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BULLETIN 55

**FOSSIL BIBIONIDAE (DIPTERA)
FROM BRITISH COLUMBIA**

H. M. A. Rice

1959

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GEOLOGICAL SURVEY
OF CANADA

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FROM BRITISH COLUMBIA

By

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DEPARTMENT OF
MINES AND TECHNICAL SURVEYS
CANADA

THE QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1959

Price \$1.00

Cat. No. M42-55

PREFACE

Although the Geological Survey of Canada has in its possession a considerable collection of fossil insects from the Tertiary beds of British Columbia, none of them has been described since 1910 when a small part of the collection was sent to A. Handlirsch in Germany.

Some time ago the collection was re-organized and a systematic study begun. This report is the start on making the data available.

J. M. HARRISON,
Director, Geological Survey of Canada

OTTAWA, January 5, 1959

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Fossil Bibionidae (Diptera) from British Columbia

Abstract

Tertiary Bibionidae belonging to the genera *Penthetria* and *Plecia* in the collections of the Geological Survey of Canada are described and figured. In all ninety-one specimens are illustrated belonging to twenty-one species.

Fifteen of the species were previously described by Handlirsch and Scudder. These have been refigured and redescribed, and to some extent regrouped, as additional intergrading specimens have shown that some forms believed to be of distinct species are in reality members of a single species.

The wing of every specimen has been drawn and many measurements are listed.

Résumé

La présente étude contient la description et la représentation de bibionidés tertiaires des genres *Penthetria* et *Plecia*, provenant des collections de la Commission géologique du Canada. Quatre-vingt-onze spécimens de vingt et une espèces y sont représentés.

Quinze de ces espèces ont déjà été décrites par Handlirsch et Scudder. On les a dessinées et décrites à nouveau et, dans une certaine mesure, regroupées, car l'examen de nouveaux spécimens se rapprochant par gradations a permis d'établir que certaines formes classées autrefois comme des espèces distinctes appartiennent en réalité à une seule et même espèce.

L'aile de chaque spécimen a été dessinée et de nombreuses mesures y sont indiquées.

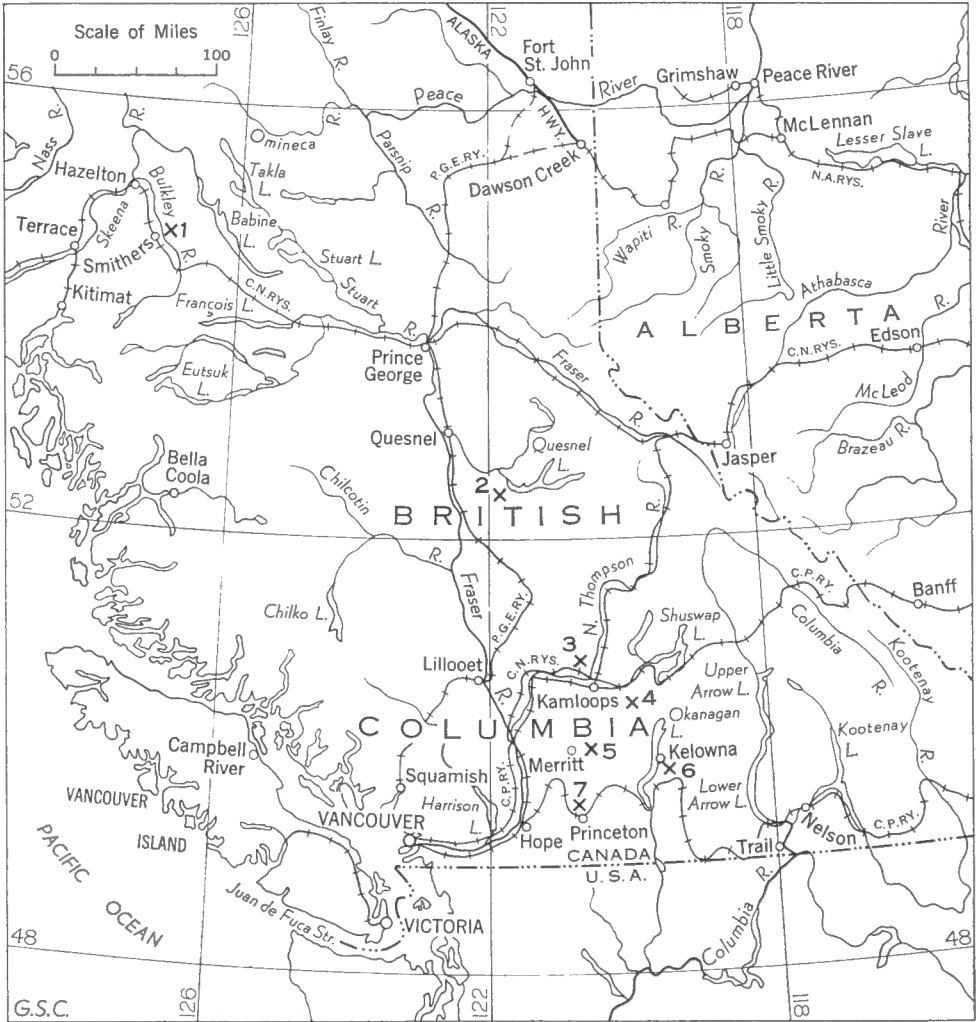


Figure 1. Index map showing fossil localities.

INTRODUCTION

The Tertiary epoch in British Columbia was marked by widespread volcanism recurring at intervals from the Eocene to the Late Pleistocene. This volcanism resulted in the development of lava flows, flat-lying remnants of which may be seen throughout the interior of the province from the International Boundary to the Yukon. Here and there among these lavas are small areas of sedimentary rocks that were laid down in discontinuous, fresh-water lakes. Some of these sediments have yielded rich floras and among the plant remains fossil insects have been found. Insects appear to be more common in beds in which plant remains are few than in beds crowded with leaves.

Although nowhere are fossil insects plentiful, collections made over a period of eight or nine decades from deposits as far south as Princeton to as far north as Smithers (*see* Figure 1) have mounted up, until the Geological Survey of Canada is now in possession of a very considerable insect fauna recovered from these beds.

Several of the early collections were reported on by Scudder (1877, 1879, 1890)¹ and Handlirsch (1910), and some were seen by F. M. Carpenter of Harvard University but no report was published. Most of the collections have, however, received no attention. In this report an attempt is made to describe the new material belonging to one dipterous family, and to redescribe and refigure material already studied and to review it in the light of the additional material now available.

The writer is glad to express his appreciation for the help and encouragement of Dr. J. R. Vockeroth, Entomology Division, Science Service, Department of Agriculture.

NATURE OF THE MATERIAL

The sediments in which the fossil insects occur are varicoloured shales, more or less tuffaceous and more or less sandy. Some cleave into paper-thin plates and some break into slabs an inch or so thick. Naturally the insects are best preserved in the finest grained material, but, nonetheless, identifiable fossils have been recovered even from the least suitable material.

By far the greater proportion of the individuals whose sex can be determined are females. At first sight this seems peculiar but it must be remembered that the female digs a burrow in moist earth an inch to 4 inches deep (Hardy, 1945, p. 276) in which she deposits her eggs. That accomplished, exhausted, she dies, generally without leaving the burrow. It is therefore not so surprising that females are preserved more often than males who die on the surface and are buried only by chance.

¹ Dates in parentheses are those of references cited at the end of this report.

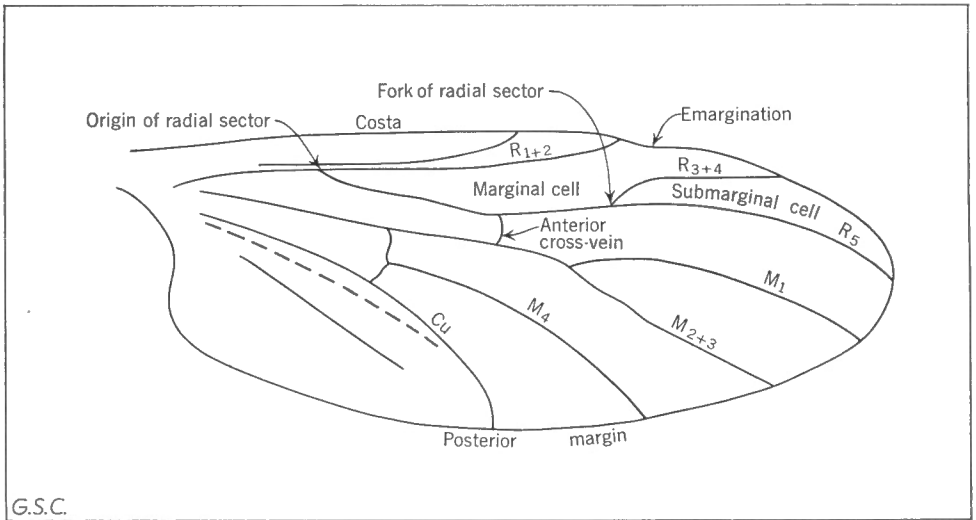


Figure 2. Drawing of wing (X10) showing parts referred to. (After Hardy.)

On the whole, the insects are remarkably well preserved for such fragile creatures, although the excellence of preservation rarely extends to the bodies. The head and thorax, in particular, are almost always badly deformed and commonly largely or entirely missing. In many specimens at least some of the legs are beautifully preserved, down to the tarsal claws, and short, fine, abundant hair with which they are clothed. Similar hair can commonly be seen on the abdomen but that part of the insect is generally too flattened for diagnostic characteristics or dimensions to be preserved.

The best preserved parts of the insect are the wings. Unless mechanically damaged the entire costal area from wing tip to near the base, including the veins of the radial system and the bases of the median and cubitus, are well preserved. The posterior margin and the terminal veins of the medial and cubital systems are less commonly preserved. In one or two specimens the preservation is truly marvellous. Fine hairs following the costa and parts of the radius are clearly visible and, in one specimen, minute microtrichia can be seen under high power studding the wing membrane.

AGE AND CLIMATE

For some years the plants collected from the Tertiary basins of British Columbia were believed to indicate for them a Late Oligocene or Early Miocene age (Rice, 1947, pp. 29-31; Cockfield, 1948). A certain element of doubt was however cast on this by the reported recovery of two mammal teeth from beds in the Princeton basin, believed to be of Eocene age (Russell, 1957, p. 86).

Further collections and studies suggest that the plants too may be older than originally believed and that perhaps an Eocene age is, after all, the most probable (Fry,¹ personal communication).²

This conclusion applies particularly to the Princeton basin but all the information as yet available suggests that it is equally true for the other basins.

The plants collected suggest that the climate when they were growing was tropical or semi-tropical. This is borne out by the Bibionidae, particularly *Plecia*. On this continent the farthest north any species of living *Plecia* is known to range is Virginia; the same restricted range is true elsewhere.

Table I
Distribution of Species

Name	Total	Localities						
		1 ¹	2	3	4	5	6	7
<i>Penthetria</i>								
<i>P. whipsawensis</i> n. sp.....	1							1
<i>P. (?) fryi</i> n. sp.....	5	3						2
<i>Plecia</i>								
<i>P. minutula</i> n. sp.....	1							1
<i>P. kelownaensis</i> n. sp.....	2	1					1	
<i>P. intermedia</i> ? (Scud.).....	1	1						
<i>P. angustipennis</i> (Hand.).....	2		1			1?		
<i>P. pulla</i> (Hand.).....	2							2
<i>P. nana</i> (Hand.).....	1							1
<i>P. curtula</i> (Hand.).....	7	1	1					5
<i>P. cairnesi</i> n. sp.....	3	2			1			
<i>P. tulameenensis</i> n. sp.....	3			1				2
<i>P. tulameenensis</i> ? n. sp.....	1							1
<i>P. reducta</i> (Hand.).....	11	5	1					5
<i>P. similkameena</i> Scud.....	4			2				2
<i>P. canadensis</i> (Hand.).....	8 ²	1		1		1?		4
<i>P. avus</i> (Hand.).....	8	4		1				3
<i>P. transitoria</i> (Hand.).....	10	1	2	1				6
<i>P. pictipennis</i> (Hand.).....	15	6				1		8
<i>P. dilatata</i> (Hand.).....	2		1					1
<i>P. platyptera</i> (Hand.).....	1		1					
<i>P. pulchra</i> (Hand.).....	2							2
<i>P. elatior</i> (Hand.).....	1							1
Totals.....	91	25	7	6	1	3	1	47

¹See list of localities, page 18.

²This total includes one specimen for which locality is unknown.

¹ W. L. Fry, University of California.

² More recent studies have led Dr. Fry to conclude that the Princeton floras are indeed of Oligocene rather than Eocene age (Fry, personal communication).

PALAEONTOLOGY

Cursory inspection of the collections reveals that the following orders at least appear to be represented: Orthoptera, Hemiptera, Neuroptera, Hymenoptera, Coleoptera, Trichoptera, and Diptera. By far the bulk of the collections are specimens of the single Dipterous family Bibionidae, the subject of this report.

Classification

As in all specimens in the collections belonging to the family Bibionidae the third longitudinal vein is forked to give rise to R_{3+4} and R_5 (see Figure 2), the only modern genera that need be considered are *Hesperinus* Walker, *Penthetria* Meigen, and *Plecia* Wiedemann. Of these *Hesperinus* may be dismissed as its characteristically long antenna is unlike that of any of the fossil specimens and the wing venation is significantly different. According to Hardy (1945, p. 390) *Plecia* can be distinguished from *Penthetria* by "the short, almost vertical vein R_{3+4} and the more vertical harpagones" of the former. The number of antennal segments in this genus varies from seven to twelve. In *Penthetria* R_{3+4} "is horizontal or nearly so and elongate compared to *Plecia*" and the harpagones are lateral in position. The number of antennal segments is from eleven to twelve.

Unfortunately the harpagones cannot be seen in the fossil material. The position of R_{3+4} is, in nearly all specimens, about midway between that characteristic of *Plecia* and that characteristic of *Penthetria*. One species in the collection however has R_{3+4} in the position typical for *Penthetria*, and in one or two others it is very close to it. It would be easy to assign these to *Penthetria* except that species intermediate to that showing the shortest R_{3+4} are plentiful. There is therefore no clear-cut dividing line. The only other clue to the genus, the number of antennal segments, is also ambiguous. The antenna is rarely preserved and even when clearly recognizable it is difficult to be sure that the maximum number of segments present in life can be determined. In the fossil material the terminal segment cannot be distinguished from the others. The writer is however reasonably sure that in a few specimens not more than ten segments were ever present. This would suggest that some of the specimens belong to the genus *Plecia*.

Handlirsch (1908, p. 953) believed the two names to be synonymous and assigned all species to *Penthetria*, a practice he followed in describing the British Columbia material in 1910. Since then, however, all writers (Cockerell, 1916 and 1917a and b; Théobald, 1937, etc.) have assigned all species congeneric with most of those in the British Columbia collection to *Plecia*.

Except for one species, in which R_{3+4} is clearly of the *Penthetria* type and another in which it resembles it closely, the writer reluctantly follows the recent practice although it seems to him that we are dealing with a single genus, and most probably one from which the modern genera *Penthetria* and *Plecia* were derived.

