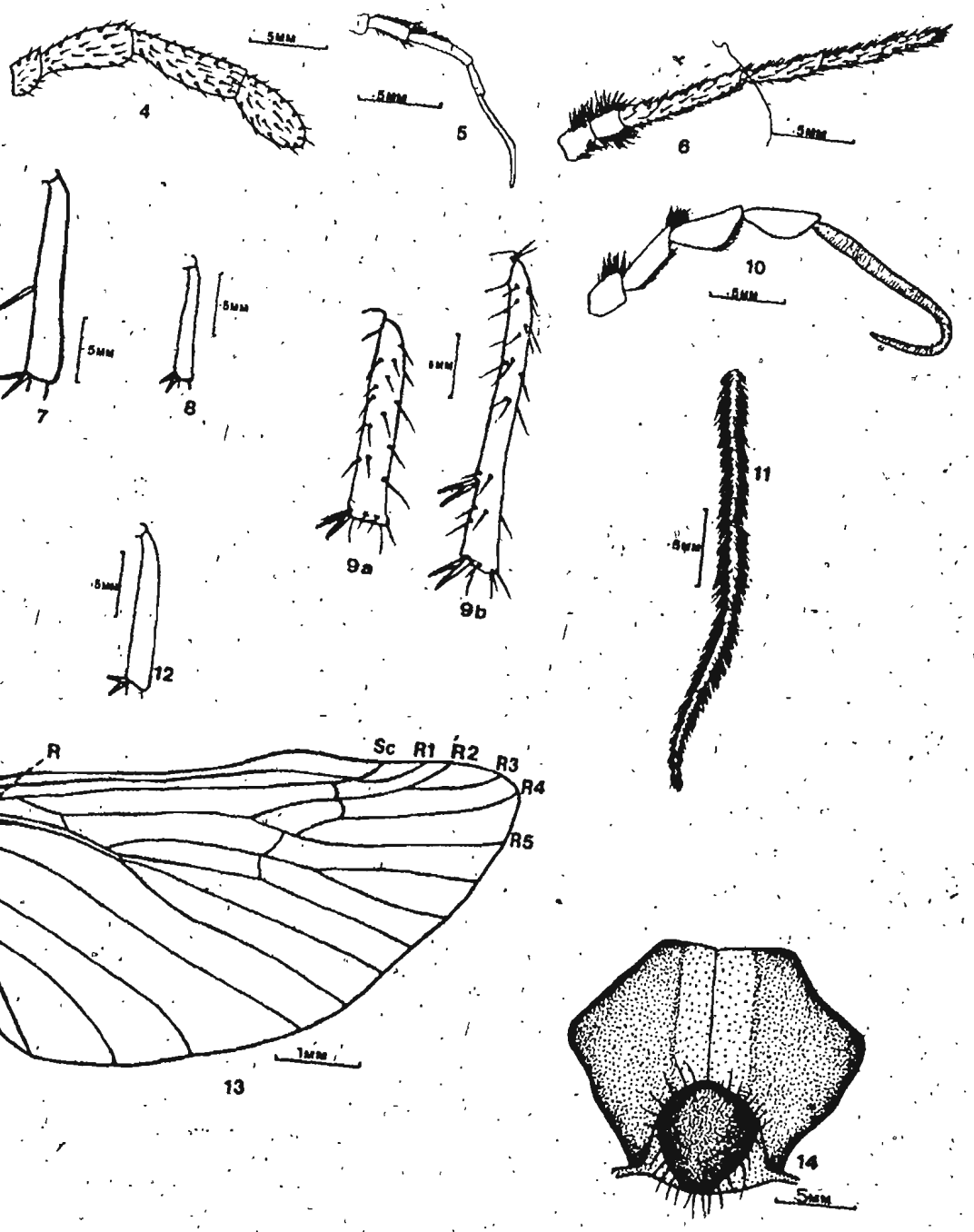
Fig. 11. *Mystacides sepulchralis*, female: maxillary palpus (2.8 mm).

Fig. 12. *Hydropsyche betteni*, male: front tibia (1.3 mm).

Fig. 13. *H. betteni*, male: right hind wing (7.5 mm).

Fig. 14. *H. betteni*, male: mesonotum (1.9 mm).

PLATE II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12
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R1
R2
R3
R4
R5
1MM
13
5MM
14

PLATE III

Fig. 15. *Polycentropus centralis*, male: front tibia (.8 mm).

Fig. 16. *P. centralis*, female: right hind wing (6.0 mm).

Fig. 17. *P. centralis*, male: mesonotum (.8 mm).

Fig. 18. *Mystacides sepulchralis*, male: middle tibia (1.3 mm).

Fig. 19. *Molanna blenda*, male: middle femora and tibia (4.3 mm).

Fig. 20. *Helicopsyche borealis*, male: right hind wing (4.5 mm).

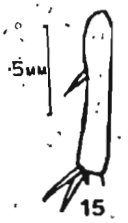
Fig. 21. *H. borealis*, female: mesonotum (.8 mm).

Fig. 22. *Athripsodes dilutus*, male: mesonotum (.8 mm).

Fig. 23. *Micrasema wataga*, male: middle tibia and tarsus (2.5 mm).

Fig. 24. *Lepidostoma bryanti*, male: middle tibia and tarsus (2.9 mm).

PLATE III



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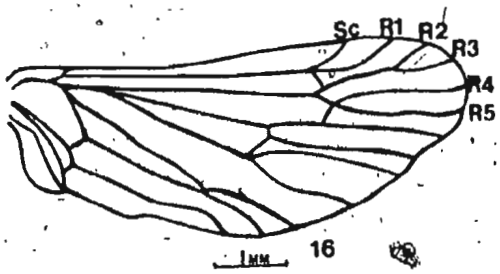

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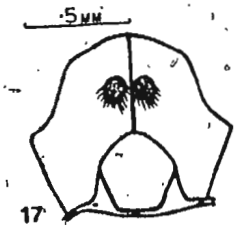

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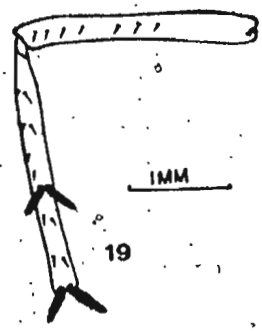

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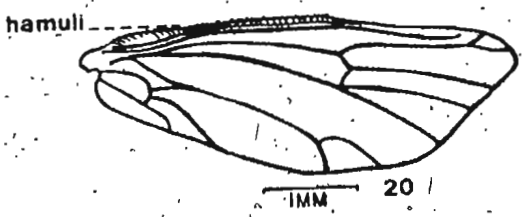

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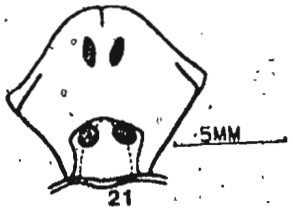

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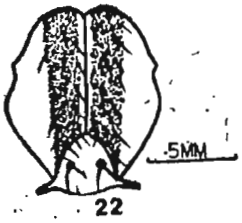

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PLATE IV

Fig. 25. *Rhyacophila melita*, male genitalia: a) lateral aspect (1.3 mm); b) dorsal aspect of 10th tergite.

Fig. 26. *Rhyacophila fuscula*, male genitalia: lateral aspect (1.4 mm).

Fig. 27. *Rhyacophila acropedes*, male genitalia: a) lateral aspect (1.4 mm); b) dorsal aspect of 10th tergite.

Fig. 28. *Glossosoma nigrior*, male genitalia: lateral aspect (.8 mm).

Fig. 29. *G. nigrior*, female genitalia: a) lateral aspect (1.8 mm); b) ventral aspect of 8th segment.

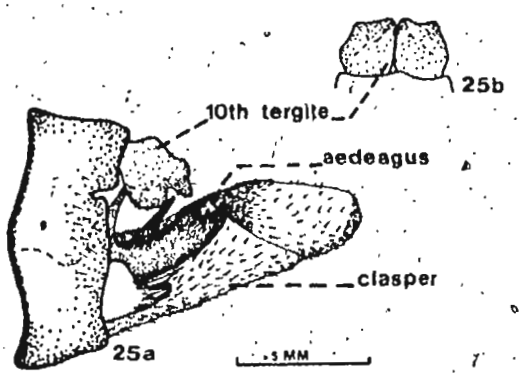
Fig. 30. *Dolophilodes distinctus*, male: front tibia (1 mm).

Fig. 31. *Chimarra obscura*, female: front tibia (.8 mm).

Fig. 32. *Dolophilodes distinctus*, male genitalia: a) lateral aspect (1 mm); b) dorsal aspect of 10th tergite.

Fig. 33. *D. distinctus*, female genitalia: lateral aspect (.8 mm).

PLATE IV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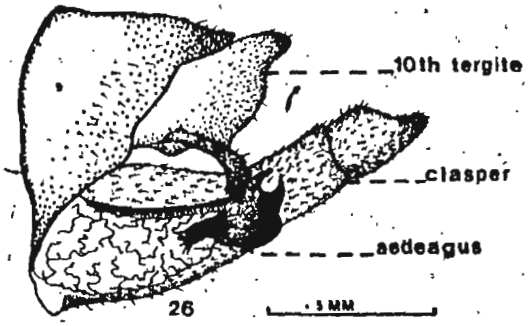
10th tergite
aedeagus
clasper
25a
.5 MM


10th tergite
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26
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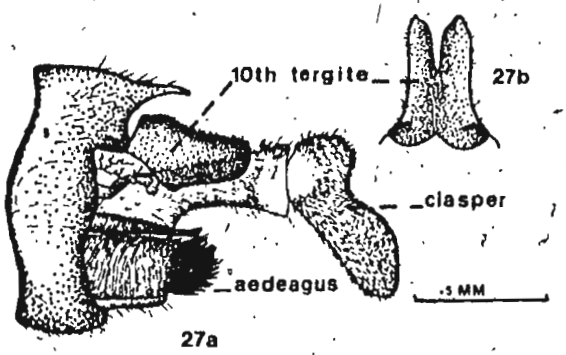
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27b
clasper
aedeagus
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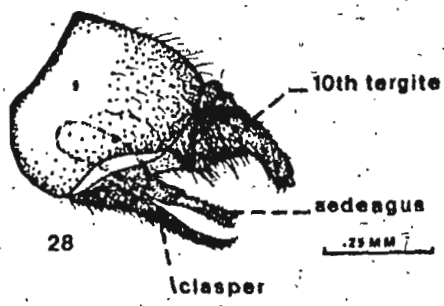
27a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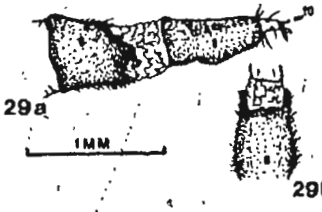
clasper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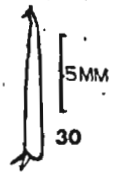
29b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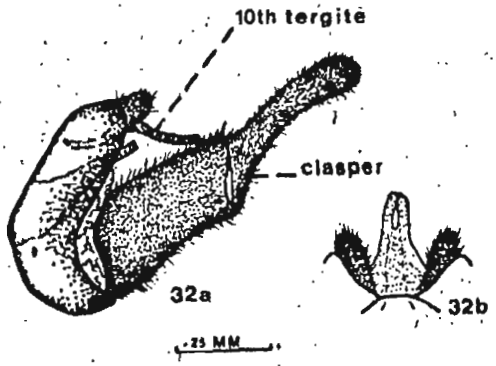
5MM
31


10th tergite
clasper
32a
32b
.25 MM

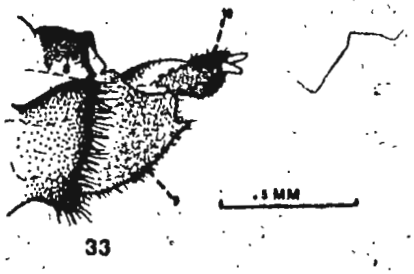

.5 MM
33

PLATE V

Fig. 34. *Chimarra aterrima*, male genitalia: a) lateral aspect (.6 mm); b) ventral aspect of clasper.

