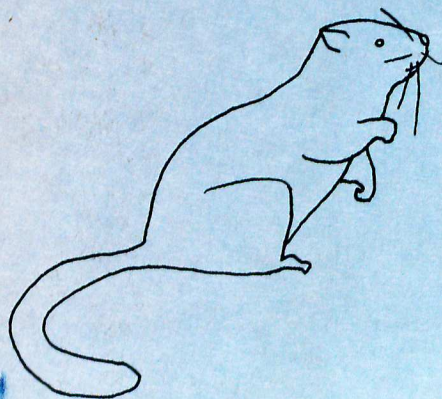
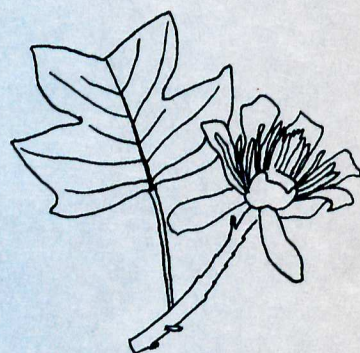


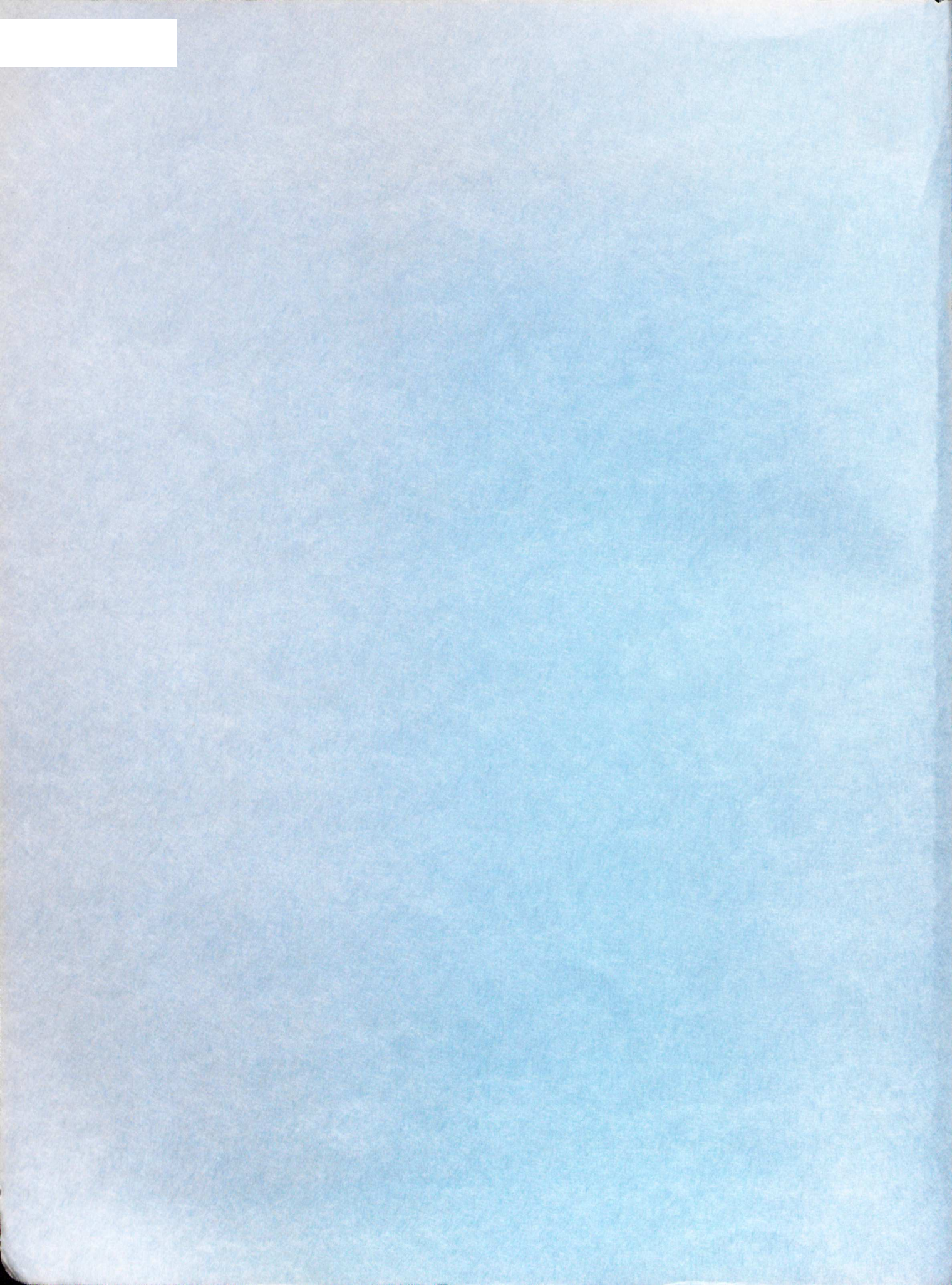
A REVISION OF THE GENUS PRIONOCERA
(DIPTERA: TIPULIDAE)