Significant Criteria

Despite careful examination and measurement the writer has been unable to recognize any useful criteria for specific identification in any part of the insect except the wings. This is undoubtedly owing to the state of preservation which prevents the observation of significant features that must have been present.

The problem therefore resolves itself into determining what features of the wings are most likely to be useful in separating one species from another. As general descriptive terms are so apt to be subjective, many measurements were made and those considered of possible significance are given in Table III, along with some the writer considers of doubtful value but that have been used by others. In actual practice the measurements of a specimen to be identified were compared graphically with those of the holotypes. By this means most species were eliminated but the actual identification was confirmed by superimposing a drawing on tracing paper of the unknown on one of the holotype of the probable species for direct comparison.

Measurements were made with a mechanical stage under a binocular microscope and could have been much more refined than the observer's ability to fix the end points. Most measurements are therefore given only to $\frac{1}{10}$ mm, which is believed to be within the limits of observational error.

Drawings were traced directly from enlarged photographs or, where these were not available, by direct plotting. The latter was done by placing a photographically prepared grid of dots $\frac{1}{4}$ mm apart on transparent film in contact with the fossil wing and examining the combination under a binocular microscope. The drawings were then made on tracing paper superimposed on a grid of $2\frac{1}{2}$ mm squares and a ten-times enlargement was automatically obtained.

In the following pages the writer's opinions as to the taxonomic significance of the various features are expressed, and an explanation of the various measurements listed in Table III is given.

Not only the size but also the shape of the wing is probably of the greatest taxonomic significance. Some species clearly have short, broad wings (*see* Figure 8, No. 5) and some have long narrow wings (*see* Figure 8, No. 11); in some the wing tip is broadly rounded (*see* Figure 3, No. 18) and in others it comes to a more or less sharp point (*see* Figure 3, No. 12). Furthermore, in some the wing tip is markedly asymmetrical, the anterior part being evenly rounded and the posterior part more or less straight (*see* Figure 4, No. 8). This gives to the wing a somewhat falcate appearance.

Wing length (WL) and wing width (WW) are probably the most important measurements, as they express the size and something of the shape of the wing. Unfortunately, the exact base of the wing can rarely be seen with certainty and the posterior margin of the wing is rarely preserved. Two other measurements were therefore made in an effort to obtain a figure that would, in some measure, express the same features where WL or WW were unobtainable. RL (the length of the radial sector) is the distance, measured in a straight line, from the origin of the sector to the tip of R_5 . This can be measured in most specimens and generally with considerable accuracy. It is closely related to the length of the

wing and was used as the abscissa in graticulating the statistics, the other measurements being used as the ordinate. Several measurements were tried in an effort to obtain a figure that would represent the width of the wing; none was entirely satisfactory. The one listed is the distance from the anterior tip of the anterior cross-vein to the costa (AxC). This certainly varies to some extent with the width of the wing but is not an entirely reliable guide as it also varies with the degree of curvature of the costa and is, in any event, too short to show much variation.

The curvature of the costa has a pronounced bearing on the shape of the wing and also seems to be of considerable taxonomic significance. Clearly species with a straight costa are distinct from those with a markedly curved costa. Most species, however, fall within these extremes and for them minor differences are probably of no significance. To express in figures the curvature of the costa, the radius of a circle (RC) is listed whose circumference passes through the base of the wing, the costa directly opposite the anterior cross-vein, and the tip of R_{3+4} . This is not entirely satisfactory but the writer could think of no better dimension.

Many forms show a pronounced emargination (*see* Figure 2) interrupting the regular curve of the costa at or near the tip of R_{1+2} . This is clearly marked in some specimens and absent in others but the writer is in doubt as to whether it is a specific or purely individual characteristic, or simply a vagary of preservation.

The writer views the length of the individual veins or parts of veins as of much less taxonomic significance than the overall shape of the wing. The single exception he would make is in the relationship between R_{3+4} and R_5 . As stated on page 4, a short erect R_{3+4} is today considered characteristic of *Plecia* and a long horizontal one of *Penthetria*. These differences should be apparent in the fossil material and they should be taxonomically significant. Such differences do appear but are less noticeable than might be expected. True, in a couple of species long, horizontal R_{3+4} s of the *Penthetria* type are present but none displays the short erect *Plecia* type. In most of the species the position of the vein varies within narrow limits only.

Seeing the possible importance of detecting small differences the writer tried all the measurements of length and angle he could think of and none proved satisfactory, indeed most failed to show differences clearly visible to the eye. As a result the only measurements given are of the lengths of the two veins (R_{3+4} and R_5), which are useful in some cases, and the height of the submarginal cell (SC), which is of little use in this regard but was used by other authors.

It is for this reason too, rather than any belief in their virtue, that the following measurements are listed: the origin of the radial sector to its fork (RF), the origin of the radial sector to the anterior cross-vein (RAX), and the height of the marginal cell (MC).

Significant features are also probably present in the posterior veins, such as the curvature of the cubitus, but the posterior part of the wing is so rarely preserved that the use of such features would be very limited.

DESCRIPTION OF SPECIES

Genus *Penthetria* Meigen

Penthetria Meigen, 1803, Illiger's Magazine II, p. 264.

Eupeitenus Macquart, 1838, Dipt. Exot, Nouv. ou peu Connus I, p. 85.

Plectia spp. of many authors refer to this genus.

In this report species assigned to this genus are characterized by vein R_{3+4} being very long and closely parallel with R_5 throughout most of its course.

Penthetria whipsawensis n. sp.

Plate I, figure 1; Figure 3, No. 1

Description. Wing about $6\frac{1}{2}$ mm¹ long and probably relatively narrow, costa moderately curved with no emargination. Characterized by an exceedingly long R_{3+4} . The base of this vein leaves R_5 at right angles and then, with another right angle, turns and runs almost straight distad to the costa about midway between the tips of R_{1+2} and R_5 . A small stub seems to project basad from the right angle turn of R_{3+4} after the manner of this vein in *P. appendicula* Hardy (Hardy, 1945, p. 384, Pl. XXIX, fig. 122c).

Remarks. This species is known from a single poorly preserved specimen but the shape and position of vein R_{3+4} seem to be unique.

Occurrence. Princeton district.

Type. Holotype, GSC No. 14416.

Penthetria (?) *fryi* n. sp.

Plate I, figure 2; Figure 3, Nos. 2-6

Description. Wing $7\frac{1}{2}$ to $8\frac{1}{2}$ mm long and relatively narrow, costa moderately curved, no emargination or possibly very slight dip in some specimens. Apex curved to somewhat pointed, perhaps slightly falcate in some specimens. Vein R_{3+4} long and closely parallel with R_5 but lacks the sharp basal angles of *P. whipsawensis*; meets costa midway between tips of R_{1+2} and R_5 . Strong tibial spurs.

Remarks. This species is represented in the collections by six specimens, the holotype being particularly well preserved. It may be conspecific with *P. whipsawensis* but is larger and the difference in the shape of the basal part of R_{3+4} seems significant. Moreover R_{3+4} is not as rigidly parallel with R_5 and diverges so far in some specimens that its assignment to this genus may be questioned. Named in honour of Dr. W. L. Fry.

¹ For measurements see Table III, p. 21.

Fossil Bibionidae (Diptera) from British Columbia

Occurrence. Holotype and best preserved specimens from Smithers district, two specimens from Princeton district.

Types. Holotype, GSC No. 14417; paratypes, GSC Nos. 14418-14421.

Genus **Plecia** Wiedemann

Plecia Wiedemann, 1828, Aussereurop. Zweifl. Ins., 1, p. 72.

Rhinoplecia Bellardi, 1859, Mem. Roy. Acad. Sci. Torino (2), 19, p. 216.

Penthera Philippi, 1865, Verh. Zool.-Bot. Ges. Wien, 15, p. 639.

In this report, to this genus are referred species in which vein R_{3+4} is relatively short and divergent from R_5 . In no case is R_{3+4} as short or as divergent as in the modern species ascribed to this genus and the writer suspects that forms transitional with those typical for *Penthetria* are present. In deference to recent practice however and in the absence of stronger evidence to the contrary the species described below are placed in this genus.

Plecia minutula n. sp.

Plate I, figure 3a, b; Figure 3, No. 7

Description. Wing less than $5\frac{1}{2}$ mm long, costa well rounded, no emargination. The posterior margin of the wing of the only specimen is missing but its position can be closely estimated and the wing seems to be relatively broad. Apex broad, evenly rounded; R_{3+4} short and strongly divergent.

Remarks. This species is characterized by its exceptionally small size and its broadly rounded wing. The only species of comparable size of which the writer is aware is *P. melanderi* Cockerell (Cockerell, 1917b) and the wing length of that species is given as 6 mm.

Occurrence. Princeton district.

Type. Holotype, GSC No. 14422.

Plecia kelownaensis n. sp.

Plate I, figure 4; Figure 3, Nos. 8, 9

Description. Wing between $5\frac{1}{2}$ and 6 mm long and relatively narrow, costa unusually straight, no emargination. Apex somewhat pointed, not falcate or only slightly so. R_{3+4} short and divergent, meeting costa not far from R_{1+2} .

Remarks. Characterized by small size, narrow wing, straight costa, and short divergent R_{3+4} .

Occurrence. Kelowna district, and Smithers district.

Types. Holotype, GSC No. 14423; paratype, GSC No. 14424.

Plecia intermedia ? (Scudder) n. comb.

Figure 3, No. 10

Mycetophaetus intermedius Scudder, U.S. Geol. Surv., Bull. 93, p. 20, Plate II, 5, 1890.

Description. Wing probably $5\frac{1}{2}$ to 6 mm long, width unknown, costa curved, no emargination. Apex missing, R_{3+4} relatively long and not widely divergent from R_5 , meets costa about a third of distance between R_{1+2} and R_5 .

Remarks. This specimen is about the size of *Mycetophaetus intermedius* Scudder which is clearly a Bibionidae of the genus *Plecia* (possibly *Penthetria*). Furthermore, the curvature of the costa and the position of R_{3+4} closely resemble those of Scudder's figure, although R_{3+4} itself is perhaps a little shorter. Unfortunately Scudder's description is not in sufficient detail and this specimen too poorly preserved to confirm its identity with his species.

Occurrence. Smithers district.

Type. Hypotype, GSC No. 14425.

Plecia angustipennis (Handlirsch) n. comb.

Plate I, figure 5; Figure 3, Nos. 11, 12

Penthetria angustipennis Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 104, 105, fig. 6 (1910).

Description. Wing about $8\frac{1}{2}$ mm long, relatively narrow, characterized by an exceedingly straight costa. Wing appears to be cuneiform with the greatest width near the base but the state of preservation makes this uncertain. Tip acute, asymmetric, anterior part rounded, posterior part straight, falcate. Vein R_{3+4} in the hypotype is long and subparallel to R_5 , close to the position in *Penthetria* but shorter than in *Penthetria* (?) *fryi* and meets costa before the midpoint between R_{1+2} and R_5 . In the holotype, as far as can be seen, it is in the position more normal for *Plecia*.

Remarks. The holotype for this species is a detached wing with a deep fold down the middle obscuring the base and the anterior branches of the medial and cubital vein systems and the general shape of the wing. However the principal criterion mentioned by Handlirsch, the straight costa, is so striking and the close agreement in the measurements (see Table III) so marked that the writer has no hesitation in placing the hypotype in this species and in basing much of his description on it.

Occurrence. Holotype from Quesnel district, hypotype from Quilchena district.

Types. Holotype, GSC No. 7251; hypotype, GSC No. 14426.

Plecia pulla (Handlirsch) n. comb.

Plate I, figures 6, 7; Figure 3, Nos. 13, 14

Penthetria pulla Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 105, 106, fig. 7 (1910).

Penthetria brevipes Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, p. 106, fig. 8. New synonymy.

Description. Wing from $7\frac{1}{2}$ to 8 mm long, width about $2\frac{1}{2}$ mm, rather narrow, costa curved, no emargination, apex bluntly rounded. R_{3+4} moderately long and evenly divergent from R_5 , meets costa at two fifths of distance R_{1+2} to R_5 .

Remarks. This species is characterized by a narrow oblong wing with a blunt end. Because it is so narrow the veins have a crowded appearance. *P. brevipes* Handlirsch is so poorly preserved and the parts that can be seen resemble *P. pulla* so closely that the species are here considered to be synonymous.

Occurrence. Princeton district.

Types. Holotype, GSC No. 7252; hypotype, GSC No. 7253, holotype for *Penthetria brevipes* Handlirsch.

Plecia nana (Handlirsch) n. comb.

Plate I, figure 8; Figure 3, No. 15a, b

Penthetria nana Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 111, 112, figs. 16, 17 (1910).

Description. Wing about $7\frac{1}{2}$ mm long, width normal about 3 mm, costa well curved no emargination. Apex rounded, probably not at all falcate. R_{3+4} rather long but definitely divergent, meets costa at two fifths of distance R_{1+2} to R_5 .

Remarks. This form is very similar to *P. pulla* and the two may be conspecific. The wing seems, however, slightly broader, the veins being thus less crowded, and the costa is possibly more curved.

Occurrence. Princeton district.

Type. Holotype, GSC 7261.

Plecia curtula (Handlirsch) n. comb.

Plate I, figures 9-11; Figure 4, Nos. 1-7

Penthetria curtula Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 119, 120, fig. 27 (1910).

Penthetria avunculus Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 114, 115, fig. 20 (1910). New synonymy.

Description. Wing between 7 and $8\frac{1}{2}$ mm long and about 3 mm wide, costa well curved, emargination none or very slight; apex bluntly curved to slightly pointed, slightly or not at all asymmetrical. R_{3+4} generally short and strongly

divergent from R_5 . The length of R_{3+4} varies with the position of the fork of the radial sector which in this as in all species seems subject to much individual variation.

Remarks. The wing of *P. curtula* seems to be broader than that of *P. pulla* and perhaps broader than *P. nana*, and R_{3+4} seems to be more widely divergent than in either. Nonetheless all three forms are very much alike and the writer is doubtful of the validity of the distinction. He feels that additional specimens will demonstrate an intergrading series for which the single name *P. curtula* could be used, sinking *P. pulla* and *P. nana* into the synonymy. Into this same species could probably be added *P. reducta*.

This he has already done for *Penthetria avunculus* Handlirsch. Handlirsch (1910, pp. 114, 115) gives two cotypes for this species, GSC No. 7264a and 7264b. Neither is well preserved and 7264a might be *Plecia reducta* (Handlirsch) or one of several other species. The other (see Figure 4, No. 7) resembles *P. curtula* so closely, except that it is slightly larger, that the writer can see no reason to continue regarding it as a distinct species.

Occurrence. Holotype from Quesnel district, one hypotype from Smithers district, and five from Princeton district.

Types. Holotype, GSC No. 7270; hypotypes, GSC Nos. 14427-14431, and 7264.

Plecia cairnesi n. sp.

Plate II, figures 3, 7; Figure 3, Nos. 17-19

Description. Wing $7\frac{1}{2}$ to 8 mm long and $3\frac{1}{2}$ to 4 mm wide, costa strongly curved with a slight emargination in some specimens; apex well rounded and symmetrical. R_{3+4} moderately long, normally divergent.