Fig. 35. *Chimarra socia*, male genitalia: lateral aspect (.5 mm).

Fig. 36. *Chimarra obscura*, male genitalia: lateral aspect (.5 mm).

Fig. 37. *Neureclipsis crepuscularis*, male: right hind wing (5 mm).

Fig. 38. *Polycentropus centralis*, male: right hind wing (5.3 mm).

Fig. 39. *Nyctiophylax affinis*, male: right front wing (6.8 mm).

Fig. 40. *Polycentropus centralis*, male: right front wing (6.3 mm).

Fig. 41. *Neureclipsis crepuscularis*, male genitalia: lateral aspect (.8 mm).

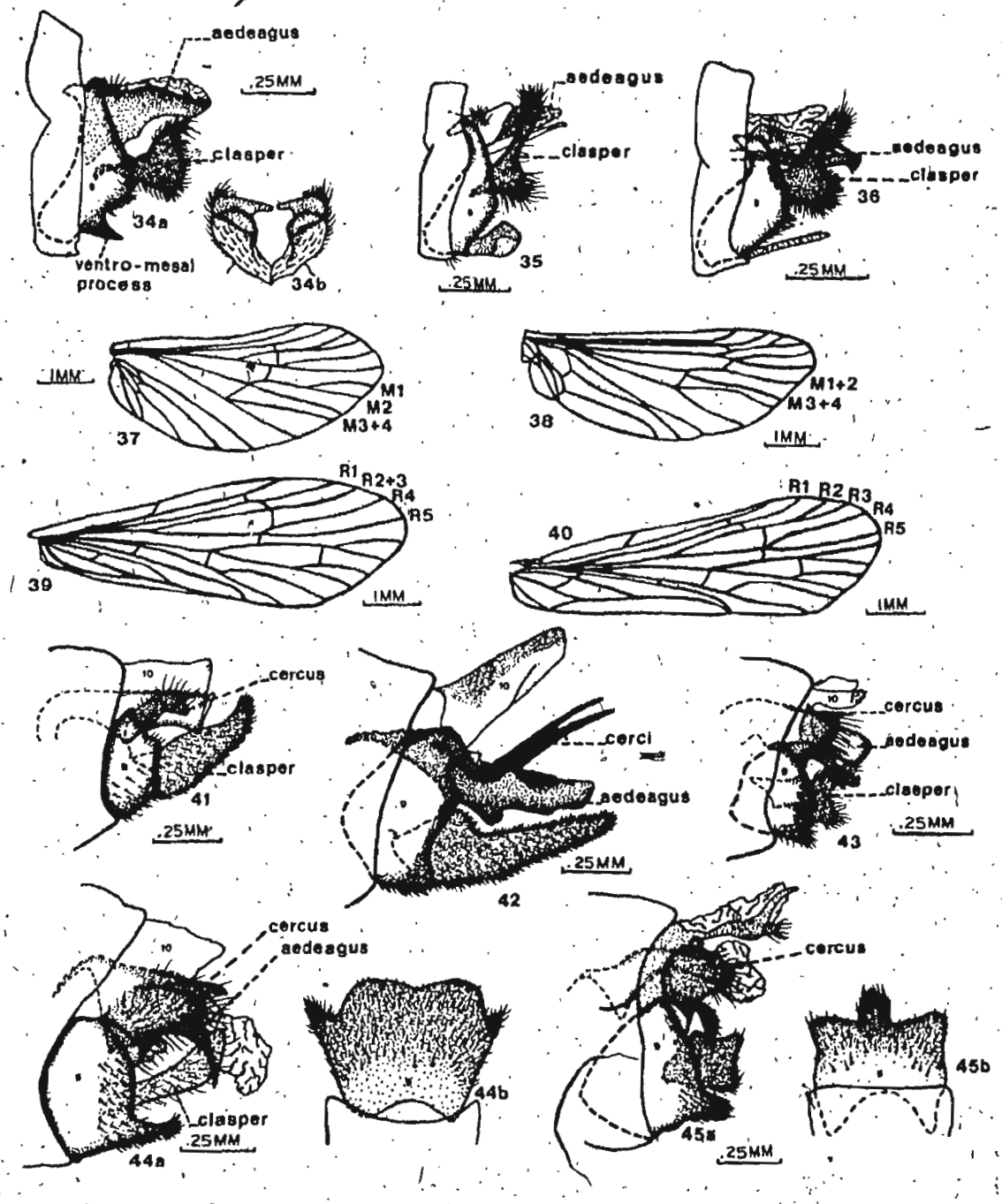
Fig. 42. *Neureclipsis bimaculatus*, male genitalia: lateral aspect (1 mm).

Fig. 43. *Nyctiophylax affinis*, male genitalia: lateral aspect (.5 mm).

Fig. 44. *Polycentropus aureolus*, male genitalia: a) lateral aspect (.7 mm); b) ventral aspect of 9th sternite.

Fig. 45. *Polycentropus weedi*, male genitalia: a) lateral aspect (.8 mm); b) ventral aspect of 9th sternite.

PLATE V


aedeagus
.25MM
clasper
34a
ventro-mesal process
34b
aedeagus
clasper
35
.25MM
aedeagus
clasper
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.25MM
1MM
M1
M2
M3+4
37
M1+2
M3+4
38
1MM
R1
R2+3
R4
R5
39
1MM
R1 R2 R3
R4
R5
40
1MM
cercus
clasper
41
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cerci
aedeagus
.25MM
42
cercus
aedeagus
claseper
.25MM
43
cercus
aedeagus
clasper
.25MM
44a
44b
cercus
45a
.25MM
45b

PLATE VI

Fig. 46. *Polycentropus confusus*, male genitalia: a) lateral aspect (.8 mm); b) ventral aspect of claspers; c) ventro-lateral aspect of baso-dorsal appendage of left clasper.

Fig. 47. *Polycentropus centralis*, male genitalia: a) lateral aspect (.5 mm); b) ventral aspect of claspers; c) ventro-lateral aspect of baso-dorsal appendage of left clasper.

Fig. 48. *Polycentropus maculatus*, male genitalia: lateral aspect (.8 mm).

Fig. 49. *Polycentropus blicklei*, male genitalia: lateral aspect (.9 mm).

Fig. 50. *Polycentropus interruptus*, male genitalia: lateral aspect (1 mm).

Fig. 51. *Polycentropus flavus*, male genitalia: lateral aspect (.9 mm).

Fig. 52. *Polycentropus remotus*, male genitalia: lateral aspect (.7 mm).

Fig. 53. *Polycentropus cinereus*, male genitalia: lateral aspect (.5 mm).

Fig. 54. *Arctopsyche ladogensis*, male: maxillary palpus (7.5 mm).

Fig. 55. *A. ladogensis*, male genitalia: lateral aspect (1.3 mm).

Fig. 56. *Hydropsyche betteni*, male genitalia: lateral aspect (1.5 mm).