Fenja Brodo



**EVOLUTIONARY
MONOGRAPHS**

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(DIPTERA: TIPULIDAE)**

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National Museums of Canada
National Museum of Natural Sciences
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ABSTRACT

In this taxonomic revision of the genus Prionocera, four species, all from North America, are described as new: byersi, cryptica, naskapi and woodorum. Eleven names are placed in synonymy: absentiva Mannheims, broweriana Alexander, fulvicauda Alexander, gracilistyla Alexander, lackschewitzi Mannheims, lapponica Tjeder, oslari Dietz, primoveris Alexander, proxima Lackschewitz, rostellata Doane and uinticola Alexander. Prionocera hybrida is removed from the genus Prionocera and is placed in synonymy with Tipula (Angarotipula) illustris Doane. Two names are considered nomina dubia: bergrothi Williston and parrii Kirby. These changes result in 21 species being recognized, five which are known only from the Palearctic (excluding Korea), nine from the Nearctic and seven which have a Holarctic distribution.

A phylogeny of the genus Prionocera is presented, and the ground plan of the genus is discussed.

ACKNOWLEDGMENTS

This study was done in partial fulfillment of a Ph.D. program at Carleton University (Ottawa). I wish to thank Dr. H.H.J. Nesbitt for his support throughout this study and Dr. D.M. Wood who set me on course. I have had the benefit of discussions with members of the Diptera Section, Biosystematics Research Centre, Ottawa, and have profited from their suggestions and from their recently published Manual of Nearctic Diptera, Volume I.

Most of this study was carried out in the Botany Division, National Museums of Canada, Museum of Natural Sciences. I am indebted to the Museum for a place to work and to the members of the Botany Division for the benefit of their council in taxonomic and other matters.

A taxonomic revision of a holarctic group is facilitated by the cooperation of many individuals. I wish to acknowledge with thanks the curators and their institutions, listed in the methods section below. It is with pleasure and appreciation that I thank Dr. George W. Byers for his generous help and advice and for initiating my interest in the crane flies. And I thank Mr. Alec Okun for translations of the Russian papers.

Lastly I thank my husband, Dr. Irwin Brodo for his unfailing respect and good sense.

INTRODUCTION

The northern nearctic insect fauna is still not very well known (Danks, 1979), but the crane fly family, Tipulidae, is one of the better known groups with relatively few species remaining to be described (McAlpine et al., 1979). When I began this study, over 1,600 unidentified specimens of Prionocera, the fruits of several northern collecting expeditions, were in the Canadian National Collection, Ottawa. Most of these specimens were impossible to identify or even to sort to species groups with any degree of certainty. Fifteen species of Prionocera had been described from North America and 13 from Eurasia. (An additional two species have since been described by Savtschenko [1983]). Three monographs had been written on the palearctic species (Lackschewitz, 1933; Tjeder, 1948; Mannheims, 1951), but no comparable treatment of the North American Prionocera was available. Most of the species descriptions were inadequate for identification. Because Prionocera is a northern genus, it was expected that several species might be circumboreal. Therefore I decided to include both the palearctic (excluding Korean) and nearctic species in this revision, to determine how many species are involved, their distributions, their affinities, and to describe and illustrate them, and finally to provide keys for their recognition.

METHODS

This study is based on approximately 2,200 specimens representing 19 species. (The two species recently described by Savtschenko [1983] were not seen. Most of the specimens examined were pinned and dried; fewer than 100 were in alcohol. Approximately 2,000 specimens were borrowed from the institutions listed below, and about 1,600 of these specimens were from the Canadian National Collection, Ottawa. The abbreviations (in parentheses) are taken from Heppner & Lamas (1982), and are used in the text when referring to specimens studied. The exceptions are ALAK, CAL, CD, MPUL, ROM, SUBC and VIL which were not included in the aforementioned list, and CMNH, MSU, SEM, UMMZ and ZSM which are, I believe, too well established to be changed.