Remarks. This species is characterized by its broad, well-rounded wing, and is distinguished from *P. curtula* and even more clearly from *P. pulla* and *P. nana* by these characteristics. The cubitus, too, seems to be more sweepingly curved, which is probably a characteristic of the broader wing. Named in honour of the late Dr. C. E. Cairnes.

Occurrence. Holotype and one paratype from Smithers district, one paratype from the Okanagan district.

Types. Holotype, GSC No. 14432; paratypes, GSC Nos. 14433, 14434.

Plecia tulameenensis n. sp.

Plate II, figures 1, 4; Figure 3, Nos. 16, 20, 21; Figure 4, No. 19

Description. Wing length 8 to $9\frac{1}{2}$ mm, width, $2\frac{1}{2}$ to 3 mm; narrow, strap-shaped wing, costa relatively straight; holotype without emargination but emargination definite in paratype, apex blunt but asymmetrical, wing sub-falcate. Because

of the narrowness of the wing all veins run more directly apicad than in other species of this size. R_{3+4} intermediate.

Remarks. The wing of this species is narrower and the costa straighter than in any species of comparable size, except *P. angustipennis* and the wing of that species is entirely different. One poorly preserved specimen that has been assigned provisionally to this species (see Figure 3, No. 16) has a rather contradictory appearance. The straight costa suggests that it is *P. tulameenensis* but, although the posterior part of the wing is missing, the separation of the veins at their bases and their apparent trends suggest a wing wider than *P. tulameenensis*, more like *P. reducta*.

Occurrence. Princeton district, and Kamloops district.

Types. Holotype, GSC No. 14435; paratypes GSC Nos. 14436, 14437; hypotype GSC No. 14438.

Plecia reducta (Handlirsch) n. comb.

Plate II, figures 2, 6; Figure 4, Nos. 8-18

Penthetria reducta Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 109, 110, fig. 13 (1910).

Description. Wing generally between 8 and 9 mm long and 3 to 3½ mm wide, being a relatively wide wing with a well-arched costa; in some specimens a well-marked emargination, in others hardly any, apex fairly pointed and asymmetrical, the tip generally being well below the end of R_5 and followed by a relatively straight part of the posterior margin, giving the wing a somewhat falcate appearance. R_{3+4} generally short and divergent from R_5 meeting costa much closer to R_{1+2} than R_5 .

Remarks. This is a broad rounded wing characterized by a somewhat falcate appearance. The latter feature seems to be the only real difference between this species and *P. curtula* except that perhaps R_5 is relatively straight in *P. reducta* and strongly arched in *P. curtula*. Nonetheless it is probable that *P. reducta* and *P. curtula* will be found to intergrade and that the two are conspecific.

Occurrence. Holotype from Quesnel district; five hypotypes from Princeton district; and five from Smithers district.

Types. Holotype GSC No. 7258; hypotypes GSC Nos. 14439-14448.

Plecia similkameena (Scudder)

Plate II, figures 5, 9; Figure 5, Nos. 1-4

Penthetria similkameena Scudder, Geol. Surv., Canada, Rept. Prog. 1877-78, pp. 177-179 B (1879).

Plecia similkameena (Scudder), Zittel, Handbook of Palæo. I, ii, p. 811, fig. 1086 (1885).

Plecia similkameena (Scudder), "Fossil Insects of North America", vol. II, pp. 583-585, Pl. 3, fig. 22 (non figs. 20, 21) 1890.

Description. Wing $9\frac{1}{2}$ to $10\frac{1}{2}$ mm long, and about 4 mm wide, costa straight, apex fairly acute and asymmetrical, wing somewhat falcate. R_{3+4} short, widely divergent and mostly rather straight, anterior cross-vein farther apicad than normal, at middle of wing or beyond, fork of radial sector also more apicad than general making R_{3+4} and R_5 short. Strong tibial spurs on all legs, two on each of the four posterior legs and at least one on each of the anterior.

Remarks. *P. similkameena* is easily distinguished by the straight costa and short, divergent R_{3+4} . It most resembles *P. tulameenensis* but is much larger.

In the Geological Survey collections are several specimens labelled *Plecia similkameena* (Scudder) and designated as cotypes. As suggested by Handlirsch (1910, pp. 121, 122), all sufficiently well preserved to be identified belong to different species. The one chosen as the lectotype is that figured by Zittel (1885) and one of the three figured by Scudder (1890). This specimen is the body of a male insect with one wing attached, this is the part figured, but there is also a detached wing that Scudder apparently believed belonged to the same insect. It is now certain that this is not so and the detached wing seems to be that of a specimen of *P. avus* (Handlirsch).

Occurrence. Lectotype and one hypotype from Princeton district; two hypotypes from Kamloops district.

Types. Lectotype, GSC No. 6172 (attached wing); hypotypes, GSC Nos. 14449-14451.

Plecia canadensis (Handlirsch) n. comb.

Plate II, figures 8, 10; Figure 5, Nos. 5-12

Penthetria canadensis Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 118, 119 (1910).

Description. Wing stout, about $9\frac{1}{2}$ to $10\frac{1}{2}$ mm long and 4 to $4\frac{1}{2}$ mm wide, costa moderately curved, emargination present in some specimens absent in others, apex poorly preserved in all specimens but apparently broadly rounded, R_{3+4} moderately long and divergent.

Remarks. This species is characterized by its broad, stout wing with a broad basal cell and long anterior cross-vein. However it is closely similar to *P. dilatata*, *P. avus*, and other species described below and may intergrade and be conspecific with them.

Occurrence. Of the eight specimens assigned to this species four are from the Princeton district, one from near Kamloops, one from the Quilchena district, and one from the Smithers district. The locality for one is unknown.

Types. Holotypes, GSC No. 7269; hypotypes, GSC Nos. 14452-14457, and 6172 (detached wing).

Plecia avus (Handlirsch) n. comb.

Plate III, figures 6, 7; Figure 5, Nos. 13-17; Figure 6, Nos. 1-3

Penthetria avus Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 115, 116, fig. 22 (1910).

Description. Wing $8\frac{1}{2}$ to 10 mm long and some $3\frac{1}{2}$ mm wide, costa well curved, distinct emargination in costa of most specimens. Apex rather acute but apparently generally symmetrical. R_{3+4} relatively long and narrowly divergent from R_5 .

Remarks. This species has a narrower, more pointed wing than *P. canadensis*. This is statistically most apparent in the smaller distance from the anterior cross-vein to the costa (AxC) which mostly ranges from 0.90 to 1.15 mm for *P. avus* and over 1.2 mm for *P. canadensis*. In general shape and appearance *P. avus* and *P. transitoria* are similar but in the latter R_{3+4} is shorter and more widely divergent. *P. pictipennis*, though resembling *P. avus* in many respects, seems to be a larger, particularly longer, form. Nonetheless it is possible, even probable, that all four species mentioned above are conspecific.

Occurrence. Four of the eight specimens assigned to this species came from the Smithers district, three from the Princeton district, and one from near Kamloops.

Types. Holotype, GSC No. 7265; hypotypes, GSC Nos. 14458-14464.

Plecia transitoria (Handlirsch) n. comb.

Plate III, figures 1, 3, 4; Plate IV, figure 3; Figure 6, Nos. 4-14

Penthetria transitoria Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 117-118, fig. 25 (1910).

Penthetria falcatala Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, p. 110, fig. 14 (1910). New synonymy.

Penthetria fragmentum Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, p. 111, fig. 15 (1910). New synonymy.

Description. Wing 10 to 11 mm long and 3 to 4 mm wide, costa moderately curved, emargination generally present; apex acute but smoothly rounded, slightly asymmetrical in some specimens; R_{3+4} short and divergent.

Remarks. *P. transitoria* has a longer and narrower wing than *P. canadensis*, shaped more like that of *P. avus*. R_{3+4} in *P. transitoria* is, however, shorter and more divergent than it is in *P. avus*, and moreover, the anterior cross-vein seems to be situated about midway between the origin of the radial sector and its fork whereas in *P. avus* it is nearer the fork.

The writer has placed *Penthetria falcatala* Handlirsch and *P. fragmentum* Handlirsch in synonymy with *Plecia transitoria* (Handlirsch) as he can see no valid reason for maintaining their specific status. True, the holotype of *Penthetria falcatala* has a slightly more falcate wing than seems usual for *Plecia transitoria*, but in the absence of any other significant difference this seems insufficient reason for separating the two forms.

Occurrence. Ten specimens are assigned to this species; of these six are from the Princeton district, two are from the Quesnel district, one from the Smithers district, and one from near Kamloops.

Types. Holotype, GSC No. 7268; hypotypes, GSC Nos. 7259, 7260, 14465-14471.

Plecia pictipennis (Handlirsch) n. comb.

Plate III, figures 2, 5, 8; Plate IV, figures 4, 6; Figure 7, Nos. 1-11;
Figure 8, Nos. 1-4

Penthetria pictipennis Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 106-108, figs. 9-11 (1910).

Penthetria separanda Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 112, 113, fig. 18 (1910). New synonymy.

Penthetria lambei Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 116, 117, fig. 23 (1910). New synonymy.

Penthetria ovalis Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, p. 117, fig. 24 (1910). New synonymy.

Description. Wing about 11 mm long and 4 mm wide, somewhat narrower than average, costa moderately curved, with fairly distinct emargination in some specimens, little or none in others; apex fairly acute, smoothly rounded, more or less symmetrical; R_{3+4} moderately long and moderately divergent but varies considerably, position of anterior cross-vein generally closer to fork of radial sector than to its origin.

Remarks. This is a robust insect with a long relatively narrow wing. There is considerable variation and it seems to the writer that he has specimens showing a complete gradation to *Penthetria separanda* Handlirsch, *P. ovalis* Handlirsch, and *P. lambei* Handlirsch, and these species are therefore placed in synonymy. The wing seems to be larger than those of *Plecia canadensis*, *P. avus*, or *P. transitoria* and the anterior cross-vein nearer the fork of the radial sector than in *P. transitoria*, R_{3+4} seems more divergent than in *P. avus*. These are all, however, small differences and it is possible that all the species mentioned above are conspecific.

Occurrence. Of the fifteen specimens assigned to this species eight are from the Princeton district, six from the Smithers district, and one from the Quilchena district.

Types. Lectotype, GSC No. 7256; paratype, GSC No. 7254; hypotypes, GSC Nos. 7262, 7266, 7267, 14472-14481.

Plecia dilatata (Handlirsch) n. comb.

Plate III, figure 9; Figure 8, Nos. 5, 6

Penthetria dilatata Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, p. 120, fig. 28 (1910).

Description. Wing about $10\frac{1}{2}$ mm long by 5 mm wide, costa well arched, no emargination; apex round, blunt, symmetrical; R_{3+4} normal.

Remarks. This species is characterized by a remarkably broad, round wing, unlike any other known to the writer. Statistically it is characterized by the great width compared to its length and the broad space between the end of the anterior cross-vein and the costa.

Occurrence. Only one specimen in the collection besides the holotype seems to belong to this species; it is from the Princeton district. The holotype is from near Quesnel.

Types. Holotype, GSC No. 7271; hypotype, GSC No. 14482.

Plecia platyptera (Handlirsch) n. comb.

Plate IV, figure 1; Figure 8, No. 7

Penthetria platyptera Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 121, 122, fig. 29 (1910).

Description. Wing 12 mm long by more than 5 mm wide, costa well arched, no emargination; apex not well preserved but appears to be narrowly rounded, symmetrical, the distal part of the posterior margin possibly slightly flattened; R_{3+4} short and widely divergent, anterior cross-vein much nearer fork than origin of sector.

Remarks. This species is known from the holotype only but is a large distinctive insect with a large broad wing. It resembles *P. dilatata* somewhat but is much longer and about the same width, giving a very differently shaped wing. The only other species of comparable size, *P. pulchra* and *P. elatior*, both have much narrower wings.

Occurrence. The only known specimen is from the Quesnel district.

Type. Holotype, GSC No. 7272.

Plecia pulchra (Handlirsch) n. comb.

Plate IV, figure 2; Figure 8, Nos. 8, 9

Penthetria pulchra Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 113, 114, fig. 19 (1910).

Description. Wing some $12\frac{1}{2}$ mm long and $4\frac{1}{2}$ mm wide, costa moderately curved, broad shallow emargination, this is apparently matched by a shallow concave curve on the posterior margin giving the wing a distinctive, pinched appearance. Apex normal, evenly rounded, R_{3+4} relatively short but not markedly divergent, anterior cross-vein midway between origin of sector and its fork.

Remarks. This very large wing at first seems distinctive and, indeed, the pinched distal part of the holotype is unmistakable. In the hypotype, which in every other respect resembles the holotype closely, this feature is much less noticeable making one wonder if it really has any taxonomic significance. This species differs but little from *P. pictipennis*, and criteria by which to distinguish

one from the other, other than size, are hard to recognize. Moreover hypotype GSC No. 14481 has been included with *P. pictipennis* because the right wing seems typical of that species. Yet the left wing is very large and seems to resemble *P. pulchra* almost as closely as *P. pictipennis*. It remains to be seen, then, if these are two distinct but closely related species, or if they are merely varieties of a single species.

Occurrence. Princeton district.

Types. Holotype, GSC No. 7263; hypotype, GSC No. 14483.

Plecia elatior (Handlirsch) n. comb.

Plate IV, figure 5; Figure 8, Nos. 10, 11

Penthetria clatior Handlirsch, Contr. to Canadian Palæo., Geol. Surv., Canada, Mem. 12, pp. 108, 109, fig. 12 (1910).

Description. The only specimen of this species is badly damaged and it seems to the writer that the anterior part of the wing has separated from the posterior so that the length of 14 mm given by Handlirsch is in error. In Figure 8, No. 11 the writer has attempted to make a drawing of the restored wing but both this and many of the measurements are suspect. Wing possibly 12 mm long and very narrow, costa apparently unusually straight, rounded acute, symmetrical, R_{3+4} long, not widely divergent.

Remarks. This is a robust insect apparently with a long, narrow wing. The only specimen is poorly preserved but nonetheless the wing seems to be shaped differently from any other as large as this that is known to the writer.

Occurrence. Princeton district.

Type. Holotype, GSC No. 7257.

LIST OF LOCALITIES

Locality 1, Smithers district, B.C.

- 1a Driftwood Creek, east side 1.45 miles from schoolhouse. Coll. A. H. Lang, 1939
- 1b Driftwood Creek, east bank from 300 to 350 yards upstream. Coll. W. L. Fry, 1956
- 1c Driftwood Creek, shale cliffs on east side of creek, same as 1b. Coll. W. L. Fry, 1957

Locality 2, Quesnel district, B.C.

- 2 Horsefly mine. Coll. L. M. Lambe, 1906

Locality 3, Kamloops district, B.C.

- 3 Tranquille Creek. Coll. L. M. Lambe, 1906

Locality 4, Okanagan Lake district, B.C.

- 4 Northwest of Falkland. Colls. C. E. Cairnes and S. S. Holland, 1932

Locality 5, Quilchena district, B.C.

- 5a General. Coll. L. M. Lambe, 1906
- 5b Diamond Vale Coal Company. Colls. Ellis and Johnston, 1904

Locality 6, Kelowna district, B.C.

- 6 Mission Creek. Coll. J. Gervais, 1930

Locality 7, Princeton group, Princeton district, B.C.