PLATE VI

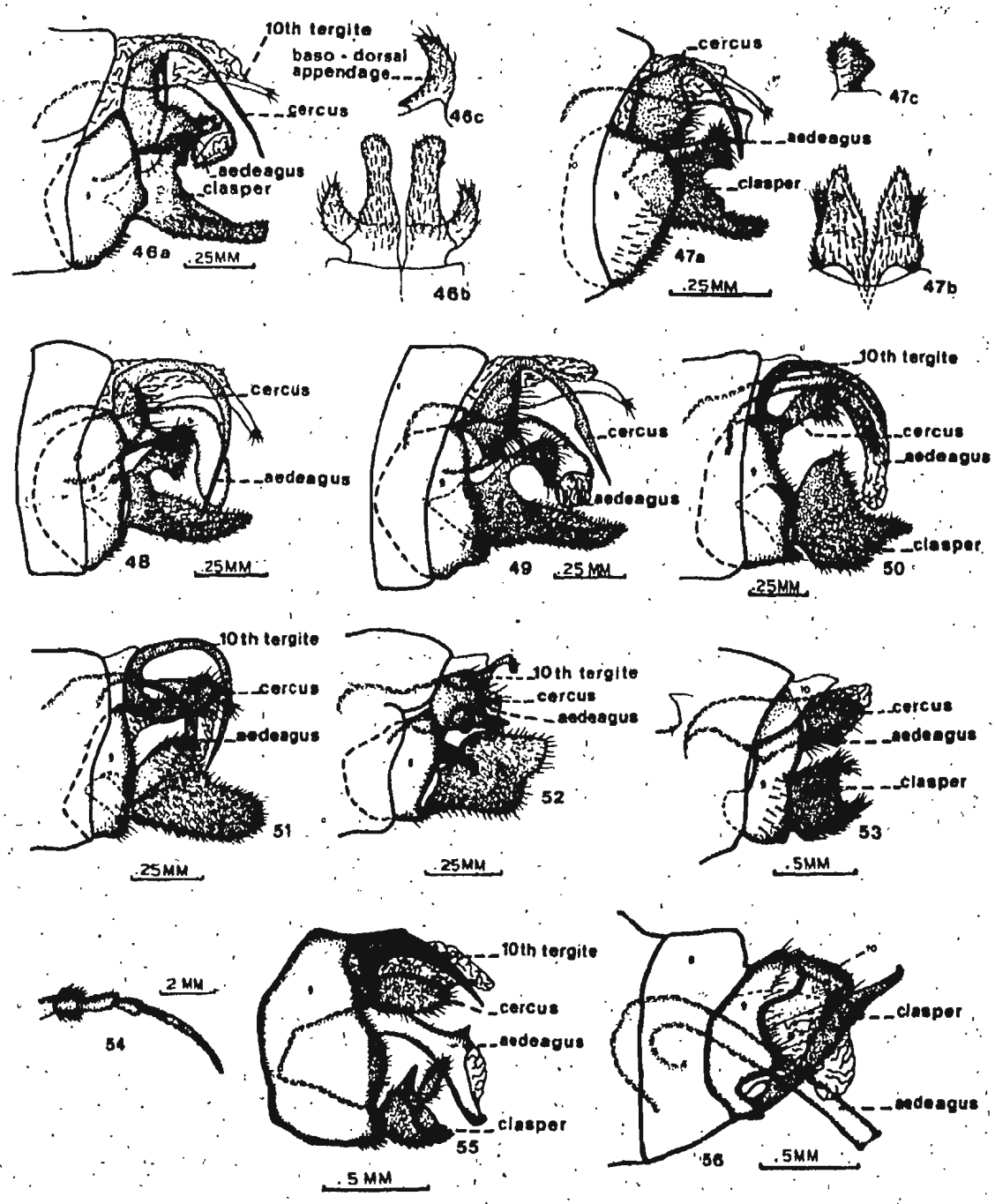

10th tergite
baso - dorsal appendage
cercus
aedeagus
clasper
46a
.25MM
46b
46c
cercus
aedeagus
clasper
47a
.25MM
47b
47c
cercus
aedeagus
48
.25MM
cercus
aedeagus
49
.25MM
10th tergite
cercus
aedeagus
clasper
50
.25MM
10th tergite
cercus
aedeagus
51
.25MM
10th tergite
cercus
aedeagus
52
.25MM
cercus
aedeagus
clasper
53
.5MM
2 MM
54
10th tergite
cercus
aedeagus
clasper
55
.5 MM
clasper
aedeagus
56
.5MM

PLATE VII

Fig. 57. *Hydropsyche sparna*, male genitalia: lateral aspect (1 mm).

Fig. 58. *Hydropsyche recurvata*, male genitalia: lateral aspect (1 mm).

Fig. 59. *Hydropsyche slossonae*, male genitalia: lateral aspect (1.3 mm).

Fig. 60. *Banksiola crotchi*, male: right front wing (length of wing 10.3 mm).

Fig. 61. *Ptilostomis ocellifera*, male: right front wing (length of wing 21 mm).

Fig. 62. *Ptilostomis semifasciata*, male genitalia: a) lateral aspect (3 mm); b) dorsal aspect of 10th tergite.

Fig. 63. *Ptilostomis ocellifera*, male genitalia: a) lateral aspect (3 mm); b) dorsal aspect of 10th tergite.

Fig. 64. *Phryganea cinerea*, male genitalia: lateral aspect (2.3 mm).

Fig. 65. *Oligostomis pardalis*, male genitalia: a) lateral aspect (3 mm); b) dorsal aspect of 10th tergite; c) ventral aspect of 9th sternite.

Fig. 66. *Oligostomis ocelligera*, male genitalia: a) lateral aspect (1.5 mm); b) ventral aspect of 9th sternite.

PLATE VII

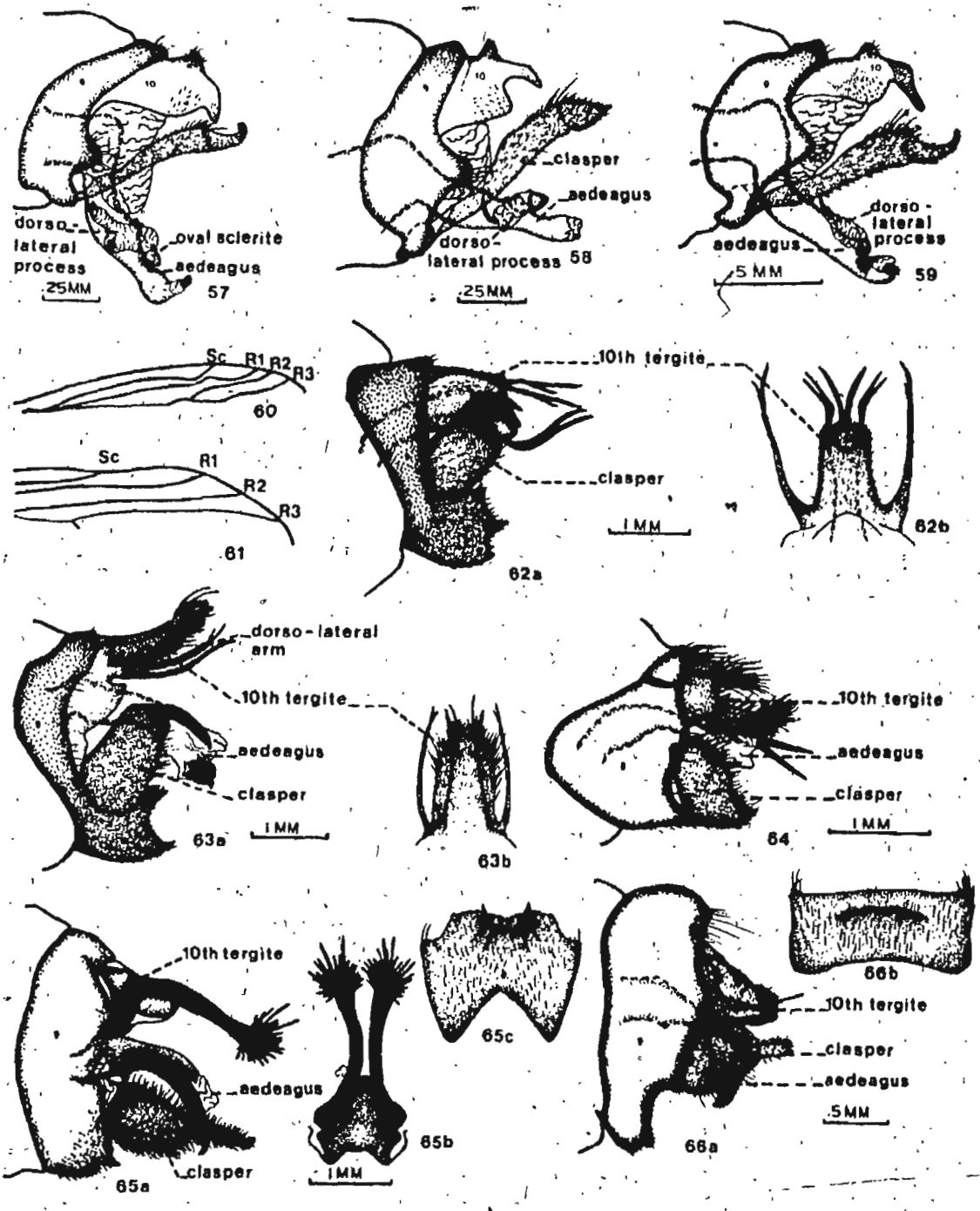

dorso-lateral process
oval sclerite
aedeagus
25MM
57
clasper
aedeagus
dorso-lateral process
25MM
58
dorso-lateral process
aedeagus
5MM
59
Sc R1 R2 R3
60
Sc R1 R2 R3
61
10th tergite
clasper
1MM
62a
62b
dorso-lateral arm
10th tergite
aedeagus
clasper
1MM
63a
63b
10th tergite
aedeagus
clasper
1MM
64
10th tergite
aedeagus
clasper
65a
65b
1MM
65c
66b
10th tergite
clasper
aedeagus
5MM
66a

PLATE VIII

Fig. 67. *Agrypnia vestita*, male genitalia: a) lateral aspect (1.4 mm); b) ventral aspect of claspers.

Fig. 68. *Agrypnia deflata*, male genitalia: lateral aspect (1.5 mm).

Fig. 69. *Agrypnia improba*, male genitalia: lateral aspect (2 mm).

Fig. 70. *Agrypnia macdunnoughi*, male genitalia: a) lateral aspect (2.4 mm); b) dorsal aspect of 10th tergite.

Fig. 71. *Agrypnia colorata*, male genitalia: a) lateral aspect (2.1 mm); b) dorsal aspect of 10th tergite.

Fig. 72. *Agrypnia macdunnoughi*, female genitalia: lateral aspect of the genital segments (2.5 mm).

Fig. 73. *Agrypnia improba*, female genitalia: lateral aspect of genital segments (2.1 mm).

Fig. 74. *Agrypnia deflata*, female genitalia: ventral aspect of 9th sternite (2.5 mm).

Fig. 75. *Agrypnia vestita*, female genitalia: ventral aspect of 9th sternite (1.5 mm).