- (ALAK) University of Alaska, Fairbanks, Alaska; Dr. S. MacLean.
- (AMNH) American Museum of Natural History, New York, N.Y.; Dr. P. Wygodzinsky.
- (ANSP) Academy of Natural Sciences, Philadelphia, Pa.; Dr. C. Dunn.
- (BMNH) British Museum (Natural History), London, England; Dr. P. Cranston,
Dr. K.G.V. Smith
- (CAL) University of Calgary, Calgary, Alta.; Dr. G. Pritchard.
- (CAS) California Academy of Sciences, San Francisco, Ca.; Dr. P.H. Arnaud, Jr.
- (CD) Dr. C. Dufour, Neuchâtel, Switzerland.
- (CMNH) Carnegie Museum of Natural History, Pittsburgh, Pa.; Dr. C. W. Young.
- (CNC) Canadian National Collection, Biosystematics Research Centre, Ottawa, Ont.;
Dr. H.J. Teskey.
- (FEM) Frost Entomological Museum, Pennsylvania State University, University Park,
Pa.; Dr. Ke Chung Kim.
- (MAKB) Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany
(B.R.D.); Dr. H. Ulrich.
- (MCZ) Museum of Comparative Zoology, Harvard University, Cambridge, Mass.; Ms. M.
Thayer, Dr. M. Hathaway, Dr. C. Vogt.
- (MPM) Milwaukee Public Museum, Milwaukee, Wisc.; Dr. G. Noonan.
- (MPUL) Musée Provancher, Université Laval, Québec, P.Q.; Dr. J.M. Perron.
- (MSU) Michigan State University, East Lansing, Mich.; Dr. R.L. Fischer.
- (NHMV) Naturhistorisches Museum, Vienna, Austria; Dr. R. Lichtenberg.
- (NRS) Naturhistoriska Riksmuseet, Stockholm, Sweden; Dr. P. Lindskog, Dr. P. I.
Persson.
- (NSMH) Nova Scotia Museum, Halifax, Nova Scotia; Mr. B. Wright.
- (OSU) Ohio State University, Columbus, Ohio; Dr. C.A. Triplehorn.

- (PUL) Purdue University, Lafayette, Indiana; Dr. A. Provonsha.
 (ROM) Royal Ontario Museum, Toronto, Ont.; Dr. G.B. Wiggins.
 (SEM) Snow Entomological Museum, University of Kansas, Lawrence, Kansas; Dr. G.W. Byers, S. Teale.
 (SUBC) Spencer Entomological Museum, University of British Columbia, Vancouver, B.C.; Mr. S.G. Cannings. Dr. G.G.E. Scudder.
 (UMMZ) University of Michigan, Museum of Zoology, Ann Arbor, Mich.; Dr. T.E. Moore.
 (UMSP) University of Minnesota, St. Paul, Minn.; Dr. P. Clausen.
 (UNH) University of New Hampshire, Durham, N.H.; Dr. J.F. Burger.
 (USNM) United States National Museum of Natural History, Washington, D.C.; Dr. W.N. Mathis.
 (VIL) Dr. V.I. Lantzov, Moscow, U.S.S.R.
 (WSU) James Entomological Collection, Washington State University, Pullman, Washington; Dr. R. Zack.
 (ZMH) Zoological Museum of the University, Helsinki, Finland; Dr. B. Lindeberg.
 (ZMHB) Museum für Naturkunde der Humboldt Universität, East Berlin, Germany (D.D.R.); Dr. H. Schumann.
 (ZMLS) Zoological Museum, Lund, Sweden; Dr. R. Danielsson, Dr. B. Tjeder.
 (ZMUB) Zoological Museum, University of Bergen, Norway; Dr. L.G. Jensen.
 (ZSM) Zoologische Staatssammlung, München, Germany (B.R.D.); Dr. W. Schacht

Several northern expeditions mounted by the Department of Agriculture, Ottawa, Canada, resulted in the collection of over 1,600 unidentified Prionocera which formed the basis for this study. In order to add to this and the other borrowed material, field work was carried out in the summers of 1977, 1978, 1979 and 1981. I thank the following individuals and their institutions for accommodations and logistical support.

Northern Studies Centre, Churchill, Manitoba; Dr. F. Cooke, Mr. B. Erickson, 25 June - 11 July 1977; 26 June - 14 July 1978.

Mountain Research Station, Institute of Arctic and Alpine Research, University of Colorado, Nederland, Colo.; Dr. J. Ives, Dr. P. Webber, Mr. M. Plam, 22 June - 12 July 1979.

Centre for Northern Studies and Research, McGill University, Schefferville, Québec; Dr. T. Moore, Mr. D. Barr, 22 June - 21 July 1981.

The species in this genus are difficult to separate without making dissections. Many specimens cited in the literature proved to be misidentified and several names had been misapplied. Therefore, only specimens which I have seen are included in this monograph, except where noted.

Field Methods

The most effective collecting method proved to be capturing specimens individually. Species of Prionocera fly in open wet habitats in and among herbaceous vegetation. Trampling through their habitat dislodges them and makes them easier to see and thus to net. At the right time and place some species are quite abundant and several can be netted with a single sweep. However, mating pairs should be netted separately.

In Schefferville I used a Malaise trap which I had constructed based on the design of Dufour (1980) and operated with and without a mercury vapour lamp. This trap failed to attract Tipulinae. Cold night temperatures just a few degrees above 0°C probably inhibited night-flying insects. Only a few midges and some moths were attracted to the light.