- 7a 3 miles up North Fork of Similkameen River. Coll. G. M. Dawson, 1877
- 7b Tulameen River, opposite Vermilion Cliff. Coll. L. M. Lambe, 1906
- 7c Tulameen River, right bank a mile above Princeton. Coll. L. M. Lambe, 1906
- 7d Whipsaw Creek. Coll. G. M. Dawson, 1877
- 7e North Fork of Similkameen River. Coll. G. M. Dawson, 1888
- 7f 0.7 mile north of bridge over Whipsaw Creek, turn left (third road after crossing bridge) up road to coal mine dump. Collected from bulldozer-cuts near crest of hill. Coll. W. L. Fry, 1955
- 7g From 40 feet above Pleasant Valley No. 2 Mine Portal, Tulameen River. Coll. W. Shaw, 1951
- 7h From section along Tulameen River about a quarter mile north, and on east side of bank downstream from CPR bridge. Coll. W. L. Fry, 1956
- 7i On CPR west of Princeton, on Station park. Coll. W. L. Fry, 1956
- 7j Road-cut in village of Princeton, directly below Princeton General Hospital. Coll. W. L. Fry, 1957
- 7k Above Tulameen River on southeast bank north of CPR bridge. Coll. W. L. Fry, 1957
- 7l Azolla locality on China (Asp) Creek. Coll. W. L. Fry, 1957
- 7m Section about 25 feet above river level, on south bank of Tulameen River 400 yards west of old entry portal. Coll. W. L. Fry, 1957

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Table II
Key to Wing Elements Measured
 (see Figure 2, page 2)

WL	— Wing length.
WW	— Wing width.
RL	— Length of radial sector.
AxC	— Distance between anterior end of anterior cross-vein and costa.
RC	— Radius of circle through base of wing, costa opposite anterior cross-vein, and the tip of R_{3+4} .
R_{3+4}	— Length of R_{3+4} (fork to tip).
R_5	— Length of R_5 (fork to tip).
SC	— Height of submarginal cell (at tip of R_{3+4}).
RF	— Distance between origin of radial sector and its fork.
RAx	— Distance between origin of radial sector and anterior cross-vein.
MC	— Height of marginal cell at anterior cross-vein.

Table III

Measurements of Wing Elements

(See Figure 2 and Table II)

Name	GSC No.	Type	Remarks	WL	WW	RL	AxC	RC	R ₃₊₄	R ₅	SC	RF	RAX	MC
<i>Penthetria</i>														
<i>P. whipsawensis</i>	14416	Holo.	.....	6.6?	—	4.7	0.66	13?	1.8	2.8	0.26	1.9	1.3	0.38
<i>P. (?) fryi</i>	14417	Holo.	.....	8.2	3.0	5.3	0.84	14	2.2	3.2	0.34	2.0	1.3	0.41
	14418	Para.	.....	7.1?	—	4.7?	0.82	14	2.0	2.7?	0.35	1.9	1.3	0.48
	14419	Para.	.....	7.7	2.7?	4.9	—	16	1.3?	2.9	—	2.1	1.2	0.46
	14420	Para.	Right wing.....	8.0	3.1	4.9	0.93	15	1.8	3.0	0.54	1.9	1.2	0.56
	14420	Para.	Left wing.....	7.5?	—	4.8	0.87?	22?	1.7	2.9	0.48	2.0	1.4	0.55
	14421	Para.	.....	8.9?	3.2?	5.5	0.98	16	2.2	3.6?	0.44	1.9	1.4	0.57
<i>Plectia</i>														
<i>P. minutula</i>	14422	Holo.	.....	5.3	2.2	3.1	0.63	8.5	1.0	1.8	0.38	1.4	0.9	0.35
<i>P. keloumaensis</i>	14423	Holo.	.....	5.8	2.1	3.6	0.48	20	0.8	1.8	0.27	1.9	0.8	0.32
	14424	Para.	.....	—	—	3.4	0.50	21	1.0	1.8	0.33	1.9	1.0	0.33
<i>P. intermedia</i> ?.....	14425	Hypo.	.....	—	—	3.6	0.58	13	1.2	2.1	0.27	1.4	1.0	0.34
<i>P. angustipennis</i>	7251	Holo.	.....	7.5?	—	5.5	0.68	30+	1.4	2.7	0.39	2.8	1.3	0.43
	14426	Hypo.	.....	8.5?	2.8	5.6	0.64	30+	1.5	2.8	0.28	2.7	1.4	0.36
<i>P. pulla</i>	7252	Holo.	Right wing.....	7.8	2.6	5.0	0.95	15	1.4	2.6	0.38	2.3	1.4	0.42
	7252	Holo.	Left wing.....	7.5?	2.5	4.9	0.94	14	1.4	2.6	0.41	2.3	1.2	0.44
	7253	Hypo.	Left wing (Holo. <i>P. brevipes</i>).....	7.3?	—	5.3	0.86	17?	1.4	2.8	0.43	2.6	1.2	0.54
	7253	Hypo.	Right wing.....	7.9?	—	—	0.76	12	1.4	2.8	0.47	—	—	—
<i>P. nana</i>	7261	Holo.	Left wing.....	7.5	—	5.1	0.90	11	1.6	2.9	0.50	2.3	1.5	0.53
	7261	Holo.	Right wing.....	7.7?	2.8	5.0	0.85	11.5	1.6	2.9	0.50	2.1	1.4	0.52
<i>P. curta</i>	7270	Holo.	.....	8.1	2.9	5.1	0.93	13	1.1	2.3	0.49	2.4	1.3	0.61
	14427	Hypo.	Right wing.....	8.2?	—	5.0	0.93	14	1.5	2.7	0.49	2.4	1.3	0.56

Table III—(Con.)
Measurements of Wing Elements—(Con.)

Name	GSC No.	Type	Remarks	WL	WW	RL	AxC	RC	R ₃₊₄	R ₆	SC	RF	RAX	MC
<i>P. curta</i> (Cont.)	14427	Hypo.	Left wing	—	3.2?	5.0	0.97	—	1.3	2.7	0.47	2.3	1.2	0.57
	14428	Hypo.	Right wing	7.2	—	4.7	0.84	12.5	1.1	2.3	0.44	2.4	1.2	0.50
	14429	Hypo.	Left wing	7.9	2.8?	5.0	0.84	11.5	1.2?	2.6	0.46	2.5	1.3	0.39
	14430	Hypo.	Right wing	8.4	3.1?	5.2	0.87	13	1.3	2.6	0.41	2.6	1.4	0.51
	14431	Hypo.	Left wing	7.6?	—	5.5	0.94	16?	1.8?	2.9	0.58	2.9	1.7	0.65
	7264	Hypo.	(Cotype, <i>P. avunculus</i>)	8.1	—	5.6	1.01	12.5	1.8	3.3	0.62	2.3	1.3	0.59
<i>P. cairnesi</i>	14432	Holo.	Left wing	8.2	3.2	5.2	0.95	11.5	1.9	3.0	0.49	2.3	1.6	0.57
	14432	Holo.	Right wing	—	3.2	5.1	0.96	—	1.5?	3.0	0.55	2.1?	1.5?	0.57
	14433	Para.	Left wing	8.0	3.6	5.3	1.05	12.5	1.8	3.3	0.55	2.1	1.1	0.58
	14434	Para.	Right wing	7.7	—	5.2	1.04	10	1.3	3.0	0.50	2.4	1.4	0.59
<i>P. tulameenensis</i>	14435	Holo.	Detached wing	7.7	2.6	5.6	0.81	22	1.9	2.9	0.44	2.5	1.4	0.32
	14435	Holo.	Attached wing	8.1?	—	5.4	0.78	—	1.5	2.9	0.34	2.5	1.4	0.43
	14436	Para.	Left wing	9.5	3.0	6.1	0.88	20	1.6	2.9	0.45	3.1	1.7	0.54
	14437	Para.	Right wing	8.7?	—	5.6	0.83	18?	1.9	3.1	0.50	2.6	1.7	0.51
<i>P. tulameenensis</i> ?	14438	Hypo.	Left wing	8.8?	—	5.3?	0.85	27	1.4	2.5?	0.41	2.7	1.7	0.52
<i>P. reducta</i>	7258	Holo.	Detached wing	8.6	3.1	5.5	0.90	15	1.4	2.9	0.45	2.7	1.4	0.58
	7258	Holo.	Attached wing	9.3	4.5?	6.1	0.83	11.5	1.5	3.1	0.58	3.1	1.5	0.51?
	14439	Hypo.	Left wing	8.4	2.8	5.5	0.97	18	1.5	2.8	0.56	2.8	1.5	0.59
	14440	Hypo.	Right wing	8.2?	—	5.5	1.02	14?	—	—	—	—	1.4	0.60
	14441	Hypo.	Left wing	7.7?	—	5.3	0.94	16	1.1	2.5	0.52	2.8	1.3	0.53
	14442	Hypo.	Right wing	8.5?	3.1	5.4	0.89	16	1.5	3.0	0.54	2.5	1.3	0.57
	14442	Hypo.	Left wing	7.9?	3.3	5.3	0.97	16	1.3	2.7	0.52	2.5	1.5	0.63
	14443	Hypo.	Right wing	8.3?	3.2	5.4	0.93	15	1.4	2.8	0.45	2.7	1.5	0.60
	14444	Hypo.	Left wing	—	3.3	5.5	0.94	14?	1.5	3.0	0.52	2.6	1.4	0.55
	14445	Hypo.	Right wing	8.1	—	5.8	0.95	11.5	1.6	3.0	0.52	2.8	1.5	0.54
	14446	Hypo.	Left wing	—	—	5.7	1.00	15	1.8	3.2	0.50	2.5	1.4	0.60
	14447	Hypo.	Right wing	8.5	—	5.6	0.95	13	1.6	2.9	0.50	2.9	1.6	0.62
14448	Hypo.	Left wing	—	—	5.7	—	—	—	1.5	2.9	0.56	—	—	—

<i>P. similikameena</i>	6172	Lecto.	Attached wing.....	9.5	3.8	6.5	1.02	27	1.5	2.9	1.07	3.6	1.9	0.58	
	14449	Hypo.		10.5?	—	6.4	1.30?	28	1.9?	3.5	0.49?	3.0	1.7	0.59	
	14450	Hypo.		10.6?	—	6.9	1.26	29	1.7	3.5	0.68	3.5	1.9	0.58	
	14451	Hypo.		—	—	6.6?	1.11	25	1.8	—	—	3.3	2.0	0.63	
<i>P. canadensis</i>	7269	Holo.	Right wing.....	10.4	4.4	6.6	1.27	20	2.0	3.5	0.56	3.1	1.9	0.70	
	7269	Holo.	Left wing.....	10.2	—	6.4	1.25	19	2.1	3.4	0.54	3.1	2.0	0.69	
	14452	Hypo.		—	3.3?	5.8	1.25	13?	2.1	3.2	0.63	2.5	1.4	0.66	
	14453	Hypo.		9.9	—	6.6	1.19	16	2.1	3.3	0.61	3.2	1.8	0.65	
	14454	Hypo.		10.1	4.0?	6.8	1.23	17	1.9	3.5	0.59	3.3	2.0	0.78	
	14456	Hypo.		9.3	—	6.6	1.22	15	2.1	3.2	0.60	2.9	1.8	0.65	
	14457	Hypo.	Right wing.....	—	4.1?	6.4?	1.22	—	—	—	—	2.7	1.5	0.68	
	14457	Hypo.	Left wing.....	—	3.9?	6.3?	1.26	14?	—	—	—	2.6	1.7	0.69	
	14455	Hypo.		8.2?	—	6.1	1.08	12	1.9	3.3	0.53	2.8	1.7	0.65	
	6172	Hypo.	Detached wing.....	9.7	—	6.4	1.30	10.5	2.1	3.4	0.56	3.0	1.8	0.79	
<i>P. avus</i>	7265	Holo.		10.1	3.3?	7.1	1.02	17	2.1	3.9	0.54	3.2	2.1	0.61	
	14458	Hypo.		9.4?	3.5	6.4	1.14	17	1.9	3.5	0.59	2.9	1.8	0.69	
	14459	Hypo.		9.4?	—	6.7	1.18	15	2.1	3.8	0.59	2.9	1.9	0.70	
	14460	Hypo.		9.1?	—	6.1	1.14	18	2.3	3.3	0.55	2.8	1.7	0.65	
	14461	Hypo.		—	—	6.1	0.90	20?	2.3	3.4	0.51	2.7	1.8	0.50	
	14462	Hypo.		8.9	—	6.3	1.05	15	2.1	3.6	0.60	2.7	1.9	0.62	
	14463	Hypo.		—	—	6.4	0.98	22	2.2	3.7	0.59	2.7	1.5	0.59	
	14464	Hypo.		8.6	3.7	6.1	1.06	14	1.9	3.4	0.63	2.7	1.8	0.62	
	<i>P. transitoria</i>	7268	Holo.	Left wing.....	10.5	4.0	6.6	1.12	15	1.9	3.5	0.60	3.1	1.8	0.61
		7268	Holo.	Right wing.....	10.8	4.0	6.8	1.10	17	1.7	3.5	0.59	3.3	1.8	0.63
7259		Hypo.	(Holo. <i>P. falcata</i>).....	10.9	4.1	7.1	1.22	18	1.8	3.5	0.60	3.6	2.0	0.69	
7260		Hypo.	(Holo. <i>P. fragmentum</i>).....	—	3.6	6.7?	1.06+	20?	—	—	—	3.4	1.7	0.60	
14465		Hypo.		10.1	3.6	6.2	1.11	19	1.9	3.2	0.58	3.1	1.7	0.62	
14466		Hypo.	Right wing.....	—	3.6	6.4	1.06	15	1.9	3.2	0.57	3.2	1.6	0.62	
14466		Hypo.	Left wing.....	9.7	3.2?	6.2	1.12	14	1.6	3.1	0.58	3.1	1.7	0.68	
14467		Hypo.		—	—	6.3	1.06	—	1.8	3.4	0.65	3.1	1.4?	0.79	
14468		Hypo.	Top wing.....	9.6?	—	6.8?	1.00	20?	1.7	3.5	0.56	3.3	1.8?	0.79	
14468		Hypo.	Bottom wing.....	10.6?	—	7.2	—	—	1.6	3.7	0.57	3.4	1.8	0.80	
14469		Hypo.	Detached.....	10.3	—	6.8	1.00	19	1.8	3.6	0.60	3.3	1.8	0.56	
14470		Hypo.		10.5	3.1?	6.6	1.09	23	1.7	3.4	0.60	3.2	1.7	0.67	
14471		Hypo.		8.8?	—	6.5	1.01	19	1.8	3.3	0.50	3.2	1.9	0.61	
<i>P. pictipennis</i>	7256	Lecto.	Right wing.....	11.0?	—	7.4	1.10	23	1.8	3.7	0.54	3.7	2.4	0.69	
	7256	Lecto.	Left wing.....	—	—	7.4	1.10	21?	1.9	3.6	0.53	3.6	2.3	0.66	
	7254	Para.		11.2?	3.6	7.5	1.11	16?	2.3	4.0	0.63	3.6	2.3	0.69	
	7262	Hypo.	(Holo. <i>P. separanda</i>).....	11.7?	4.1	8.0	1.29?	23	2.2	3.8	0.64	4.2	2.6	0.76	

Table III—(Conc.)