PLATE VIII

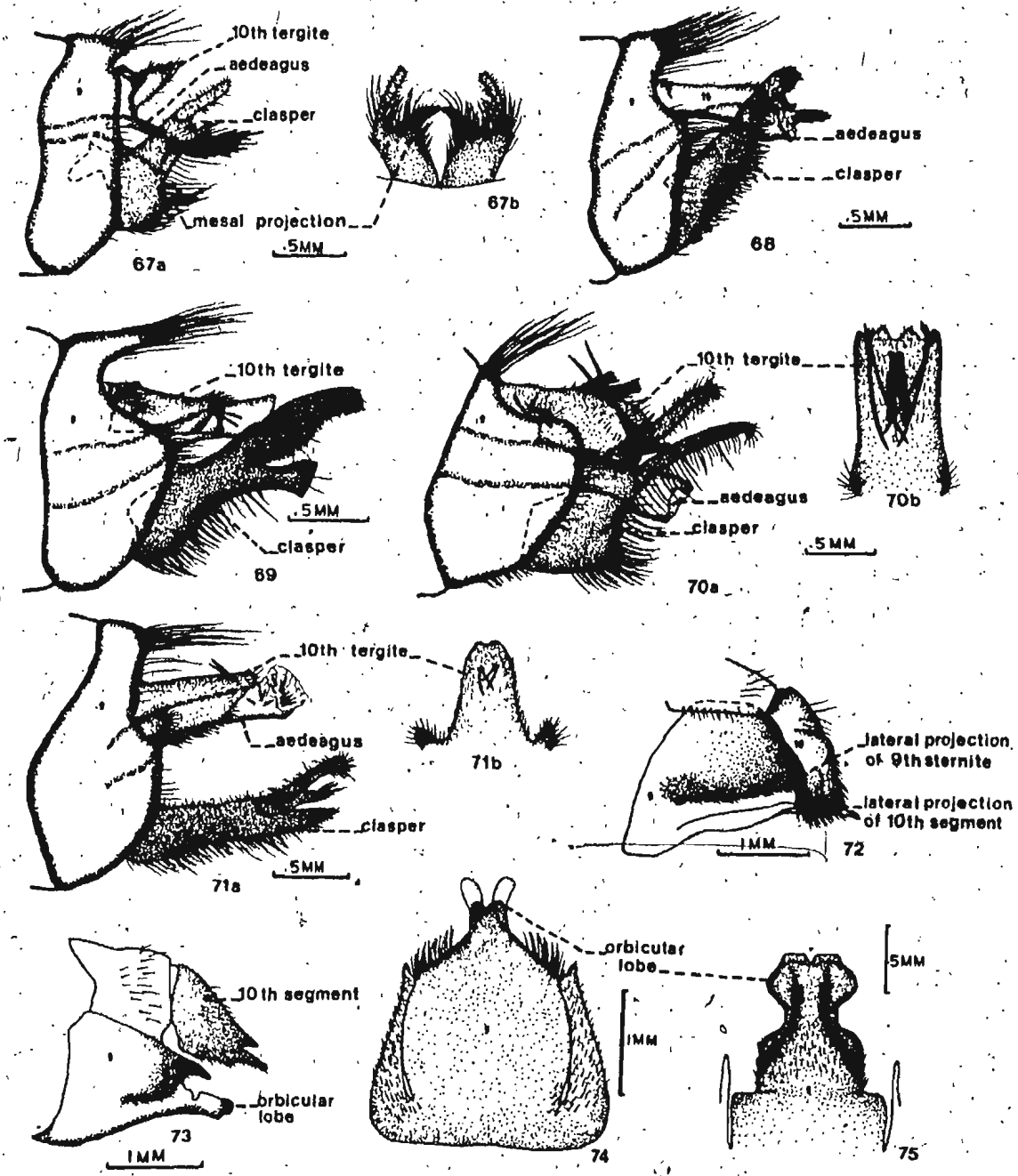

10th tergite
aedeagus
clasper
mesal projection
.5MM
67a
67b
aedeagus
clasper
.5MM
68
10th tergite
.5MM
clasper
69
10th tergite
aedeagus
clasper
.5MM
70a
70b
10th tergite
aedeagus
clasper
.5MM
71a
71b
lateral projection of 9th sternite
lateral projection of 10th segment
1MM
72
10th segment
orbicular lobe
1MM
73
orbicular lobe
1MM
74
5MM
75

PLATE IX

Fig. 76. *Banksiola crotchi*, male genitalia: a) lateral aspect (1.5 mm); b) dorsal aspect of extensile process of aedeagus.

Fig. 77. *Banksiola dossuaria*, male genitalia: lateral aspect (1.5 mm).

Fig. 78. *Banksiola smithi*, male genitalia: lateral aspect (1.5 mm).

Fig. 79. *Fabria complicata*, male genitalia: a) lateral aspect (1.5 mm); b) dorsal aspect of 10th tergite and cerci.

Fig. 80. *Apatania stigmatella*, male: right front wing (6.8 mm).

Fig. 81. *Neophylax oligius*, male: right hind wing (8.1 mm).

Fig. 82. *N. oligius*, male: head, dorsal aspect (width 1.3 mm).

Fig. 83. *Pseudostenophylax sparsus*, male: right front wing (12.5 mm).

Fig. 84. *Platycentropus radiatus*, female: left front wing (14.3 mm).

Fig. 85. *Nemotaulius hostilis*, male: right front wing (24 mm).

PLATE IX

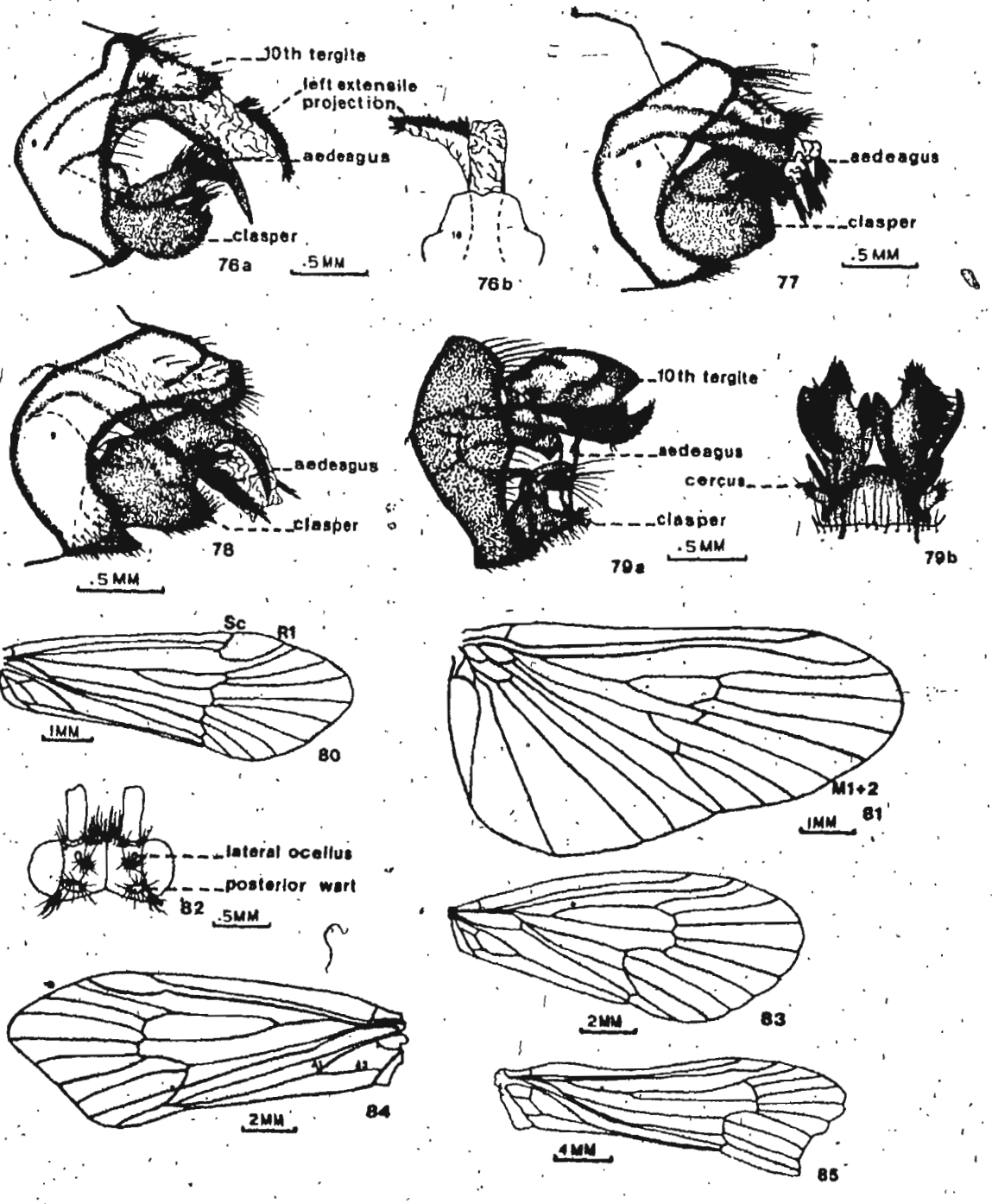

10th tergite
left extensile projection
aedeagus
clasper
.5 MM
76a
10
76b
aedeagus
clasper
.5 MM
77
aedeagus
clasper
.5 MM
78
10th tergite
aedeagus
cercus
clasper
.5 MM
79a
79b
Sc
R1
1MM
80
M1+2
1MM
81
lateral ocellus
posterior wart
82
.5MM
2MM
83
2MM
84
4MM
85

PLATE X

Fig. 86. *Anabolia bimaculata*, male: right hind wing (12.5 mm).

Fig. 87. *Glyphopsyche irrorata*, female: right front wing (15.3 mm).

Fig. 88. *Psychoglypha subborealis*, male: right front wing (15 mm).

Fig. 89. *Pycnopsyche guttifer*, male: a) right front wing (wing length 18 mm); b) right hind wing (wing length 15.5 mm).

Fig. 90. *Hydatophylax argus*, male: right hind wing (wing length 20.5 mm).

Fig. 91. *Apatania stigmatella*, male genitalia: lateral aspect (.9 mm).

Fig. 92. *Neophylax nacatus*, male genitalia: a) lateral aspect (.5 mm); b) ventral aspect of claspers.

Fig. 93. *Neophylax ornatus*, male genitalia: a) lateral aspect (.6 mm); b) ventral aspect of claspers.

Fig. 94. *Neophylax oligius*, male genitalia: a) lateral aspect (.5 mm); b) ventral aspect of claspers.

Fig. 95. *Neophylax aniqua*, male genitalia: a) lateral aspect (.6 mm); b) ventral aspect of claspers.

Fig. 96. *Neophylax ornatus*, female genitalia: ventral aspect of 9th segment (.6 mm).

Fig. 97. *Neophylax aniqua*, female genitalia: ventral aspect of 9th segment (.5 mm).