Preparation of specimens

Collected specimens were placed in cork-topped glass shell vials (10 x 2.5 cm) containing a 3 cm plug of facial tissue moistened each collecting day with 2 drops of ethylene dichloride. After 2-3 hours, adult flies were papered in the manner described by Byers (1961). Because the distribution of pleural hairs on these

papered flies is usually obscured by the legs, a portion of each collection was pinned. Styrofoam sheets, 2.5 cm thick, covered with a smooth sheet of paper were found to be ideal for pinning long-legged crane flies. The pin bearing an insect was pushed into the styrofoam leaving a space of a few millimeters below the body; the legs could then be suitably arranged and held in place by additional pins if necessary. After a day or two of drying, the pinned insects were removed and properly labelled.

Dissection

For more detailed study, and for all drawings, the genitalia and other sections to be studied were first gently wetted with water by a fine brush. The section was cut off with a pair of small scissors, cleared in warm NaOH, or KOH (2 pellets/12ml H₂O) for 10-15 minutes, and then neutralized in warm lactic acid for 10 minutes and finally put into a drop of glycerine on a slide for study. For permanent storage, insect parts were removed with a drop of glycerine to genitalia vials. Each vial was pinned beneath the rest of its respective specimen.

Some specimens borrowed from European collections had the genitalia preserved in balsam on small plastic slides pinned beneath the rest of the specimen. Slides unsuitable for study were removed from the pin and gently warmed in xylol until the balsam, and often the plastic slide itself, had dissolved. The still brittle insect fragments were then softened in warm NaOH for 10 minutes and handled as described above.

Illustrations

Drawings were made with the aid of a Wild dissecting microscope and an ocular grid. As far as possible each specimen was drawn from a standard orientation. Corresponding structures were drawn to the same size to emphasize morphological rather than size differences.

Measurements

The measurement "body length" refers to the shortest distance between the tip of the abdomen and the most anterior portion of the head (excluding antennae), regardless of the position in which the specimen is preserved. Because of the differences in contraction or deflection of parts, this measurement provides only a very rough estimate of general size.

"Wing length" is the distance between the wing's tip and its point of attachment.

The nasus is measured in profile from its tip (excluding projecting hairs) to its base.

The hypogynial valvulae are measured laterally from their tips to the membranous connection ventrally with sternite 8.

Colour

All colour designations with reference numbers are based on Kelly (1965), and the colour names are based on McKnight (1977). Where a colour range is given, such as "grayish blue to dark bluish gray (186,192)", this does not mean 186 to 192 all inclusive but that the hue varies between no. 186 and no. 192.

I always noted colour under the same illumination, a 6 volt stereomicroscope lamp with a light blue daylight filter. *Prionocera* is not a colourful genus, but there are significant if subtle colour differences useful in distinguishing species. The use of a standardized colour chart encompassing the entire spectrum of colours seen by the human eye together with a simple dictionary of colour names greatly enhances communication. The centroid colour charts are obtainable from the U.S. Bureau of Standards, but even when one does not have the set at hand, the simple but rather wordy colour names make for easy recognition and comprehension especially for those relatively unfamiliar with the English language.

Immature Stages will be dealt with in a subsequent paper.

TAXONOMIC AND NOMENCLATURAL HISTORY

The genus Prionocera was erected by Loew (1844) to accommodate a single European species which he described and named Prionocera pubescens. In 1863 Loew rejected the name Prionocera in favor of Stygeropsis, and in that paper he described Stygeropsis sordida from North America. Subsequently he described two more North American species: Stygeropsis dimidiata and S. fuscipennis (Loew, 1866) (= Tipula illustris, see below). Osten Sacken (1878) transferred Ctenophora parrii Kirby to this genus. (This species is here considered to be a nomen dubium.)

Apparently Loew presumed that Prionocera was preoccupied by the coleopterous genus "Prionocera." The problem was created by Shuckard (1839) who had misspelled the name Priocera Dum. Subsequently Bergroth (1889), recognizing that Loew had made an illegitimate name change, resurrected the name Prionocera. Despite this, Williston (1893) described bergrothi in Stygeropsis, another species which I consider to be a nomen dubium.

Wallengren (1882) recognized that Tipula diana Meigen (1818) (a synonym of turcica Fabricius, 1787), Tipula serricornis Zetterstedt (1838), and Tipula subserricornis Zetterstedt (1851) belonged to Loew's genus Prionocera. However, he preferred to consider Prionocera as a subgenus of Tipula.

Kertész (1902) restored Prionocera to generic rank and, following Bergroth (1889) and Mik (1890), erroneously synonymized subserricornis with turcica and included salicetorum Siebke with a question mark. Lundström and Frey (1916) subsequently transferred tumidicornis to Prionocera.