Measurements of Wing Elements—(Conc.)

Name	GSC No.	Type	Remarks	WL	WW	RL	AxC	RC	R ₃₊₄	R ₅	SC	RF	RAx	MC	
<i>P. pictipennis</i>	14472	Hypo.	Right wing.....	—	—	7.1	1.15	18	1.7	3.3	0.50	3.9	2.0	0.68	
	14472	Hypo.	Left wing.....	10.8?	—	7.1	1.05	20	1.8	3.4	0.52	3.8	2.1	0.64	
	14473	Hypo.	Right wing.....	11.4	4.1	7.4	1.22	19	1.9	3.2	0.54	3.9	2.3	0.75	
	14473	Hypo.	Left wing.....	10.9	4.1	7.2	1.17	20	2.0	3.3	0.58	3.4	2.2	0.62	
	14474	Hypo.	Right wing.....	11.3	—	7.3?	1.23	19	2.1	3.8	0.61	3.4	2.2	0.74	
	14474	Hypo.	Left wing.....	11.7	—	7.6	1.12	17	2.1	3.9	0.61	3.8	2.6	0.71	
	14475	Hypo.	.....	10.8	—	7.1	1.11	21	1.8?	3.4	0.58?	3.6	2.3	0.61
	14476	Hypo.	.....	11.9?	—	7.4	1.21	20	2.4	3.9	0.64	3.6	2.4	0.74
	14477	Hypo.	Right wing.....	11.0?	—	7.4	1.05	23	2.6	3.4?	0.64	4.0	2.7	0.69	
	14477	Hypo.	Left wing.....	11.2	—	8.0?	0.97	—	1.8	3.3?	0.59	3.4	2.2	0.60	
	7266	Hypo.	(Holo. <i>P. ovalis</i>).....	10.9?	3.9	7.2	1.17	17	1.9	3.7?	0.67	3.7	1.9	0.66	
	14478	Hypo.	(Holo. <i>P. lambel</i>).....	12??	4.0	7.5	1.27	15	1.9	3.9	0.67	3.7	2.1	0.75	
	14479	Hypo.	11.5?	—	7.4	1.22	17?	—	4.0	—	—	3.3	1.8	0.64
	14480	Hypo.	.....	11.8?	4.3	7.1	—	19	2.6	4.0	0.60	3.8	2.2	0.74
14481	Hypo.	.....	10.8	4.2	7.8	1.22	20	2.2	3.8	0.58	3.4	2.2	0.65	
14481	Hypo.	Right wing.....	11.7	—	7.4	1.37	20	2.1	4.1	0.66	3.3	2.1	0.79		
14481	Hypo.	Left wing.....	12.1	3.5?	7.6	1.08	21	2.1	4.1	0.54	3.5	2.1	0.72		
<i>P. dilatata</i>	7271	Holo.	.....	10.4	5.1	7.1	1.40	11.5	2.3	3.7	0.77	3.2	1.8	0.79
	14482	Hypo.	.....	10.1?	—	6.9	1.36	15	2.1	3.7	0.61	3.2	2.2	0.77
<i>P. platyptera</i>	7272	Holo.	Left wing.....	12.0	5.3	7.7	1.57	14	2.1	3.9	0.79	3.8	2.6	0.87	
	7272	Holo.	Right wing.....	—	5.2	8.1	1.45	—	2.4	4.1	0.72	4.1	2.8	0.84	
<i>P. pulchra</i>	7263	Holo.	Left wing.....	12.4	4.4	8.5	1.22	21	1.9	3.9	0.61	4.6	2.5	0.68	
	7263	Holo.	Right wing.....	12.6	4.3	8.3	1.15	—	1.9	3.8	0.55?	4.5?	2.5	0.77	
	14483	Hypo.	.....	—	4.5	8.3	1.23	21	1.8	4.1	0.62	4.2	2.2	0.67
<i>P. elatior</i>	7257	Holo.	.....	12.0?	—	8.2?	1.31	—	2.1	4.3	0.74	3.9?	2.3?	0.70?

FIGURES 3 TO 8

FIGURE 3

(All enlarged x 5)

- No. 1. *Penthetria whipsawensis* n. sp. Holotype, GSC No. 14416. Locality 7d. (Page 7.)
- No. 2. *Penthetria* (?) *fryi* n. sp. Holotype, GSC No. 14417. Locality 1b. (Page 7.)
- No. 3. *Penthetria* (?) *fryi* n. sp. Paratype, GSC No. 14418. Locality 7m. (Page 7.)
- No. 4. *Penthetria* (?) *fryi* n. sp. Paratype, GSC No. 14419. Locality 7g. (Page 7.)
- No. 5. *Penthetria* (?) *fryi* n. sp. Paratype, GSC No. 14420. Locality 1c. (Page 7.)
- No. 6. *Penthetria* (?) *fryi* n. sp. Paratype, GSC No. 14421. Locality 1b. (Page 7.)
- No. 7. *Plecia minutula* n. sp. Holotype, GSC No. 14422. Locality 7g. Holotype and reverse combined. (Page 8.)
- No. 8. *Plecia kelownaensis* n. sp. Holotype, GSC No. 14423. Locality 6. (Page 8.)
- No. 9. *Plecia kelownaensis* n. sp. Paratype, GSC No. 14424. Locality 1b. (Page 8.)
- No. 10. *Plecia intermedia* ? (Scudder). Hypotype, GSC No. 14425. Locality 1c. (Page 9.)
- No. 11. *Plecia angustipennis* (Handlirsch). Holotype, GSC No. 7251. Locality 2. (Page 9.)
- No. 12. *Plecia angustipennis* (Handlirsch). Hypotype, GSC No. 14426. Locality 5b. (Page 9.)
- No. 13. *Plecia pulla* (Handlirsch). Holotype, GSC No. 7252. Locality 7b. (Page 10.)
- No. 14. *Plecia pulla* (Handlirsch). Hypotype, GSC No. 7253. Locality 7b. Holotype of *Penthetria brevipes* Handlirsch. (Page 10.)
- No. 15a, b. *Plecia nana* (Handlirsch). Holotype, GSC No. 7261. Locality 7b. (Page 10.)
- No. 16. *Plecia tulameenensis* ? n. sp. Hypotype, GSC No. 14438. Locality 7m. (Page 11.)
- No. 17. *Plecia cairnesi* n. sp. Holotype, GSC No. 14432. Locality 1a. (Page 11.)
- No. 18. *Plecia cairnesi* n. sp. Paratype, GSC No. 14433. Locality 1a. (Page 11.)
- No. 19. *Plecia cairnesi* n. sp. Paratype, GSC No. 14434. Locality 4. (Page 11.)
- No. 20. *Plecia tulameenensis* n. sp. Holotype, GSC No. 14435. Locality 7g. (Page 11.)
- No. 21. *Plecia tulameenensis* n. sp. Paratype, GSC No. 14436. Locality 7g. (Page 11.)

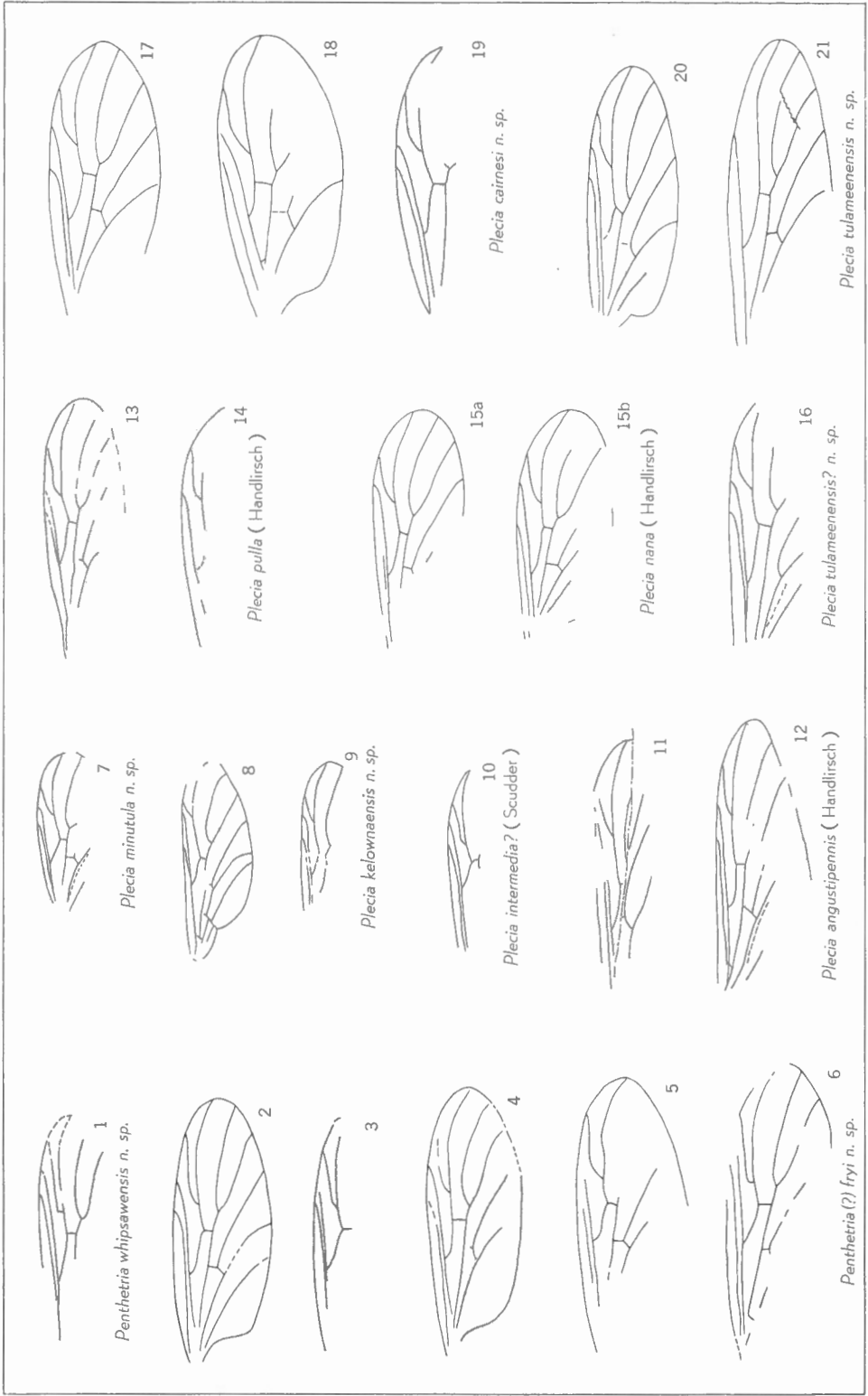


Figure 3

FIGURE 4

(All enlarged x 5)

- No. 1. *Plecia curtula* (Handlirsch). Holotype, GSC No. 7270. Locality 2. (Page 10.)
- No. 2. *Plecia curtula* (Handlirsch). Hypotype, GSC No. 14427. Locality 7h. (Page 10.)
- No. 3. *Plecia curtula* (Handlirsch). Hypotype, GSC No. 14428. Locality 7g. (Page 10.)
- No. 4. *Plecia curtula* (Handlirsch). Hypotype, GSC No. 14429. Locality 7c. (Page 10.)
- No. 5. *Plecia curtula* (Handlirsch). Hypotype, GSC No. 14430. Locality 1c. (Page 10.)
- No. 6. *Plecia curtula* (Handlirsch). Hypotype, GSC No. 14431. Locality 7k. (Page 10.)
- No. 7. *Plecia curtula* (Handlirsch). Hypotype, GSC No. 7264. Locality 7b. Cotype of *Penthetria avunculus* Handlirsch. (Page 10.)
- No. 8. *Plecia reducta* (Handlirsch). Holotype, GSC No. 7258. Locality 2. (Page 12.)
- No. 9. *Plecia reducta* (Handlirsch). Hypotype, GSC No. 14439. Locality 7g. (Page 12.)
- No. 10. *Plecia reducta* (Handlirsch). Hypotype, GSC No. 14440. Locality 7g. (Page 12.)
- No. 11. *Plecia reducta* (Handlirsch). Hypotype, GSC No. 14441. Locality 1c. (Page 12.)
- No. 12. *Plecia reducta* (Handlirsch). Hypotype, GSC No. 14442. Locality 7l. (Page 12.)
- No. 13. *Plecia reducta* (Handlirsch). Hypotype, GSC No. 14443. Locality 1c. (Page 12.)
- No. 14. *Plecia reducta* (Handlirsch). Hypotype, GSC No. 14444. Locality 1a. (Page 12.)
- No. 15. *Plecia reducta* (Handlirsch). Hypotype, GSC No. 14445. Locality 1a. (Page 12.)
- No. 16. *Plecia reducta* (Handlirsch). Hypotype, GSC No. 14446. Locality 7b. (Page 12.)
- No. 17. *Plecia reducta* (Handlirsch). Hypotype, GSC No. 14447. Locality 7m. (Page 12.)
- No. 18. *Plecia reducta* (Handlirsch). Hypotype, GSC No. 14448. Locality 1c. (Page 12.)
- No. 19. *Plecia tulameenensis* n. sp. Paratype, GSC No. 14437. Locality 3. (Page 11.)