PLATE X

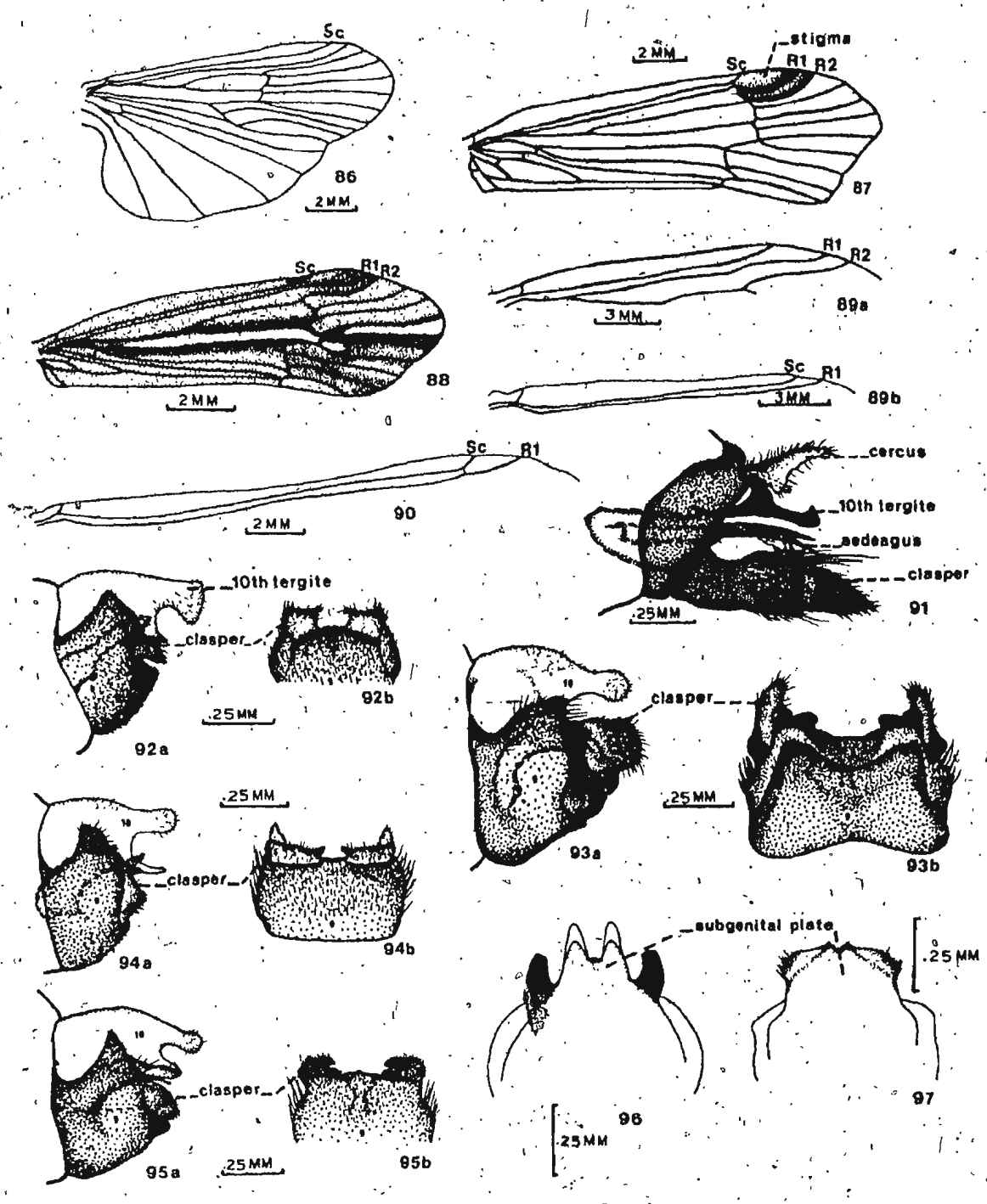

Sc
86
2MM
2MM
stigma
Sc
R1 R2
87
Sc
R1 R2
88
2MM
R1 R2
3MM
89a
Sc R1
3MM
89b
Sc R1
2MM
90
cercus
10th tergite
aedeagus
clasper
.25MM
91
10th tergite
clasper
.25MM
92a
92b
clasper
.25MM
93a
.25MM
93b
.25MM
clasper
94a
94b
clasper
95a
.25MM
95b
subgenital plate
.25MM
96
97

PLATE XI

Fig. 98. *Pseudostenophylax sparsus*, male genitalia: a) lateral aspect (1.5 mm); b) dorsal aspect.

Fig. 99. *Onocosmoecus quadrinotatus*, male genitalia: lateral aspect (1.6 mm).

Fig. 100. *O. quadrinotatus*, female genitalia: ventro-caudal aspect (1.5 mm).

Fig. 101. *Platycentropus indistinctus*, male genitalia: a) lateral aspect (.8 mm); b) caudal aspect of 10th tergite and cerci.

Fig. 102. *Platycentropus radiatus*, male genitalia: a) lateral aspect (1.6 mm); b) dorsal aspect of 10th tergite and cerci; c) lateral aspect of aedeagus.

Fig. 103. *Platycentropus indistinctus*, female genitalia: ventral aspect (.8 mm).

Fig. 104. *Nemotaulius hostilis*, male genitalia: lateral aspect (1.5 mm).

Fig. 105. *Arctopora pulchella*, male genitalia: a) lateral aspect (.5 mm); b) dorsal aspect of 10th tergite and cerci; c) caudal aspect of 10th tergite and cerci.

PLATE XI

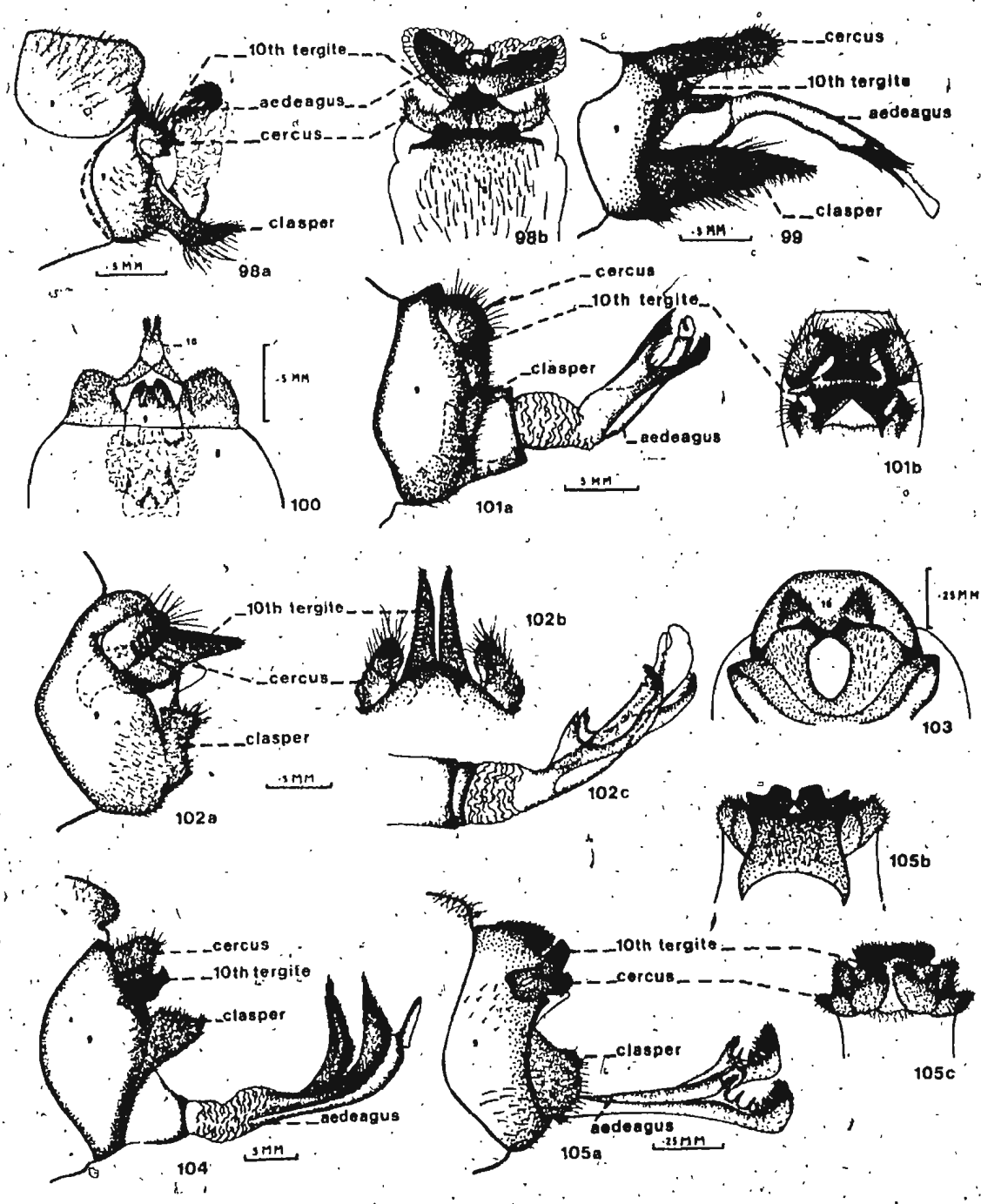

10th tergite
aedeagus
cercus
clasper
.5 MM
98a
98b
cercus
10th tergite
aedeagus
clasper
.5 MM
99
100
cercus
10th tergite
clasper
aedeagus
.5 MM
101a
101b
10th tergite
cercus
clasper
.5 MM
102a
102b
102c
.25 MM
103
105b
cercus
10th tergite
clasper
aedeagus
.5 MM
104
10th tergite
cercus
clasper
aedeagus
.25 MM
105a
105c

PLATE XII

Fig. 106. *Lenarchus crassus*, male genitalia: lateral aspect (1.3 mm).

Fig. 107. *Limnephilus perpusillus*, male: front tarsal segments (1.8 mm).

Fig. 108. *Limnephilus ademus*, male: front tarsal segments (1.7 mm).

Fig. 109. *Limnephilus hyalinus*, male genitalia: a) lateral aspect (.9 mm); b) caudal aspect of right cercus and 10th tergite.

Fig. 110. *Limnephilus sublunatus*, male genitalia: a) lateral aspect (1.5 mm); b) dorsal aspect of cercus and 10th tergite.

Fig. 111. *Limnephilus externus*, male genitalia: a) lateral aspect (1 mm); b) caudal aspect of right cercus and 10th tergite.

Fig. 112. *Limnephilus indivisus*, male genitalia: a) lateral aspect (1.1 mm); b) caudal aspect of right cercus and 10th tergite.

Fig. 113. *Limnephilus sericeus*, male genitalia: a) lateral aspect (.9 mm); b) caudal aspect of right cercus and 10th tergite.

Fig. 114. *Limnephilus perpusillus*, male genitalia: a) lateral aspect (.7 mm); b) caudal aspect of right cercus and 10th tergite.