The palearctic species of Prionocera were revised in a monograph by Lackschewitz (1933), who recognized six species: serricornis, subserricornis, turcica, and three new species, abscondita, anceps and proxima. As, however, Lackschewitz relied entirely upon species descriptions, having no recourse to the types, he misidentified both serricornis and subserricornis. He transferred tumidicornis Lundström and salicetorum Siebke to the genus Tipula, an interpretation followed here.

Tjeder (1948) redescribed and figured ten species of Prionocera in his monograph of the Swedish species. Of Lackschewitz's six species, he recognized only two: proxima and turcica. (I am placing proxima in synonymy with subserricornis.) Tjeder studied Zetterstedt's original material and established the identities of serricornis and subserricornis. He placed anceps Lackschewitz in synonymy with serricornis and suggested that serricornis sensu Lackschewitz was a new species, but lacking specimens he declined to name it. The species misidentified as subserricornis by Lackschewitz was misidentified again by Tjeder as "pubescens Loew." Tjeder described five species as new: anderi, lapponica, recta, ringdahli and setosa. (I am placing lapponica in synonymy with recta.) Prionocera abscondita was omitted because of a lack of Swedish specimens.

The genus Prionocera was revised again by Mannheims (1951). He recognized 13 species, of which the following eight corresponded with those of Tjeder: lapponica, proxima, recta, ringdahli, serricornis, setosa, subserricornis and turcica. Having seen Loew's type material, Mannheims placed anderi Tjeder in synonymy with pubescens Loew, and pubescens sensu Tjeder he named tjederi. The species which Tjeder (1948:90) had recognized as being misidentified as serricornis by Lackschewitz, was renamed lackschewitzi by Mannheims. Prionocera absentiva was described as new and compared with the written description of abscondita Lackschewitz. In addition, Mannheims mentioned but did not describe parrii (Kirby) from Greenland and North America. (I am not recognizing absentiva, lackschewitzi nor parrii here.)

More recently, Savtschenko (1983) reviewed the genus Prionocera. In addition to the 13 species of Mannheims, he included gracilistyla and parrii from North America, chosenicola and serenicola from North Korea, and described two new species from the U.S.S.R., subturcica and mannheimsi. Although I have not seen these new species, I have included them in this monograph.

From North America, Alexander described Stygeropsis unimicra (1915), S. parrioides (1919) and S. ominosa (1920a); by the end of the year he had accepted

the name Prionocera (Alexander, 1920b). He described 13 additional species and subspecies of Prionocera. Arranged chronologically they are: Prionocera electa, 1927b; P. altivolans and P. laetipennis, 1935; P. rostellata var. churchilliana and var. prominens, 1942b; P. oregonica, 1943a; P. primoveris, 1943b; P. chosenicola and serenicola (1945); P. uinticola, 1948a; P. fulvicauda, 1948b; P. gracilistyla, 1956; and P. broweriana, 1961.

In 1946 Alexander moved fuscipennis Loew and parrioides Alexander to Tipula (Arctotipula). The name fuscipennis had to be dropped in favour of the junior synonym illustris Doane (1901) because fuscipennis was preoccupied by Tipula fuscipennis Curtis (1834). Savtschenko (1961) moved altivolans and laetipennis to his new subgenus Tipula (Angarotipula). Alexander (1962) recognized that illustris and parrioides also belonged to this new subgenus.

Dietz (1918) described Pachyrhina hybrida and P. oslari from Colorado. These species were subsequently transferred to Prionocera (Alexander, 1965a). In this revision I synonymized hybrida Dietz with Tipula (Angarotipula) illustris and oslari Dietz with Prionocera dimidiata.

I recognize only four of Alexander's nearctic species of Prionocera: unimicra, ominosa, electa and oregonica. No varieties of P. rostellata (= dimidiata Loew) are recognized. I have placed Prionocera primoveris, P. uinticola and P. fulvicauda in synonymy with P. oregonica; P. gracilistyla is placed in synonymy with P. recta Tjeder and P. broweriana with P. unimicra. Four new species are described, making a total of 21 species included in this monograph (see Appendix A).

The oriental species of Prionocera are omitted from this study. They include Prionocera flaviceps Enderlein (1912) from Sumatra, P. indica Edwards (1926) from French Indo-China (Laos) and P. chosenicola and P. serenicola described by Alexander (1945) from northern Korea.

MORPHOLOGY AND TERMINOLOGY OF THE TIPULIDAE

There have been several important studies of the morphology of the Tipulidae, the earliest being that of Reaumur (1740). Westhoff (1882) described the male genitalia of the genus Tipula, and Byers (1961) described the internal and external anatomy of both the male and female in the members of the genus Dolichopeza and, more recently, of those of the genus Chionea (1983). The earlier studies were summarized by Frommer (1963), who also provided a convenient table of equivalent terminologies used by these workers.