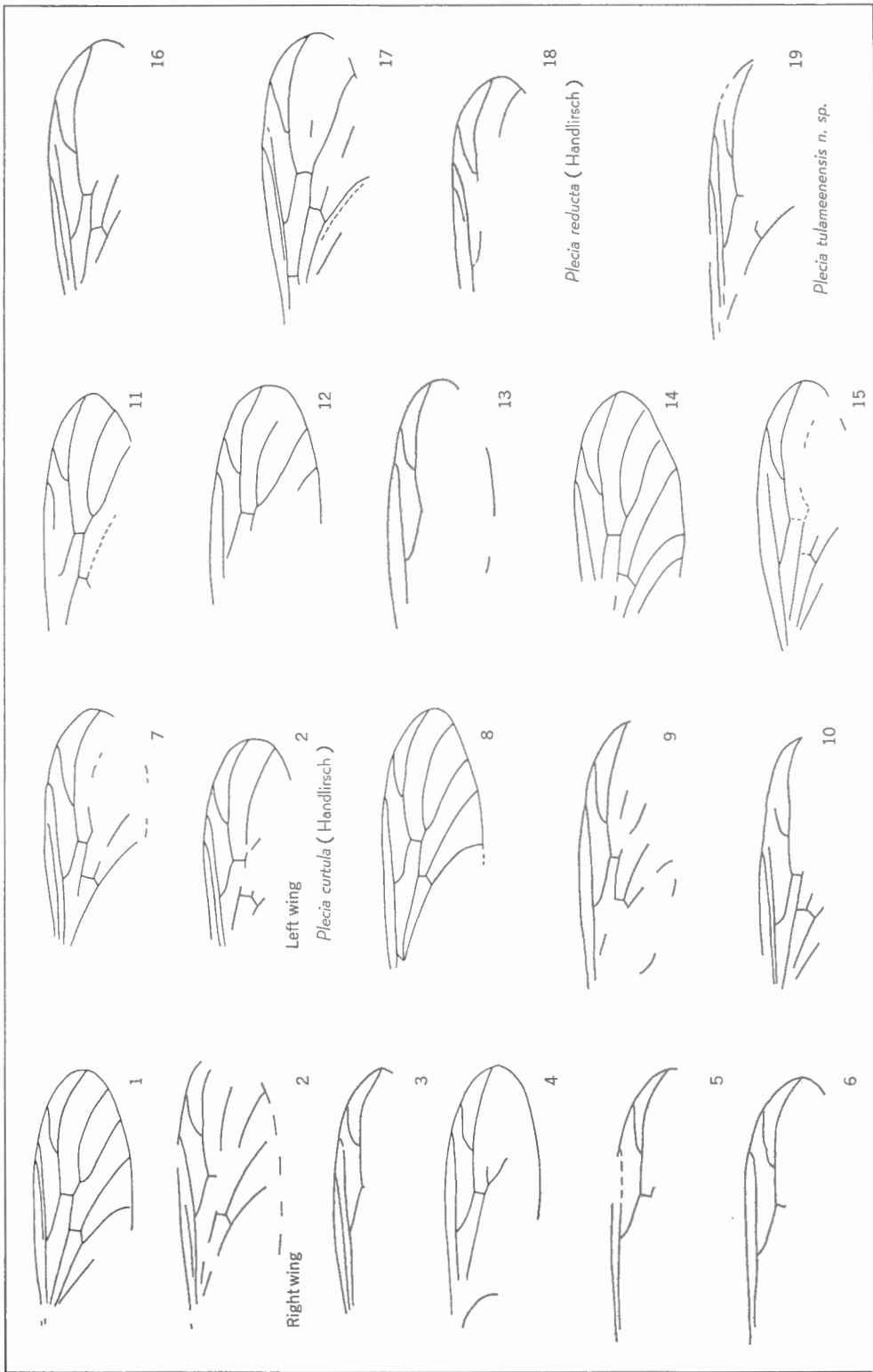


Figure 4

FIGURE 5

(All enlarged x 5)

- No. 1. *Plecia similkameena* (Scudder). Lectotype, GSC No. 6172 (attached wing). Locality 7a. (Page 12.)
- No. 2. *Plecia similkameena* (Scudder). Hypotype, GSC No. 14449. Locality 3. (Page 12.)
- No. 3. *Plecia similkameena* (Scudder). Hypotype, GSC No. 14450. Locality 7g. (Page 12.)
- No. 4. *Plecia similkameena* (Scudder). Hypotype, GSC No. 14451. Locality 3. (Page 12.)
- No. 5. *Plecia canadensis* (Handlirsch). Holotype, GSC No. 7269. Locality 7b. (Page 13.)
- No. 6. *Plecia canadensis* (Handlirsch). Hypotype, GSC No. 14452. Locality 7g. (Page 13.)
- No. 7. *Plecia canadensis* (Handlirsch). Hypotype, GSC No. 14453. Locality 5b?. (Page 13.)
- No. 8. *Plecia canadensis* (Handlirsch). Hypotype, GSC No. 14454. Locality unknown. (Page 13.)
- No. 9. *Plecia canadensis* (Handlirsch). Hypotype, GSC No. 14455. Locality 3. (Page 13.)
- No. 10. *Plecia canadensis* (Handlirsch). Hypotype, GSC No. 14456. Locality 1c. (Page 13.)
- No. 11. *Plecia canadensis* (Handlirsch). Hypotype, GSC No. 14457. Locality 7g. (Page 13.)
- No. 12. *Plecia canadensis* (Handlirsch). Hypotype, GSC No. 6172 (detached wing). Locality 7a. (Page 13.)
- No. 13. *Plecia avus* (Handlirsch). Holotype, GSC No. 7265. Locality 7b. (Page 14.)
- No. 14. *Plecia avus* (Handlirsch). Hypotype, GSC No. 14458. Locality 1b. (Page 14.)
- No. 15. *Plecia avus* (Handlirsch). Hypotype, GSC No. 14459. Locality 3. (Page 14.)
- No. 16. *Plecia avus* (Handlirsch). Hypotype, GSC No. 14460. Locality 7i. (Page 14.)
- No. 17. *Plecia avus* (Handlirsch). Hypotype, GSC No. 14461. Locality 7m. (Page 14.)

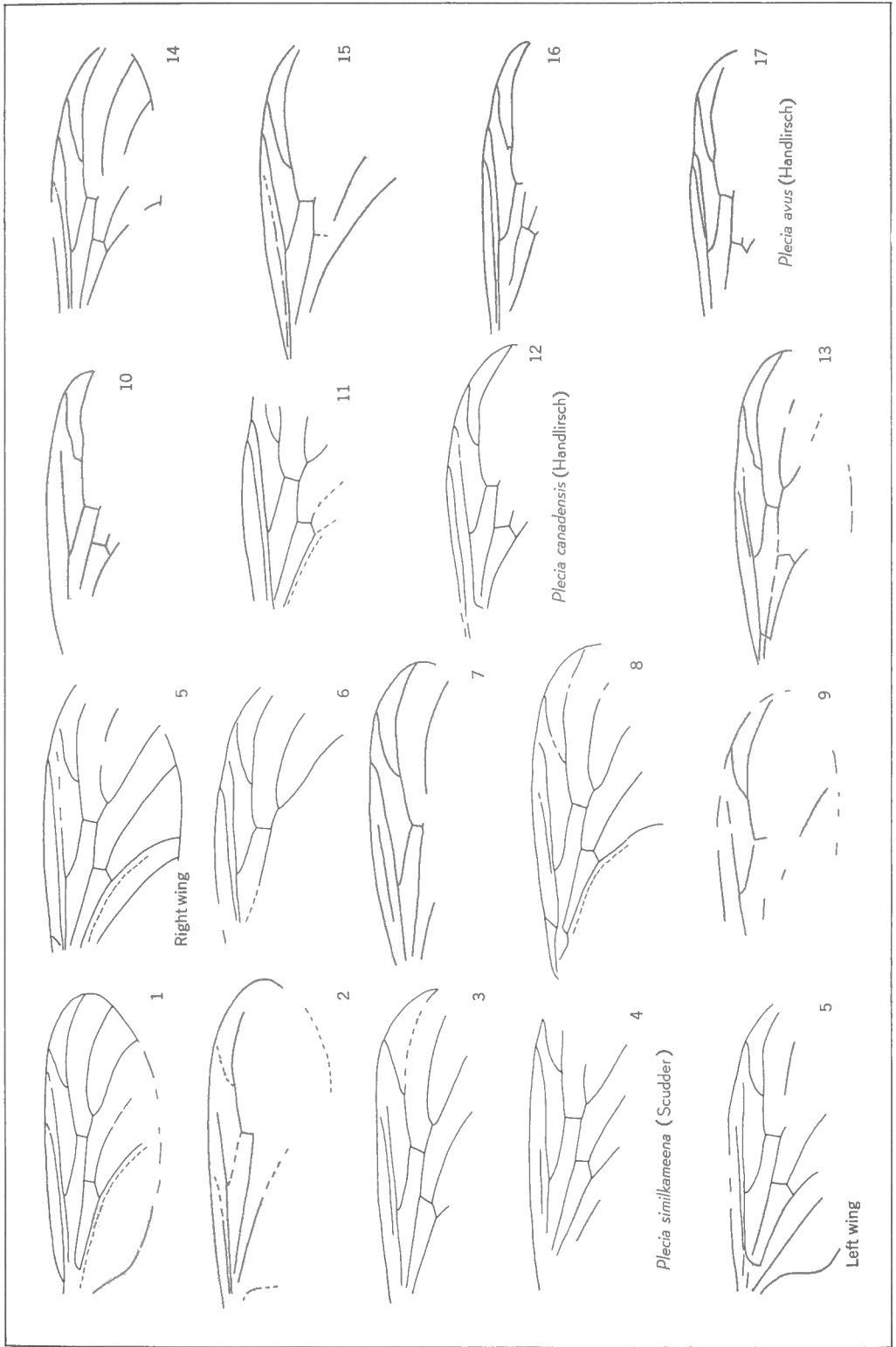


Figure 5

FIGURE 6

(All enlarged x 5)

- No. 1. *Plecia avus* (Handlirsch). Hypotype, GSC No. 14462. Locality 1c. (Page 14.)
- No. 2. *Plecia avus* (Handlirsch). Hypotype, GSC No. 14463. Locality 1a. (Page 14.)
- No. 3. *Plecia avus* (Handlirsch). Hypotype, GSC No. 14464. Locality 1c. (Page 14.)
- No. 4a, b. *Plecia transitoria* (Handlirsch). Holotype, GSC No. 7268. Locality 7b. (Page 14.)
- No. 5. *Plecia transitoria* (Handlirsch). Hypotype, GSC No. 7259. Locality 7b. Holotype of *Penthetria falcatula* Handlirsch. (Page 14.)
- No. 6. *Plecia transitoria* (Handlirsch). Hypotype, GSC No. 7260. Locality 2. Holotype of *Penthetria fragmentum* Handlirsch. (Page 14.)
- No. 7. *Plecia transitoria* (Handlirsch). Hypotype, GSC No. 14465. Locality 1b. (Page 14.)
- No. 8a, b. *Plecia transitoria* (Handlirsch). Hypotype, GSC No. 14466. Locality 7g. (Page 14.)
- No. 9. *Plecia transitoria* (Handlirsch). Hypotype, GSC No. 14467. Locality 7a. (Page 14.)
- No. 10. *Plecia transitoria* (Handlirsch). Hypotype, GSC No. 14468 (top wing). Locality 7b. (Page 14.)
- No. 11. *Plecia transitoria* (Handlirsch). Hypotype, GSC No. 14468 (bottom wing). Locality 7b. May not belong to same individual as No. 10. (Page 14.)
- No. 12. *Plecia transitoria* (Handlirsch). Hypotype, GSC No. 14469 (detached wing). Locality 7j. (Page 14.)
- No. 13. *Plecia transitoria* (Handlirsch). Hypotype, GSC No. 14470. Locality 2. (Page 14.)
- No. 14. *Plecia transitoria* (Handlirsch). Hypotype, GSC No. 14471. Locality 3. (Page 14.)

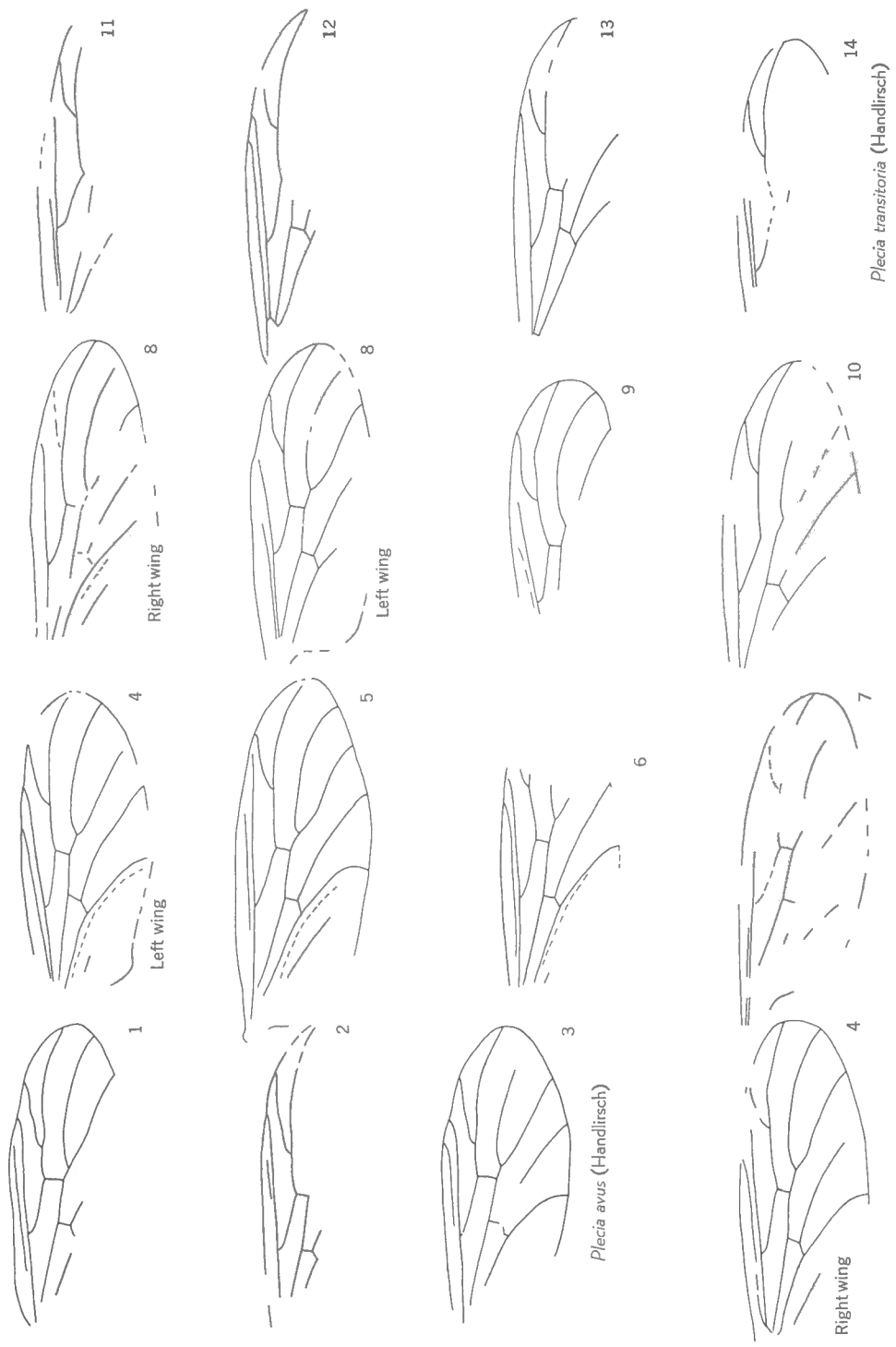
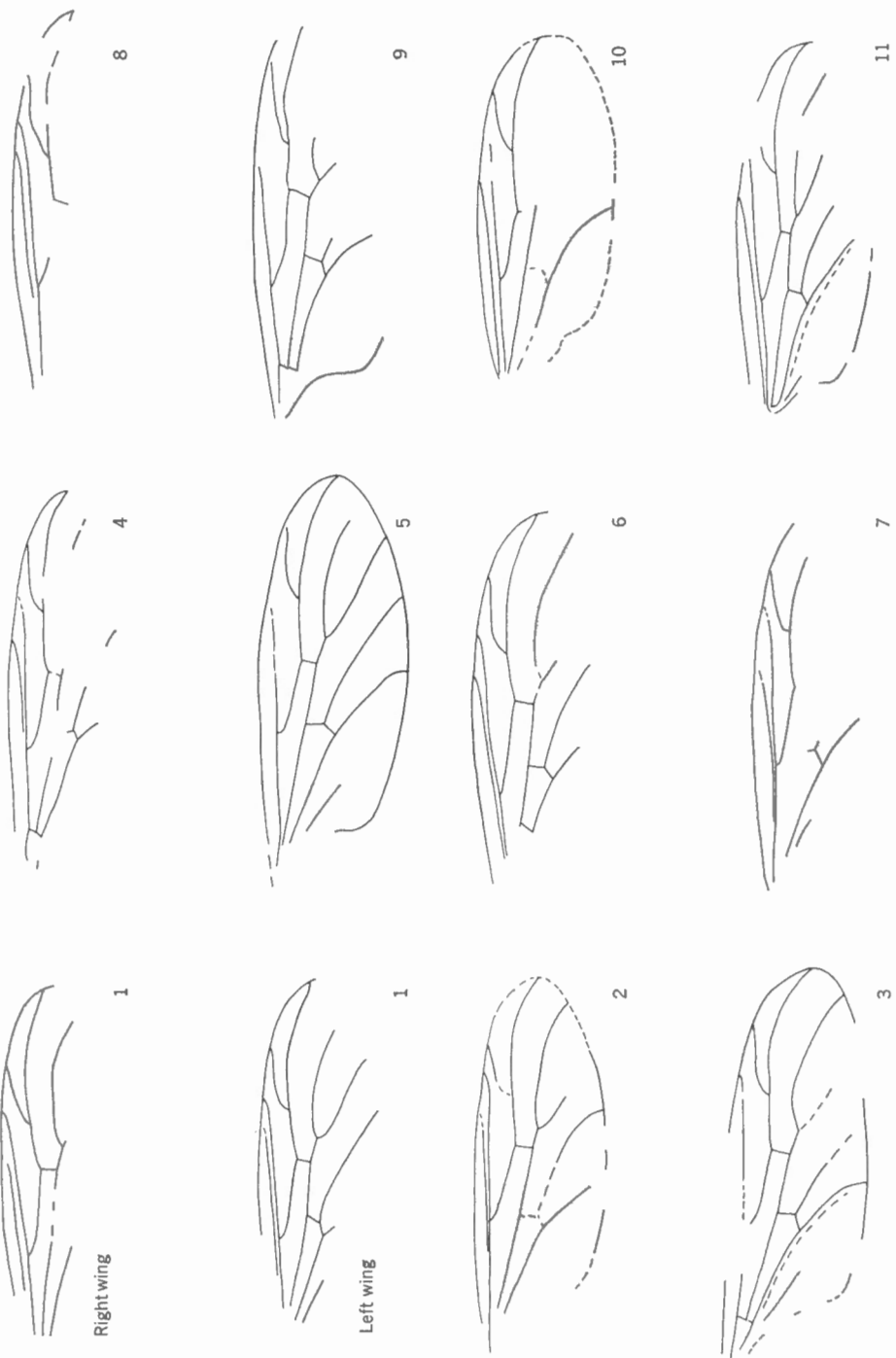