PLATE XII

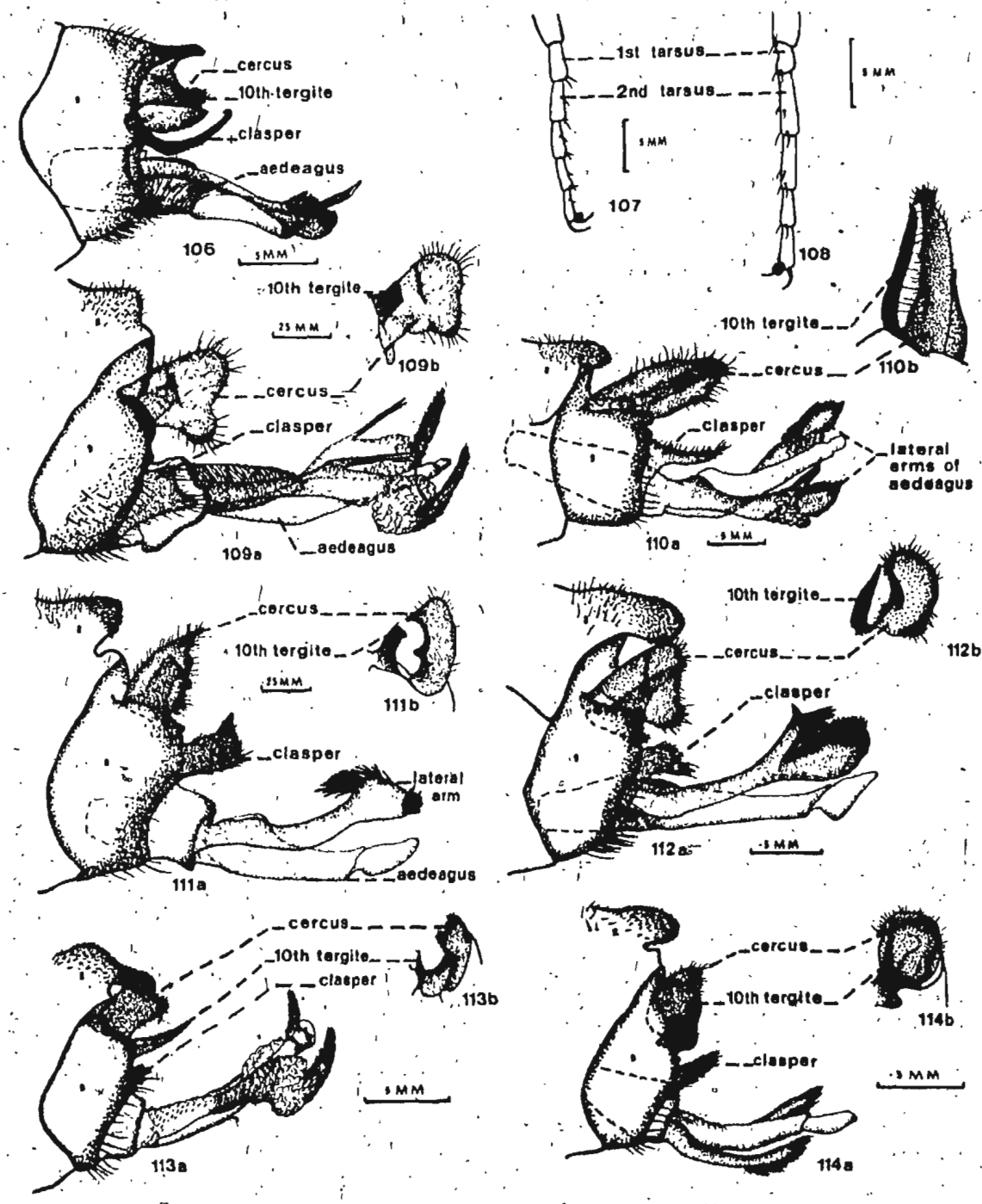

cercus
10th tergite
clasper
aedeagus
106
5 MM
1st tarsus
2nd tarsus
5 MM
107
5 MM
108
10th tergite
25 MM
109b
cercus
clasper
109a
aedeagus
10th tergite
cercus
110b
clasper
lateral arms of aedeagus
110a
5 MM
cercus
10th tergite
25 MM
111b
clasper
lateral arm
aedeagus
111a
10th tergite
cercus
112b
clasper
112a
5 MM
cercus
10th tergite
clasper
113b
5 MM
113a
cercus
10th tergite
114b
clasper
5 MM
114a

PLATE XIII

Fig. 115. *Limnephilus argenteus*, male genitalia: lateral aspect (1.1 mm).

Fig. 116. *Limnephilus nebulosus*, male genitalia: a) lateral aspect (1 mm); b) dorsal aspect of right cercus and 10th tergite.

Fig. 117. *Limnephilus rhombicus*, male genitalia: a) lateral aspect (1.7 mm); b) caudal aspect of right cercus and 10th tergite.

Fig. 118. *Limnephilus moestus*, male genitalia: lateral aspect (1 mm).

Fig. 119. *Limnephilus ornatus*, male genitalia: lateral aspect (1.5 mm).

Fig. 120. *Limnephilus kennicotti*, male genitalia: a) lateral aspect (1 mm); b) ventral aspect of right clasper, cercus and 10th tergite.

Fig. 121. *Limnephilus ademus*, male genitalia: lateral aspect (.6 mm).

Fig. 122. *Limnephilus submonilifer*, male genitalia: lateral aspect (.6 mm).

PLATE XIII

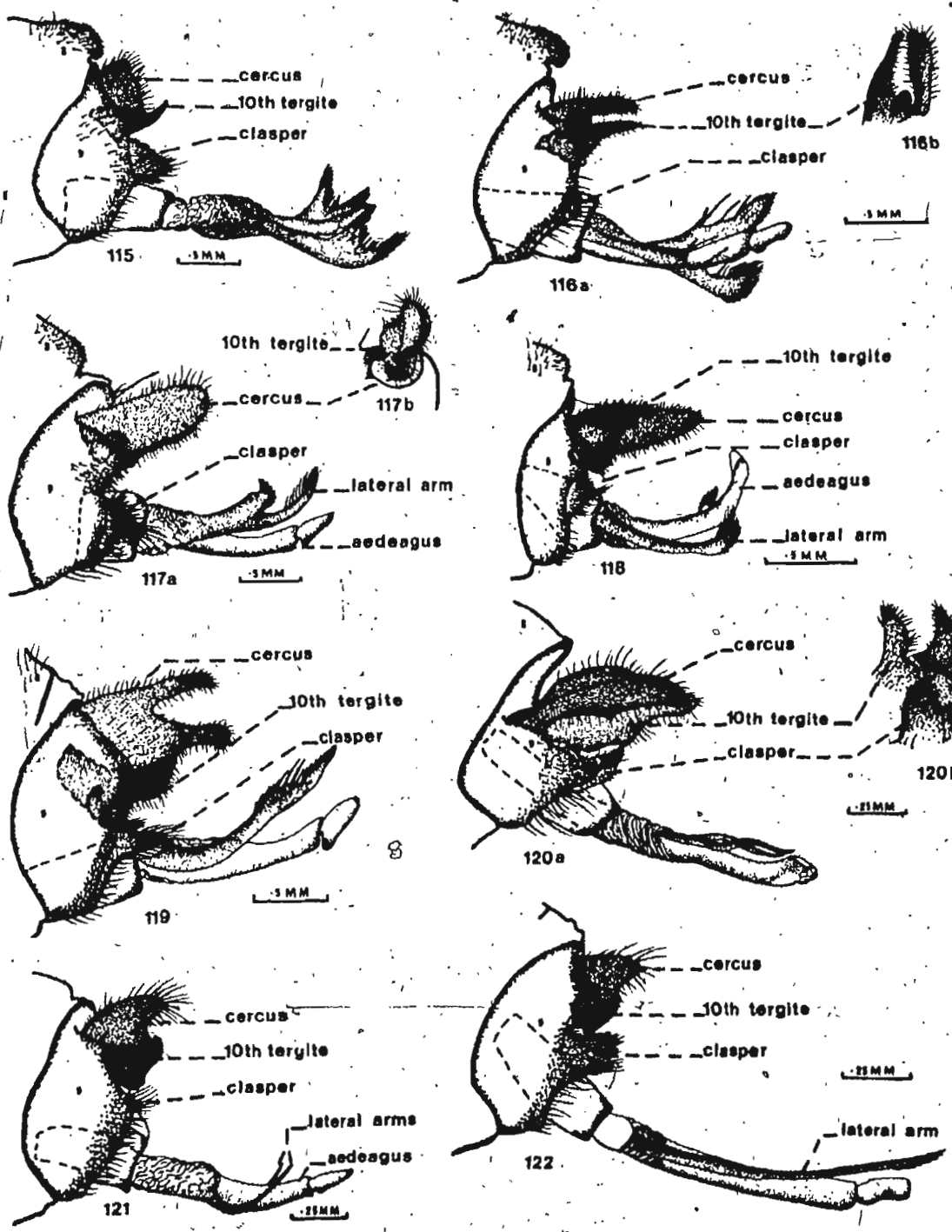

cercus
10th tergite
clasper
115
.5MM
cercus
10th tergite
clasper
116b
116a
.5MM
10th tergite
cercus
117b
clasper
lateral arm
aedeagus
117a
.5MM
10th tergite
cercus
clasper
aedeagus
lateral arm
118
.5MM
cercus
10th tergite
clasper
119
.5MM
cercus
10th tergite
clasper
120b
120a
.25MM
cercus
10th tergite
clasper
lateral arms
aedeagus
121
.25MM
cercus
10th tergite
clasper
.25MM
lateral arm
122

PLATE XIV

Fig. 123. *Limnephilus ademus*, female genitalia: lateral aspect (.6 mm).

Fig. 124. *Anabolia sordida*, male genitalia: a) lateral aspect (1.4 mm); b) ventral aspect of right cercus and 10th tergite.

Fig. 125. *Anabolia bimaculata*, male genitalia: a) lateral aspect (1.3 mm); b) ventral aspect of right cercus and 10th tergite.

Fig. 126. *Glyphopsyche irrorata*, male genitalia: lateral aspect (.8 mm).

Fig. 127. *Psychoglypha subborealis*, male genitalia: lateral aspect (.7 mm).

Fig. 128. *Hydatophylax argus*, male genitalia: a) lateral aspect (1.3 mm); b) caudal aspect of claspers, cerci, and 10th tergite.

Fig. 129. *Pycnopsyche guttifer*, male genitalia: a) lateral aspect (1 mm); b) caudal aspect of right clasper, cercus and 10th tergite.

Fig. 130. *Pycnopsyche scabripennis*, male genitalia: a) lateral aspect (1 mm); b) caudal aspect of right clasper, cercus and 10th tergite.