McAlpine (1981) developed a uniform terminology to apply to all Diptera. In order to facilitate phylogenetic comparisons of the Tipulidae with other families, McAlpine's terminology is followed here. Since Alexander and later workers based their crane fly terminology on the morphological work of Crampton (1942) and because McAlpine also based his work, in part, on the work of Crampton, only a few important changes of traditional crane fly terminology had to be made here, and these will be explained below.

Head: (Fig. 1). The compound eye occupies a large proportion of the side of the head. No true ocelli are present in this family. However, in Prionocera and in several species in the large genus Tipula, a round to oval structure, the pseudo-ocellus, is found on either side of a slightly raised frontal vitta just behind the antenna. This structure may be light sensitive. The rostrum, bearing the mouthparts distally, is more elongated in the Tipulinae and is thought to be composed of the clypeus, gena (in part) and subgena (in part). In most Tipulinae the rostrum bears a small nasus distally. The gena is the facial region bordered by the rostrum, antenna, and compound eye. The postgena is the posteroventral area lateral to the occiput.

Thorax: (Fig. 1). The true prescutum (presct) is greatly reduced in all Tipulidae and is marked posteriorly by the prescutal pits (Matsuda, 1976; McAlpine, 1981). These pits have been called humeral pits or pseudosutural foveae (Alexander, 1942a; Byers, 1961).

The scutum (sct) is divided into an anterior and a posterior section by the V-shaped transverse suture (trn sut) characteristic of the family Tipulidae. The entire region between the transverse suture and the pronotum has been referred to as the "prescutum" (Alexander, 1942a; Byers, 1961). Tangelder (1983) distinguished the anterior and posterior sections as "scutum 1" and "scutum 2," respectively. The transverse suture is apparently a secondarily developed internal strengthening ridge having no muscle attachments. Three broad longitudinal stripes dominate the mesonotum in the Tipulinae. The median stripe, extending from near the edge of the pronotum to the transverse suture, thus traversing both the prescutum and anterior scutum, may be further divided longitudinally by a narrow vitta. Because of this secondary division, the mesonotum in Prionocera, and in the Tipulinae in general, is alternately described as having four rather than three stripes. The lateral stripes are confined to the scutum, extending from the prescutal pits across the transverse suture to the posterior section of the scutum. These stripes tend to be less distinct posteriorly.

The postnotum consists of a mediotergite (mtg) (postscutellum, Byers, 1961) flanked by a laterotergite (pleurotergite, Alexander, 1942a; Byers, 1961). The laterotergite is further divided into a dorsal anatergite (anatg) and ventral katatergite (ktg).

The strong pleural suture divides the mesopleuron into the anterior episternum and posterior epimeron (pteropleurite, Alexander, 1942a; mesepimeron, Byers, 1961). The episternum in turn is divided longitudinally by the anapleural suture into a dorsal anepisternum (anepst) and a ventral katepisternum (kepst) (sternopleurite, Alexander, 1942a; pre-episternum, Byers, 1961). The epimeron (pteropleurite, Alexander, 1942a; mesepimeron, Byers, 1961) is similarly divided into an anepimeron (anepm) and a katepimeron (kepm) by the transepimeral suture. This suture lies at the level of the posterior spiracle (p spr) and is therefore not contiguous with the anapleural suture but is ventral to it; consequently the katepimeron is very small. The much longer anepimeron appears to be secondarily divided into a dorsal and ventral region by a shallow depression which is contiguous with anapleural suture of the episternum and can therefore be mistaken for the transepimeral suture.

Wing: (Fig. 2). A few changes in the interpretation of the wing venation should be noted. These are based on McAlpine (1981). There is apparently only one subcosta which either joins the costa, atrophies at the tip, or, as in Prionocera, is connected to R_1 by a short transverse vein, sc-r. Previous authors (Alexander, 1942a; Byers, 1961) have considered this veinlet to be the first section of Sc_2 . A costal cross vein (c-r) (free tip of Sc_2 , Alexander, 1942a) may be present in the pterostigmal region. Anterior media (MA) occurs as a short, stout, transverse vein between posterior media and radius. This is the anterior arculus of Alexander (1927a, 1929); it is atrophied in Prionocera. Three branches of posterior media reach the wing margin, there being no evidence of a fourth branch in the Mecopteroidea (McAlpine, 1981). There are two cubital veins, anterior cubitus with two branches: CuA_1 and CuA_2 and posterior cubitus, CuP , a fold just behind CuA_1 . CuA_1 corresponds to M_4 of Alexander (1927a, 1929) and later authors, and his "m-cu" is here interpreted as the basal section of CuA_1 . The true medial cubital cross vein is a very small element between CuA_1 and the discal cell.

Male terminalia: (Figs. 3-7, 10-62). There are nine distinct segments in male Tipulidae. A tenth segment is apparently lacking or is confined to the anal region (Dahl, 1980).