Figure 6

FIGURE 7

(All enlarged x 5)

- | | | | | |
|------------|---|--------------------------|--------------|--|
| No. 1a, b. | <i>Plecia pictipennis</i> (Handlirsch). | Lectotype, GSC No. 7256. | Locality 5a. | (Page 15.) |
| No. 2. | <i>Plecia pictipennis</i> (Handlirsch). | Paratype, GSC No. 7254. | Locality 7b. | (Page 15.) |
| No. 3. | <i>Plecia pictipennis</i> (Handlirsch). | Hypotype, GSC No. 7262. | Locality 7b. | Holotype of <i>Penthetria separanda</i> Handlirsch. (Page 15.) |
| No. 4. | <i>Plecia pictipennis</i> (Handlirsch). | Hypotype, GSC No. 14472. | Locality 1b. | (Page 15.) |
| No. 5. | <i>Plecia pictipennis</i> (Handlirsch). | Hypotype, GSC No. 14473. | Locality 1a. | (Page 15.) |
| No. 6. | <i>Plecia pictipennis</i> (Handlirsch). | Hypotype, GSC No. 14474. | Locality 7g. | (Page 15.) |
| No. 7. | <i>Plecia pictipennis</i> (Handlirsch). | Hypotype, GSC No. 14475. | Locality 1a. | (Page 15.) |
| No. 8. | <i>Plecia pictipennis</i> (Handlirsch). | Hypotype, GSC No. 14476. | Locality 7l. | (Page 15.) |
| No. 9. | <i>Plecia pictipennis</i> (Handlirsch). | Hypotype, GSC No. 14477. | Locality 7m. | (Page 15.) |
| No. 10. | <i>Plecia pictipennis</i> (Handlirsch). | Hypotype, GSC No. 7267. | Locality 7b. | Holotype of <i>Penthetria ovalis</i> Handlirsch. (Page 15.) |
| No. 11. | <i>Plecia pictipennis</i> (Handlirsch). | Hypotype, GSC No. 7266. | Locality 7b. | Holotype of <i>Penthetria lambei</i> Handlirsch. (Page 15.) |



Plecia pictipennis (Handlirsch)

Figure 7

FIGURE 8

(All enlarged x 5)

- No. 1. *Plecia pictipennis* (Handlirsch). Hypotype, GSC No. 14478. Locality 7b. (Page 15.)
- No. 2. *Plecia pictipennis* (Handlirsch). Hypotype, GSC No. 14479. Locality 1b. (Page 15.)
- No. 3. *Plecia pictipennis* (Handlirsch). Hypotype, GSC No. 14480. Locality 1a. (Page 15.)
- No. 4a, b. *Plecia pictipennis* (Handlirsch). Hypotype, GSC No. 14481. Locality 1b. (Page 15.)
- No. 5. *Plecia dilatata* (Handlirsch). Holotype, GSC No. 7271. Locality 2. (Page 15.)
- No. 6. *Plecia dilatata* (Handlirsch). Hypotype, GSC No. 14482. Locality 7f. (Page 15.)
- No. 7. *Plecia platyptera* (Handlirsch). Holotype, GSC No. 7272. Locality 2. (Page 16.)
- No. 8. *Plecia pulchra* (Handlirsch). Holotype, GSC No. 7263. Locality 7c. (Page 16.)
- No. 9. *Plecia pulchra* (Handlirsch). Hypotype, GSC No. 14483. Locality 7e. (Page 16.)
- No. 10. *Plecia elatior* (Handlirsch). Holotype, GSC No. 7257. Locality 7b. (Page 17.)
- No. 11. *Plecia elatior* (Handlirsch). Holotype, GSC No. 7257 restored.

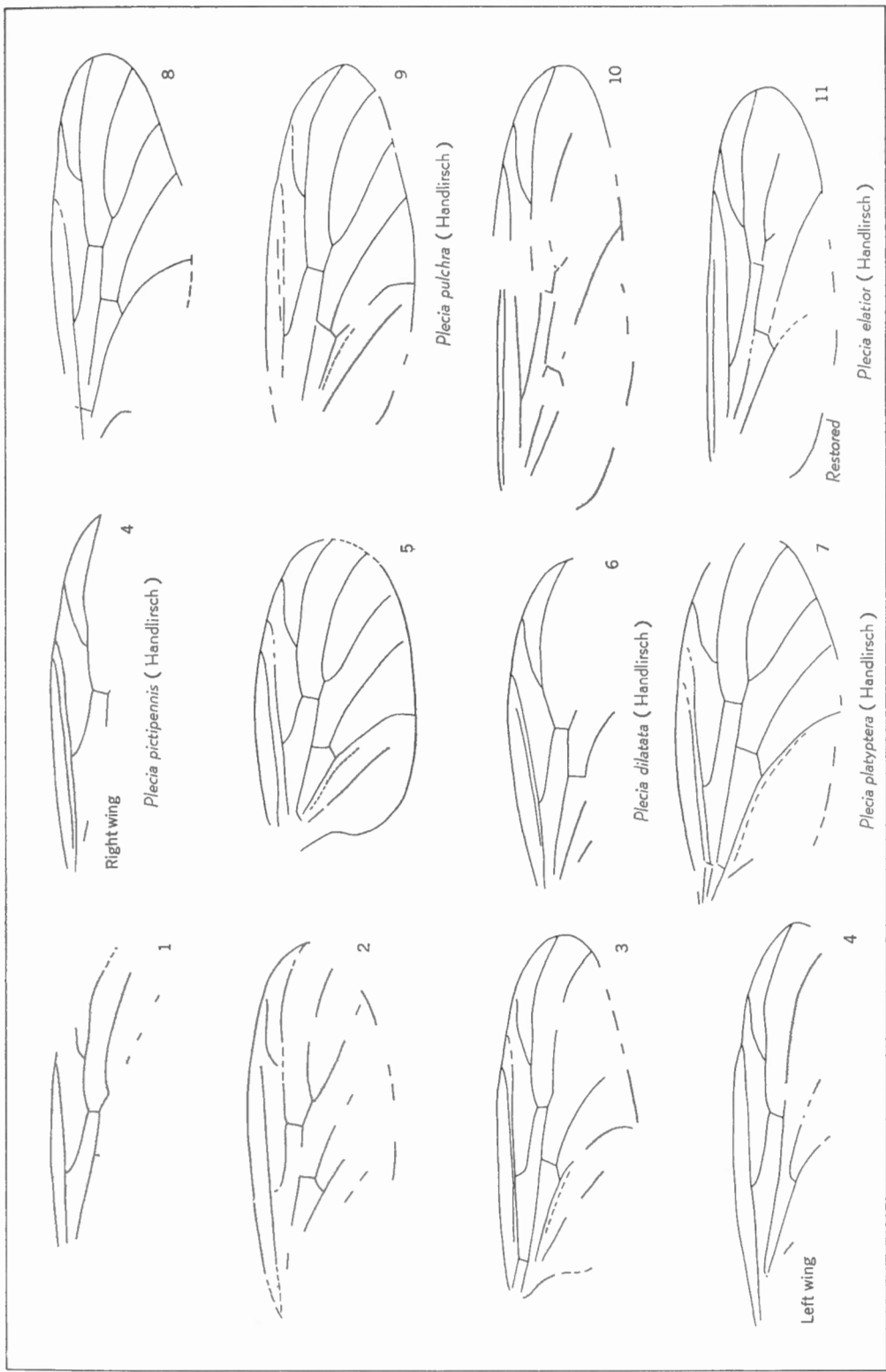


Figure 8

PLATES I TO IV

PLATE I

- Figure 1. *Penthetria whipsawensis* n. sp. Holotype, GSC No. 14416 x 5. Locality 7d. (Page 7.)
- Figure 2. *Penthetria* (?) *fryi* n. sp. Holotype, GSC No. 14417 x 5. Locality 1b. (Page 7.)
- Figure 3a, b. *Plecia minutula* n. sp. Holotype, GSC No. 14422 x 5. Locality 7g. (Page 8.)
- Figure 4. *Plecia kelownaensis* n. sp. Holotype, GSC No. 14423 x 5. Locality 6. (Page 8.)
- Figure 5. *Plecia angustipennis* (Handlirsch). Hypotype, GSC No. 14426 x 5. Locality 5b. (Page 9.)
- Figure 6. *Plecia pulla* (Handlirsch). Holotype, GSC No. 7252 x 5. Locality 7b. (Page 10.)
- Figure 7. *Plecia pulla* (Handlirsch). Hypotype, GSC No. 7253 x 5. Locality 7b. Holotype of *Penthetria brevipes* Handlirsch. (Page 10.)
- Figure 8. *Plecia nana* (Handlirsch). Holotype, GSC No. 7261 x 5. Locality 7b. (Page 10.)
- Figure 9. *Plecia curtula* (Handlirsch). Holotype, GSC No. 7270 x 5. Locality 2. (Page 10.)
- Figure 10. *Plecia curtula* (Handlirsch). Hypotype, GSC No. 14427 x 5. Locality 7h. Page 10.)
- Figure 11. *Plecia curtula* (Handlirsch). Hypotype, GSC No. 7264 x 5. Locality 7b. Cotype of *Penthetria avunculus* Handlirsch. (Page 10.)

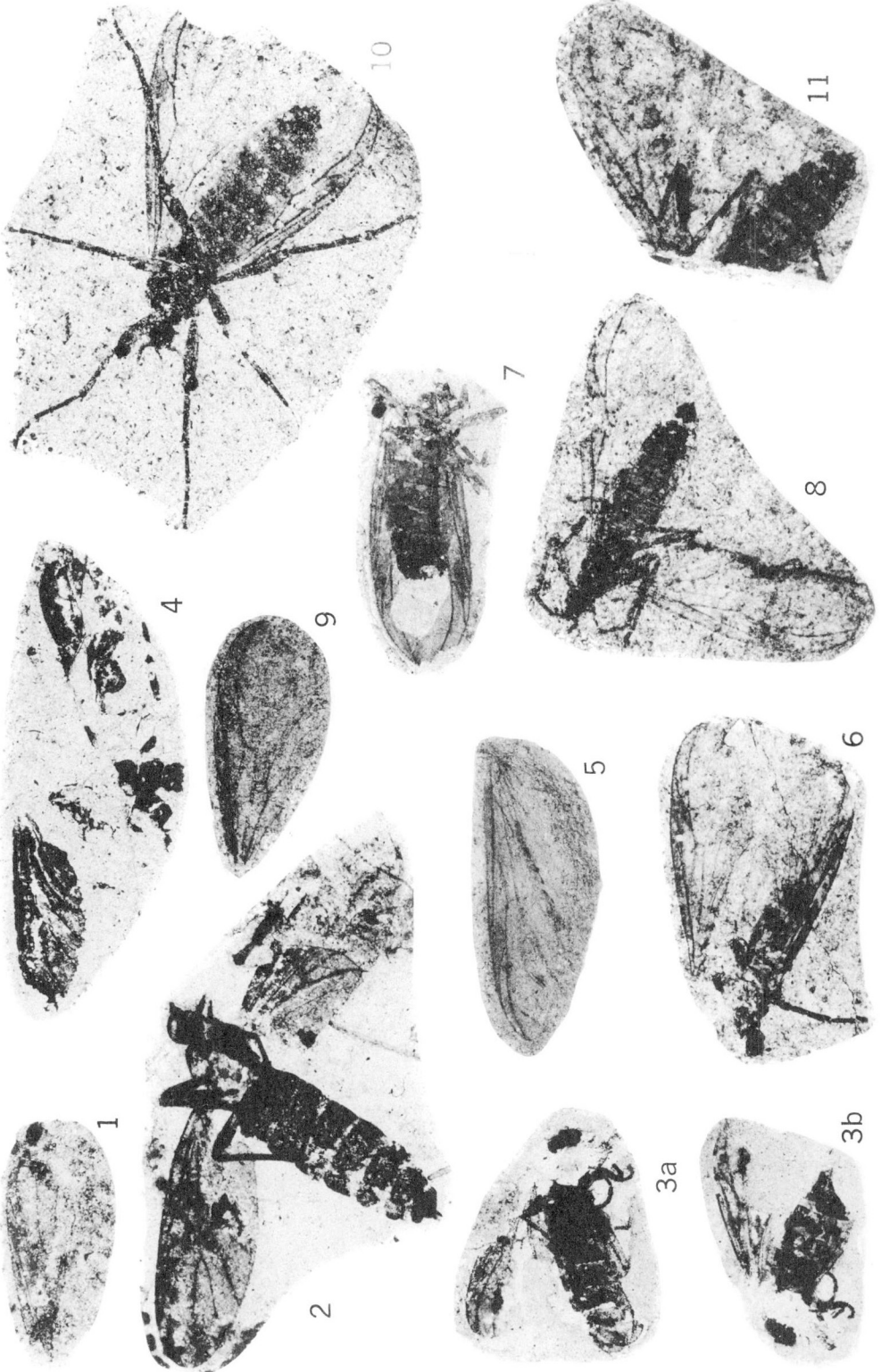


PLATE II

- Figure 1. *Plecia tulameenensis* n. sp. Holotype, GSC No. 14435 x 5. Locality 7g. (Page 11.)
- Figure 2. *Plecia reducta* (Handlirsch). Holotype, GSC No. 7258 x 5. Locality 2. (Page 12.)
- Figure 3. *Plecia cairnesi* n. sp. Paratype, GSC No. 14433 x 5. Locality 1a. (Page 11.)
- Figure 4. *Plecia tulameenensis* n. sp. Paratype, GSC No. 14436 x 5. Locality 7g. (Page 11.)
- Figure 5. *Plecia similkameena* (Scudder). Lectotype, GSC No. 6172 (attached wing) x 5. Locality 7a. (Page 12.)
- Figure 6. *Plecia reducta* (Handlirsch). Hypotype, GSC No. 14444 x 5. Locality 1a. (Page 12.)
- Figure 7. *Plecia cairnesi* n. sp. Holotype, GSC No. 14432 x 5. Locality 1a. (Page 11.)
- Figure 8. *Plecia canadensis* (Handlirsch). Hypotype, GSC No. 14454 x 5. Locality unknown. (Page 13.)
- Figure 9. *Plecia similkameena* (Scudder). Hypotype, GSC No. 14449 x 5. Locality 3. (Page 12.)
- Figure 10. *Plecia canadensis* (Handlirsch). Holotype, GSC No. 7269 x 5. Locality 7b. (Page 13.)