PLATE XIV

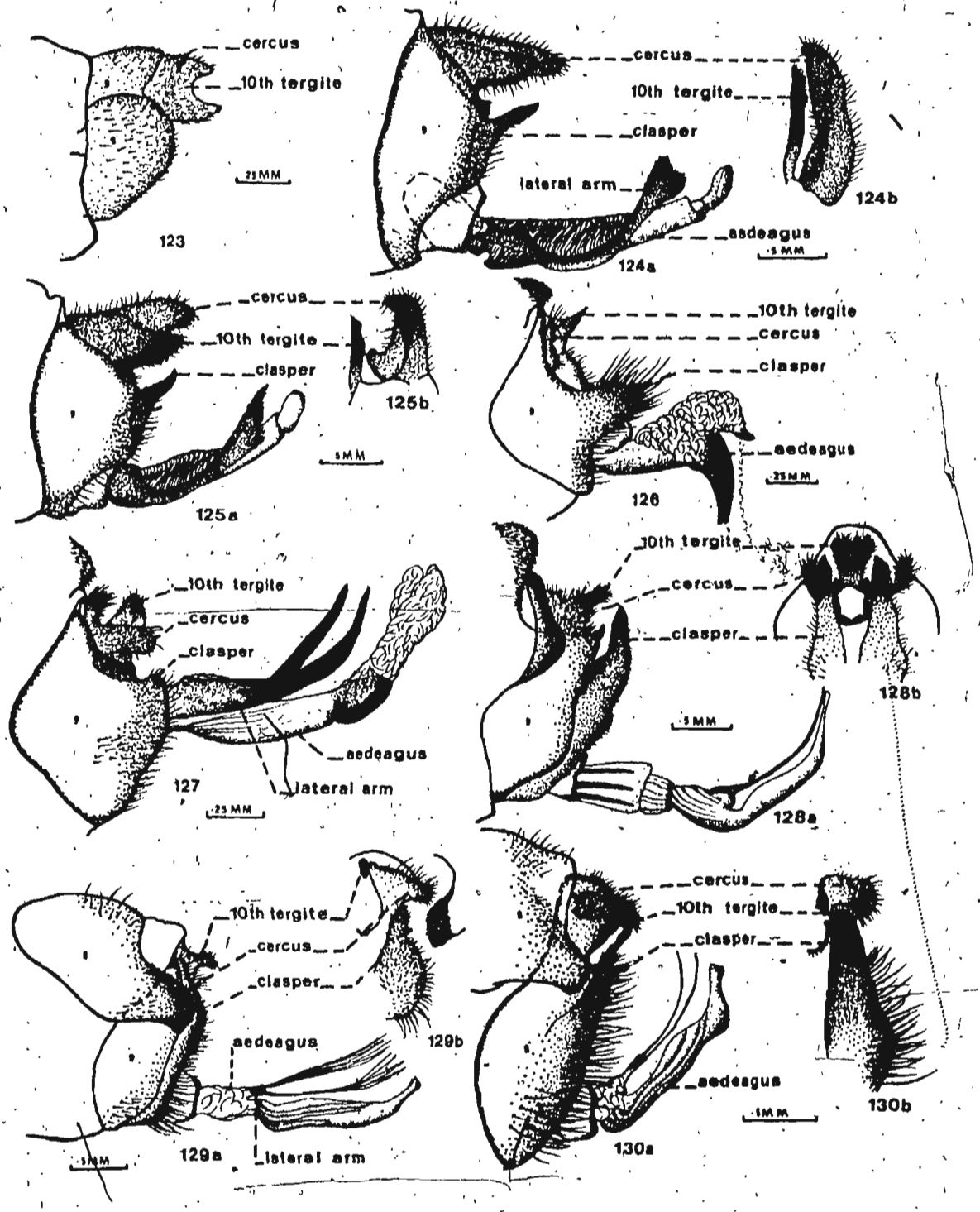

cercus
10th tergite
.25MM
123
cercus
10th tergite
clasper
lateral arm
aedeagus
.5MM
124a
124b
cercus
10th tergite
clasper
.5MM
125a
125b
10th tergite
cercus
clasper
aedeagus
.25MM
126
10th tergite
cercus
clasper
aedeagus
lateral arm
.25MM
127
10th tergite
cercus
clasper
.5MM
128a
128b
10th tergite
cercus
clasper
aedeagus
.5MM
129a
129b
cercus
10th tergite
clasper
aedeagus
.1MM
130a
130b

PLATE XV

Fig. 131. *Pycnopsyche limbata*, male genitalia: lateral aspect (.9 mm).

Fig. 132. *Pycnopsyche lepida*, male genitalia: a) lateral aspect (1.3 mm); b) caudal aspect of clasper.

Fig. 133. *Molanna uniophila*, male genitalia: a) lateral aspect (1.1 mm); b) ventral aspect of right clasper.

Fig. 134. *Molanna blenda*, male genitalia: a) lateral aspect (.8 mm); b) ventral aspect of right clasper.

Fig. 135. *M. blenda*, female genitalia: lateral aspect (.8 mm).

Fig. 136. *Triaenodes injusta*, male: front right wing (10 mm).

Fig. 137. *Oecetis inconspicua*, male: front right wing (8 mm).

Fig. 138. *Mystacides sepulchralis*, male: front right wing (7.6 mm).

Fig. 139. *M. sepulchralis*, male: dorsal aspect of head (width 1.2 mm).

Fig. 140. *Athripsodes annulicornis*, male: dorsal aspect of head (width 1.3 mm).

PLATE XV

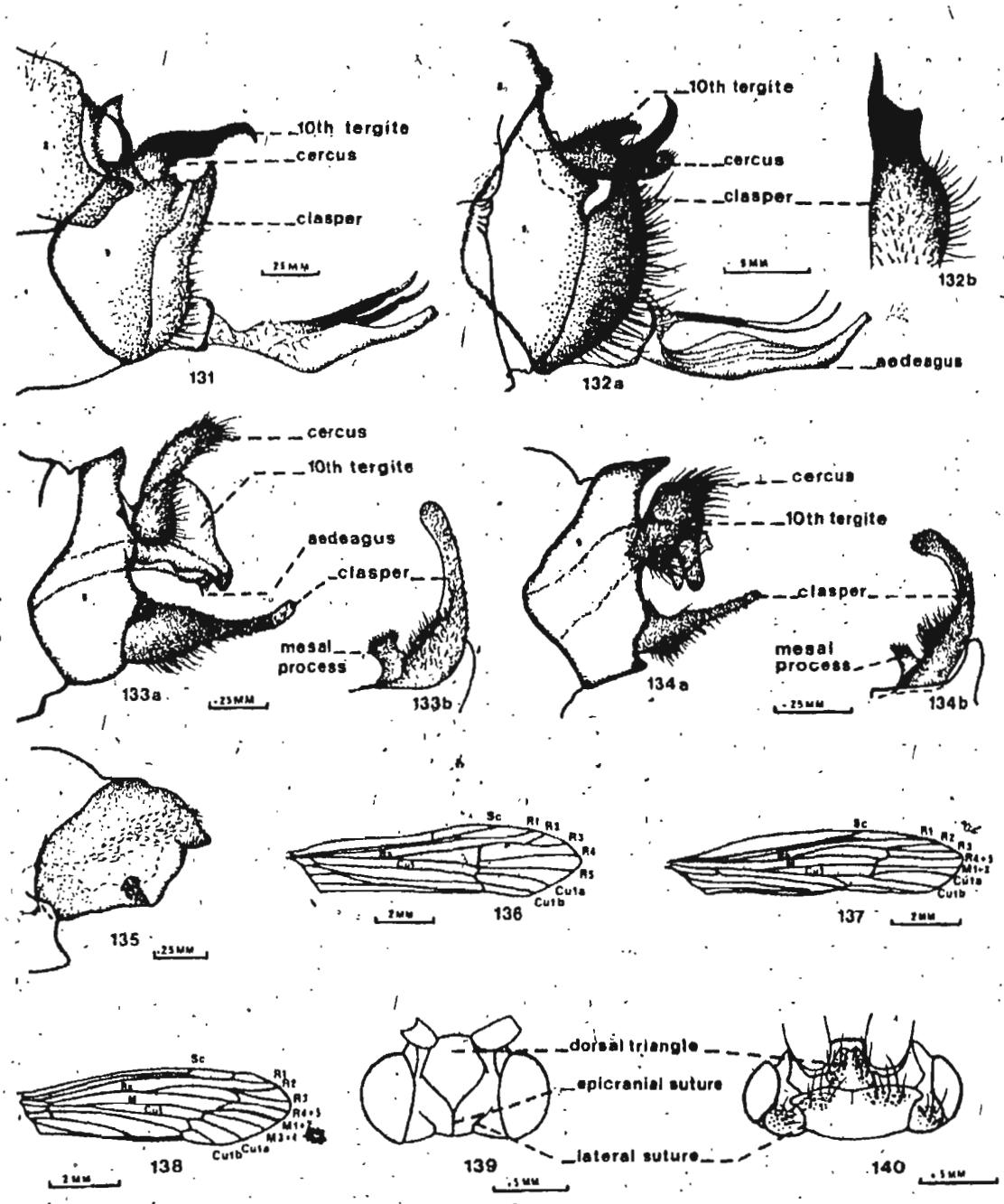

10th tergite
cercus
clasper
.25MM
131
10th tergite
cercus
clasper
.5MM
132b
aedeagus
132a
cercus
10th tergite
aedeagus
clasper
mesal process
133a
.25MM
133b
cercus
10th tergite
clasper
mesal process
134a
.25MM
134b
135
.25MM
Sc
R1
R3
R4
R5
Cuta
Cutb
2MM
136
Sc
R1
R2
R3
R4+5
M1+2
Cuta
Cutb
137
2MM
Sc
R1
Rs
M
Cu1
R3
R4+5
M1+2
M3+4
Cutb
Cuta
2MM
138
dorsal triangle
epicranial suture
lateral suture
139
.5MM
140
.5MM

PLATE XVI

Fig. 141. *Triaenodes injusta*, male genitalia: a) lateral aspect (1.3 mm); b) dorsal aspect of 10th tergite.

Fig. 142. *Oecetis osteni*, male genitalia: lateral aspect (.6 mm).

Fig. 143. *Oecetis inconspicua*, male genitalia: lateral aspect (.7 mm).

Fig. 144. *Oecetis persimilis*, male genitalia: lateral aspect (.8 mm).

Fig. 145. *Mystacides sepulchralis*, male genitalia: a) lateral aspect (1.1 mm); b) ventral aspect of right clasper and postero-mesal process of 9th sternite.

Fig. 146. *Athripsodes alagmus*, male genitalia: a) lateral aspect (1 mm); b) caudal aspect of right clasper.

Fig. 147. *Athripsodes annulicornis*, male genitalia: a) lateral aspect (.6 mm); b) caudal aspect of right clasper.

Fig. 148. *Athripsodes dilutus*, male genitalia: a) lateral aspect (.3 mm); b) caudal aspect of right clasper.