The 9th tergite often bears various processes and lobes posteriorly. These processes appear to be secondary extensions of the 9th tergite, but it is possible that in Prionocera the more ventrally situated single median lobe and/or the paired apical processes are remnants of a 10th tergite.

The proctiger, or the anus-bearing region, lies beneath the posterior edge of the 9th tergite. It is reinforced laterally by an irregularly sclerotized region that I refer to as the rectal sclerite. This may be the vestige of a paraproct, although true paraprocts have not been identified in the Diptera (Crampton, 1942;

McAlpine, 1981). Dobrotworsky (1967) illustrated Leptotarsus (Macromastix) with rectal sclerites ("lateral plates") and cerci ("anal styles"). This suggests that a vestige of an 11th segment may be present, at least in some Tipulinae.

My interpretation of the terminalia in the subfamily Tipulinae is that the ninth tergite and sternite are fused, but the sternal portion has been very much reduced. Only a very narrow anterior region remains to which are attached the enlarged gonocoxites. Each gonocoxite bears two gonostyli distally. Dahl (1980) has shown that in Limonia (Tipulidae) and Trichocera (Trichoceridae) only the anterior portion of the ninth sternal region in the prepupa develops into the sternal region of the adult. The gonocoxites and gonostyli which she refers to collectively as the claspers, develop from the distal part of the ninth sternal region. In contrast, the gonocoxites in the Anisopodidae develop from the lateral region of the genital primordium (ibid.). Therefore, it would appear that the gonocoxites in the Tipulidae and the Trichoceridae are not homologous to the gonocoxites in the Anisopodidae, and by extension, to the rest of the Diptera. However, as Matsuda (1976) has pointed out, substitution and heterochrony can alter developmental pathways and obscure underlying homologies. I am retaining McAlpine's terminology here, and refer, therefore, to gonocoxites and gonostyli.

The gonocoxites have been variously referred to as "9th sternite" (Tjeder, 1948), "basistyles fused with the 9th sternite" (Alexander, 1942a, 1967; Byers 1961; Matsuda, 1976; Oosterbroek, 1980) and "basimeres fused with the 9th sternite" (Frommer, 1963). The gonostyli have been termed "styles" (Tjeder, 1948), "dististyles" (Alexander, 1942a, 1967; Byers, 1961, Oosterbroek, 1980) and "telomeres" (Frommer, 1963).

The gonocoxites are fused ventrally in most of the Tipulinae, although a partially membranous connection usually remains. They lie beneath the 9th tergite; consequently most of their dorsal surface is internal and membranous. However there is a variable retention and development of dorsal fragments (gon frag) ("ipr," Tjeder, 1948) of the gonocoxites characteristic of the different taxa within the Tipulinae. These fragments lie dorsal or lateral to the aedeagus (aed), and posterior to the sperm pump (sp), occupying the position of the parameres found in the other subfamilies of crane flies. The Tipulinae lack true parameres as defined by McAlpine (1981).

There is a lot of confusion surrounding the naming of parts of the male genitalia. Following McAlpine (1981), I am reserving the term aedeagus for the intromittent organ. In the Tipulinae the aedeagus arises from the sperm pump and extends through the aedeagal guide (aed g). The aedeagus ranges from a short inflexible tube with limited exertion (e.g., in Prionocera) to a very long, thin, flexible tube capable of being exerted for most of its length and also of being completely retracted within the abdomen.

At the base of the aedeagus is the bulbous sperm sac enclosed by the sperm pump (vesica, Tjeder, 1948; Byers, 1961; aedeagus, Oosterbroek, 1980). There is a moveable dorsal apodeme (d ap) (moveable apodeme, Byers, 1961; compressor apodeme, Frommer, 1963; Oosterbroek, 1980) which is found at the point of invagination of the sperm sac wall. McAlpine (1981:53) describes an aedeagal apodeme which may be homologous to the dorsal apodeme in the Tipulidae. However, the term aedeagal apodeme seems inappropriate because, in the Tipulidae, the apodeme is clearly associated with the sperm pump and not with the aedeagus.

The sperm pump in Prionocera has a single rigid transverse posterior apodeme (p ap) and a pair of rigid lateral apodemes (l ap). Muscles originating on the anterior and posterior surfaces of the dorsal apodeme and inserting on the paired lateral and single posterior apodemes of the sperm pump, respectively, control the transmission of sperm.

The movement of the sperm pump in Prionocera is restricted by the attachments of the gonocoxal fragments dorsally and the aedeagal guide ventrally. In most other genera of the Tipulinae (e.g., Tipula, Nephrotoma, Ctenophora, Dolichopeza) the sperm pump can rotate up to 180° in the sagittal plane (Byers, 1961). Such rotation is controlled by muscles from the abdominal wall to the walls and apodemes of the sperm pump (Byers, 1961; Frommer, 1963).