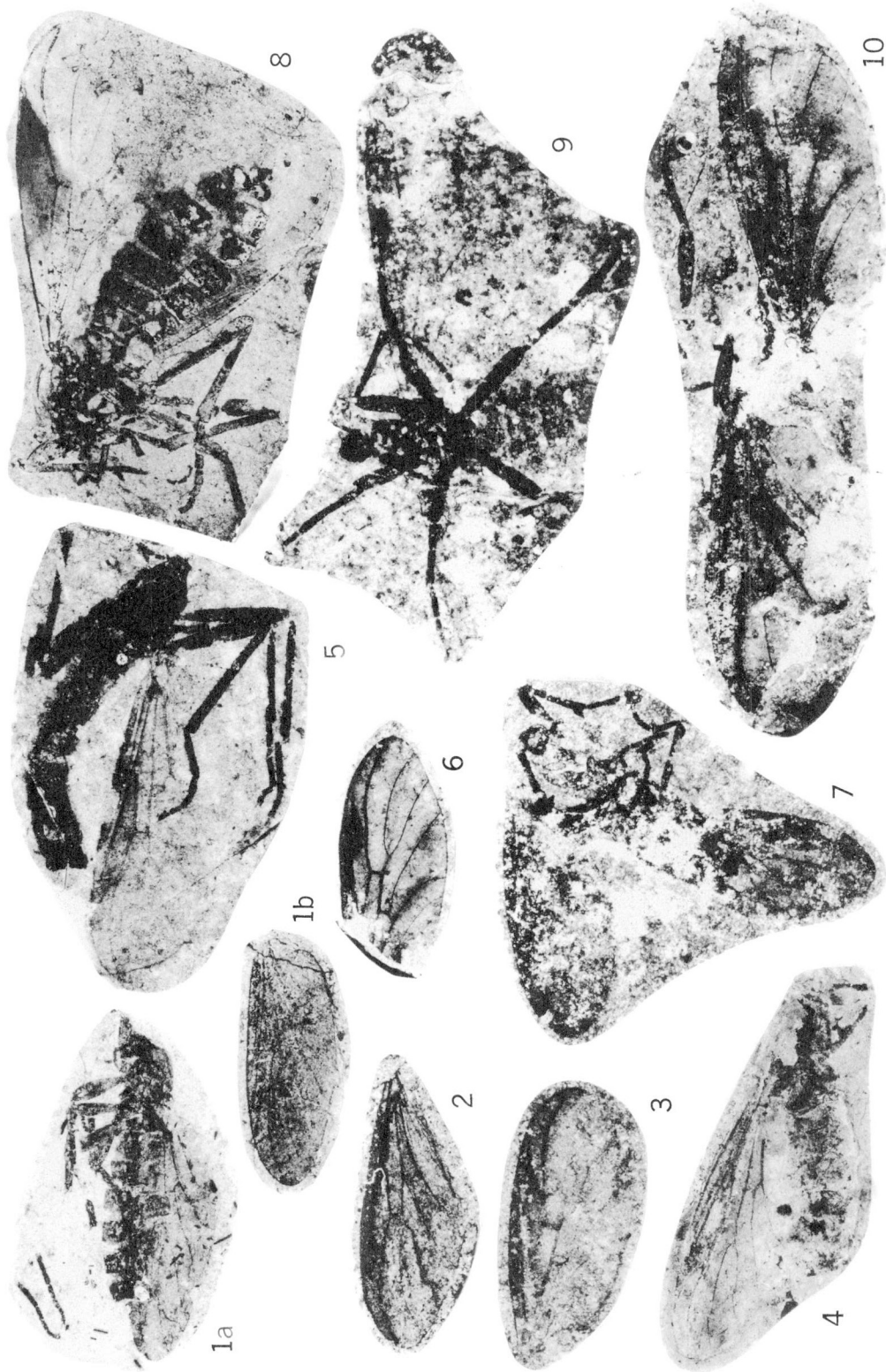
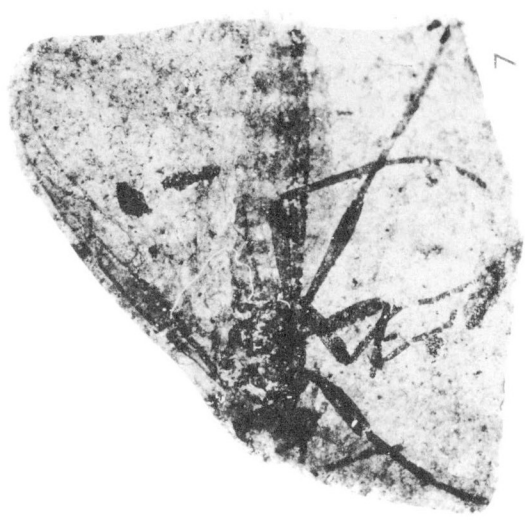


PLATE III

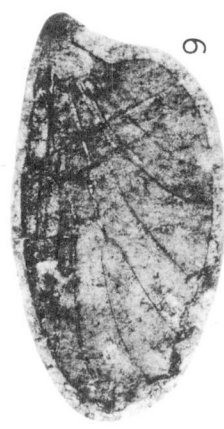
- Figure 1. *Plecia transitoria* (Handlirsch). Hypotype, GSC No. 7259 x 5. Locality 7b. Holotype of *Penthetria falcata* Handlirsch. (Page 14.)
- Figure 2. *Plecia pictipennis* (Handlirsch). Lectotype, GSC No. 7256 x 5. Locality 5a. (Page 15.)
- Figure 3. *Plecia transitoria* (Handlirsch). Holotype, GSC No. 7268 x 5. Locality 7b. (Page 14.)
- Figure 4. *Plecia transitoria* (Handlirsch). Hypotype, GSC No. 14466 x 5. Locality 7g. (Page 14.)
- Figure 5. *Plecia pictipennis* (Handlirsch). Hypotype, GSC No. 7267 x 5. Locality 7b. Holotype of *Penthetria ovalis* Handlirsch. (Page 15.)
- Figure 6. *Plecia avus* (Handlirsch). Holotype, GSC No. 7265 x 5. Locality 7b. (Page 14.)
- Figure 7. *Plecia avus* (Handlirsch). Hypotype, GSC No. 14459 x 5. Locality 3. (Page 14.)
- Figure 8. *Plecia pictipennis* (Handlirsch). Hypotype, GSC No. 7266 x 5. Locality 7b. Holotype of *Penthetria lambei* Handlirsch. (Page 15.)
- Figure 9. *Plecia dilatata* (Handlirsch). Holotype, GSC No. 7271 x 5. Locality 2. (Page 15.)



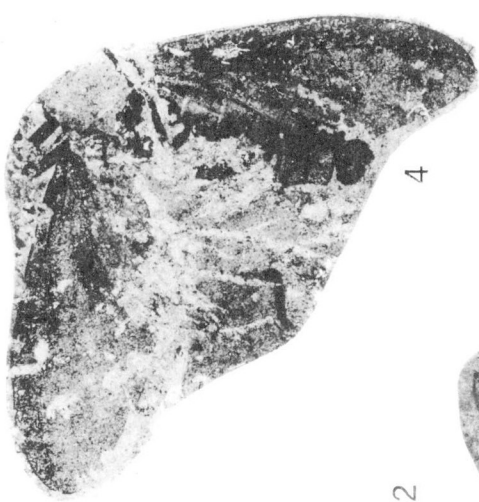
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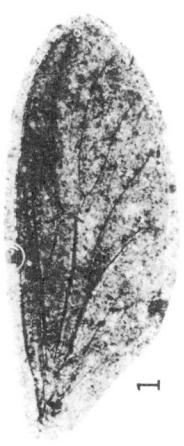
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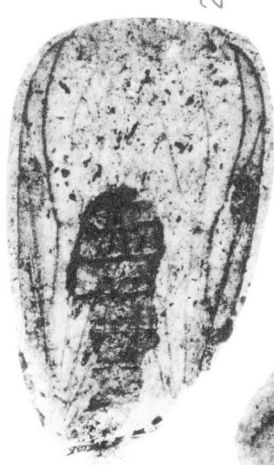
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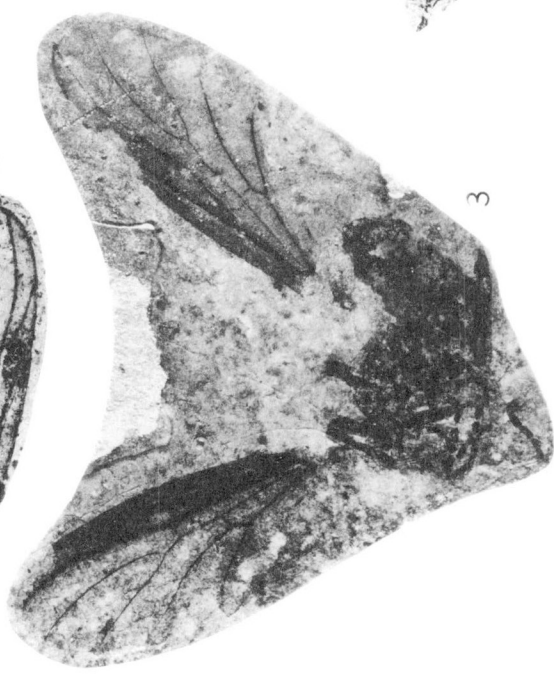
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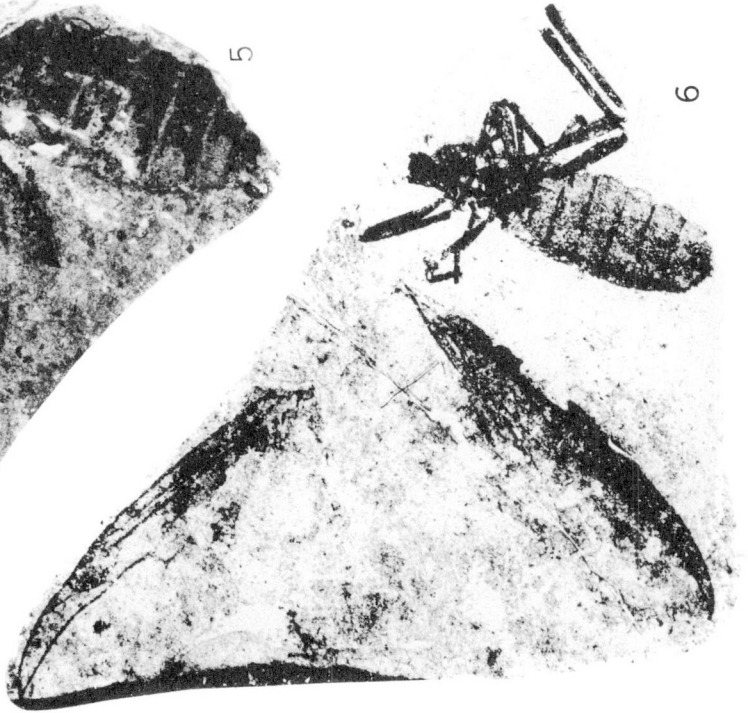
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PLATE IV

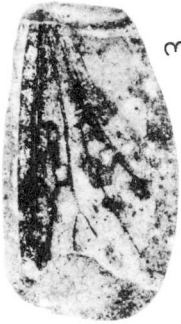
- Figure 1. *Plecia platyptera* (Handlirsch). Holotype, GSC No. 7272 x 5. Locality 2. (Page 16.)
- Figure 2. *Plecia pulchra* (Handlirsch). Holotype, GSC No. 7263 x 5. Locality 7c. (Page 16.)
- Figure 3. *Plecia transitoria* (Handlirsch). Hypotype, GSC No. 7260 x 5. Locality 2. Holotype of *Penthetria fragmentum* Handlirsch. (Page 14.)
- Figure 4. *Plecia pictipennis* (Handlirsch). Hypotype, GSC No. 7262 x 5. Locality 7b. Holotype of *Penthetria separanda* Handlirsch. (Page 15.)
- Figure 5. *Plecia elatior* (Handlirsch). Holotype, GSC No. 7257 x 5. Locality 7b. (Page 17.)
- Figure 6. *Plecia pictipennis* (Handlirsch). Hypotype, GSC No. 14481 x 5. Locality 1b. (Page 15.)



5



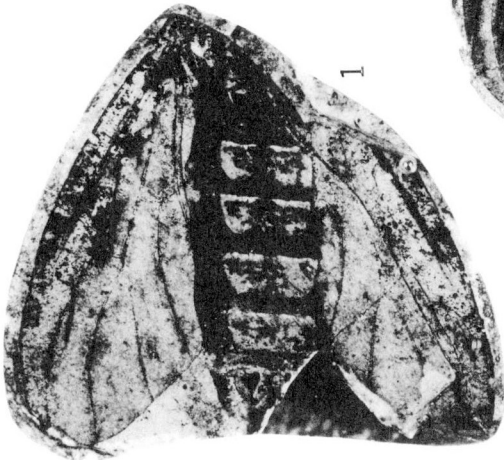
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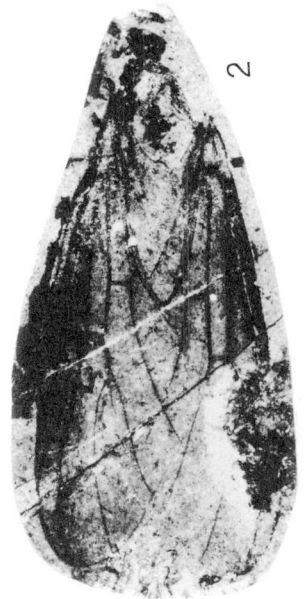
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