PLATE XVI

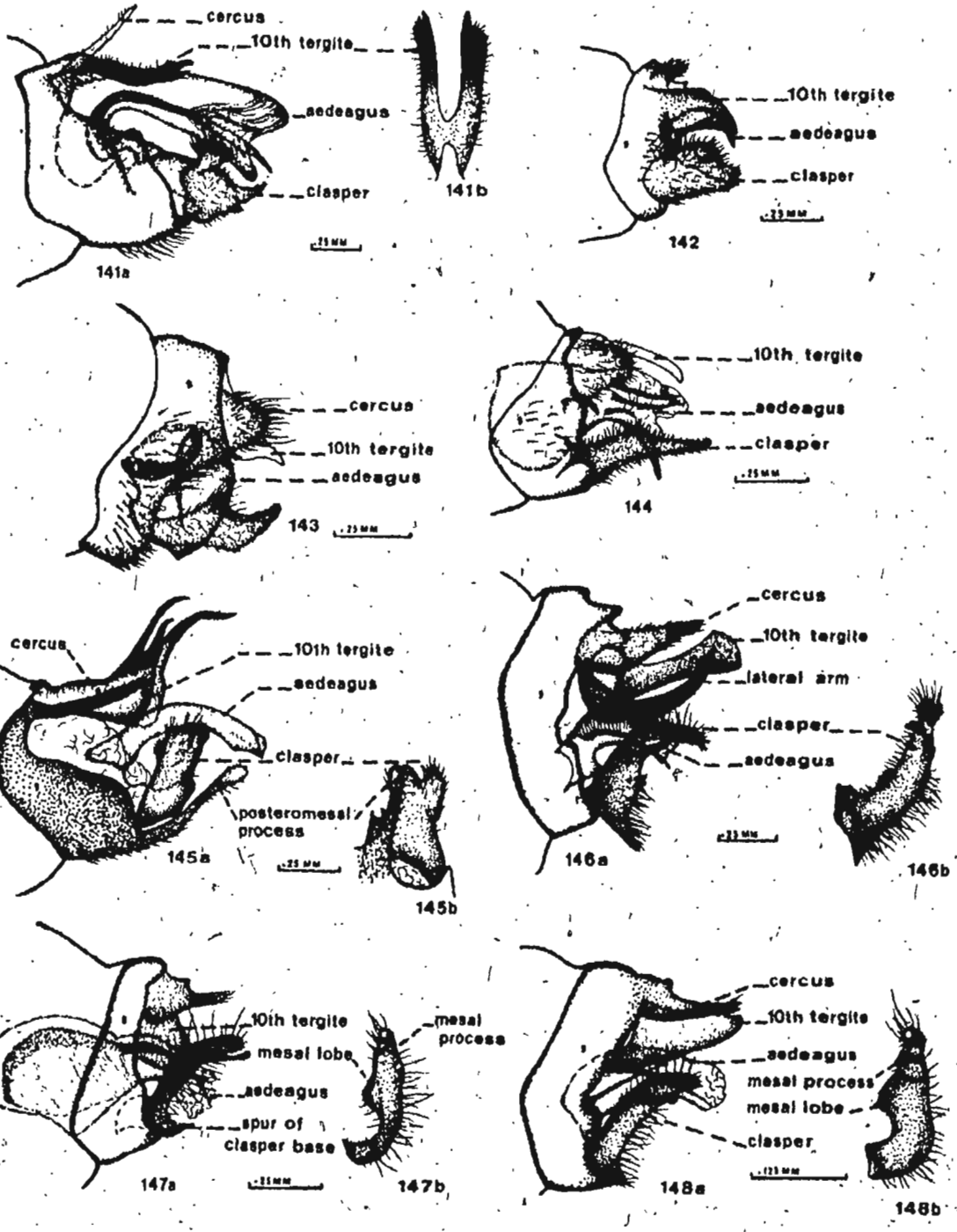

cercus
10th tergite
aedeagus
clasper
141a
141b
.25 MM
10th tergite
aedeagus
clasper
.25 MM
142
cercus
10th tergite
aedeagus
143
.25 MM
10th tergite
aedeagus
clasper
.25 MM
144
cercus
10th tergite
aedeagus
clasper
posteromesal process
145a
.25 MM
145b
cercus
10th tergite
lateral arm
clasper
aedeagus
.25 MM
146a
146b
10th tergite
mesal lobe
aedeagus
spur of clasper base
mesal process
147a
.25 MM
147b
cercus
10th tergite
aedeagus
mesal process
mesal lobe
clasper
.25 MM
148a
148b

PLATE XVII

Fig. 149. *Athripsodes angustus*, male genitalia: a) lateral aspect (.7 mm); b) caudal aspect of right clasper.

Fig. 150. *Athripsodes cancellatus*, male genitalia: a) lateral aspect (1.1 mm); b) caudal aspect of right clasper.

Fig. 151. *Athripsodes sp.*, male genitalia: a) lateral aspect (.5 mm); b) caudal aspect of right clasper.

Fig. 152. *Lepidostoma vernalis*, male genitalia: a) lateral aspect (.6 mm); b) dorsal aspect of 10th tergite.

Fig. 153. *Lepidostoma swannanoa*, male genitalia: a) lateral aspect (.7 mm); b) dorsal aspect of right clasper.

Fig. 154. *Lepidostoma togatum*, male genitalia: a) lateral aspect (.8 mm); b) ventral aspect of right clasper.

Fig. 155. *Lepidostoma bryanti*, male genitalia: a) lateral aspect (.6 mm); b) dorsal aspect of 10th tergite; c) ventral aspect of right clasper.

Fig. 156. *Lepidostoma strophis*, male genitalia: a) lateral aspect (.6 mm); b) dorsal aspect of 10th tergite; c) ventral aspect of right clasper.

PLATE XVII

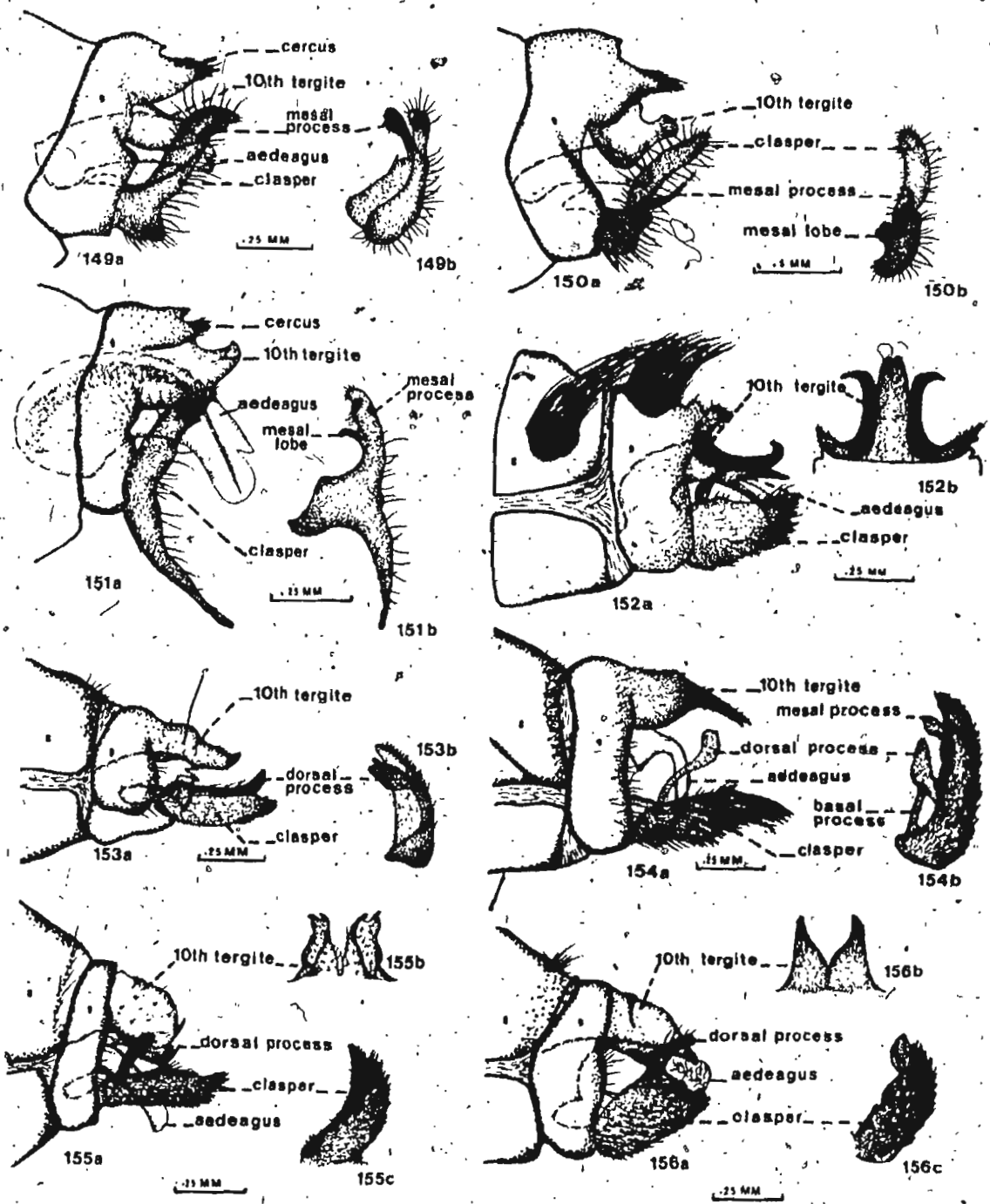

cercus
10th tergite
mesal process
aedeagus
clasper
.25 MM
149a
149b
10th tergite
clasper
mesal process
mesal lobe
.5 MM
150a
150b
cercus
10th tergite
aedeagus
mesal lobe
mesal process
clasper
.25 MM
151a
151b
10th tergite
152b
aedeagus
clasper
.25 MM
152a
10th tergite
dorsal process
clasper
.25 MM
153a
153b
10th tergite
mesal process
dorsal process
aedeagus
basal process
clasper
.25 MM
154a
154b
10th tergite
155b
dorsal process
clasper
aedeagus
155a
.25 MM
155c
10th tergite
156b
dorsal process
aedeagus
clasper
156a
.25 MM
156c

PLATE XVIII

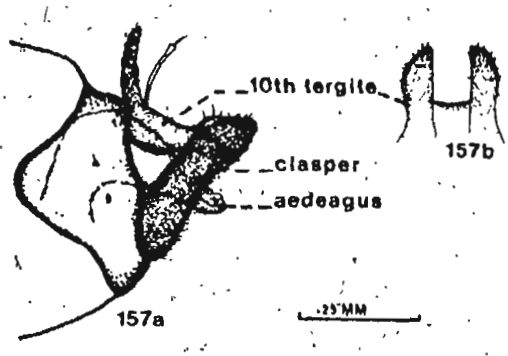
Fig. 157. *Micrasema wataga*, male genitalia: a) lateral aspect (.5 mm); b) dorsal aspect of 10th tergite.

Fig. 158. *M. wataga*, female genitalia: ventral aspect of subgenital plate (.6 mm).

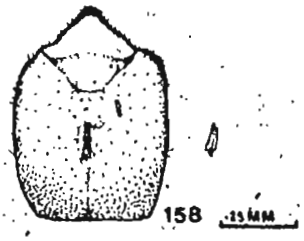
Fig. 159. *Helicopsyche borealis*, male genitalia: a) lateral aspect (.7 mm); b) ventral aspect of right clasper; c) dorsal aspect of 10th tergite.

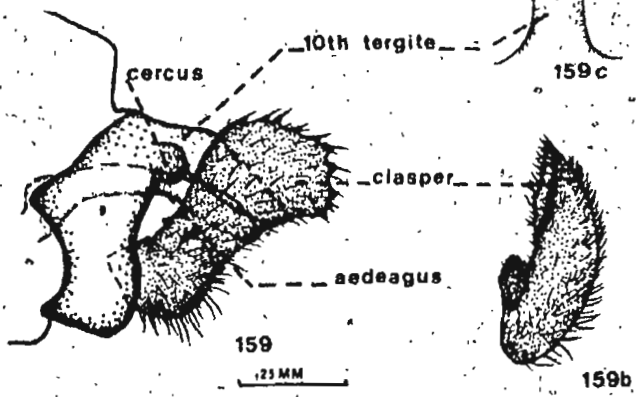
Fig. 160. *H. borealis*, female genitalia: ventral aspect of subgenital plate (.7 mm).

PLATE XVIII


10th tergite
clasper
aedeagus
157a
.25 MM

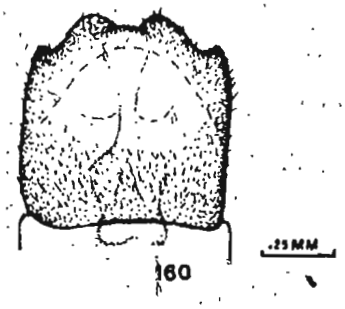
157b


158
.25 MM


cercus
10th tergite
clasper
aedeagus
159
.25 MM


159c

159b


160
.25 MM