The aedeagal guide (adminiculum of authors) is always attached ventrally to the medial posterior margin of the gonocoxites. It surrounds the aedeagus for most of its length in Prionocera but surrounds only a short section of the aedeagus in many other Tipulinae. In all Prionocera and most Tipulinae the aedeagal guide is separated dorsally. The aedeagal guide may extend towards or be attached to the sperm pump, as in Prionocera (Tjeder, 1948) and Dolichocheza (adminicular rods, Byers, 1961). Lateral lobes of the aedeagal guide (gonapophyses, Byers, 1961) are not present in Prionocera.

Female terminalia: (Figs. 8, 9, 63-94). The abdomen is generally considered to comprise 10 segments. It has been suggested that portions of the 11th may also be present or at least fused with the 10th (Crampton, 1942; Frommer, 1963; Matsuda, 1976; McAlpine, 1981). However, Dahl (1980) showed that in both the Tipulidae and the Trichoceridae the female has only nine segments.

Tergite 8 lies dorsal to but separate from sternite 8, except in the genus Dolichocheza (Byers, 1961), where these sclerites are narrowly joined anteriorly. Tergite 8 is generally shorter than tergite 7, whereas sternite 8 is at least as long as tergite 8 and 9 combined, and in addition bears the hypogynial valvulae posteriorly. These valvulae vary from being heavily sclerotized (e.g., Ctenophora) to a very reduced bilobed flap (e.g., Tipula [Vestiplex]).

The hypogynial valvulae (hy) are paired, hollow, flattened blades which together form a V-shaped structure beneath the cerci. Tjeder (1958) considered the hypogynial valvulae in the tribe Limoniini to be composed of three separate valves. His terminology was applied to genera in the Tipulinae by Vane-Wright (1967). These may be good descriptive terms, but there is no morphological basis for claiming that the hypogynial valves are composed of three separate valves. Each blade has a medial ("ventral valve," Tjeder, 1958) and a lateral ("lateral valve," Tjeder, 1958) surface. These surfaces are joined distally and ventrally but are separated proximally and dorsally by a triangular dorsal surface ("dorsal valve," Tjeder, 1958). In Dolichocheza this dorsal surface is broader medially, and extends roof-like over the pocket described by Byers (1961).

The hypogynial valves may be homologous to the anterior gonopophyses of the Orthopteroids (Crampton, 1942; McAlpine, 1981). They function as an ovipositor. (Females of Prionocera, captive in a vial, were observed to raise their cerci out of the way, and expel their eggs individually by a rhythmic downward thrust of the hypogynial valves.)

The 9th segment lies with its anterior margin partially telescoped under the 8th. The sternite consists of two parts: (1) an apparently paired sclerite closely associated with, and sometimes fused with tergite 9 laterally (s 9), and (2) the genital fork (gen fk) (furca or vaginal apodeme), a much smaller, usually single sclerite lying with its stem dorsal to the oviduct and its posterior arms flanking the opening of the bursa copulatrix. Crampton (1942) suggested that the larger sclerite (s 9), or at least parts of it, may be homologous to the posterior valvulae of Orthopteroids. Byers (1961) had referred to this structure as "fused valvulae"; however, in a later paper (1979) and currently (personal communication), he refers to this structure simply as the 9th sternum. There is no evidence of anything homologous to the orthopteran valvulae in the Mecopteroidea.

Between sternites 8 & 9 there is a membranous genital chamber. The entrance to the bursa copulatrix, or common spermathecal duct (co), opens on the dorsal wall of this chamber and the gonopore, opening of the common oviduct, is on the ventral wall, on the ridge formed by the proximal edges of the hypogynial valves.

Tergite 10 is strongly sclerotized and is sometimes fragmented distally. It has been suggested that these fragments may represent an 11th segment (Byers, 1961; Frommer, 1963; Matsuda, 1976). Dahl (1980) found that in the Tipulidae and the Trichoceridae the so-called 10th tergite develops from the distal portion of the 9th segment in the prepupa and that the cerci are formed from detached lateral elements of the 9th sternite. Developmental pathways may be misleading. The apparent 9th segment, as observed by Dahl in the females mentioned above, could be a composite 9th and 10th segment. The 10th segment then is only expressed in the

adult. I have retained the terminology of McAlpine (1981) and refer to separate 9th and 10th tergites.

There is no sclerotized sternite 10. The infra anal plate (infra), a hairy membranous flap enclosing the anus ventrally at the base of the cerci may represent the 10th or the 11th sternite, or possibly a fusion of the two (Frommer, 1963; McAlpine, 1981). Or, if Dahl (1980) is correct, the infra anal plate must be part of the 9th segment.

The paired cerci (Fig. 8) are elongate, narrowed distally, with bluntly rounded tips. In most Tipulinae they are separated proximally by a narrow posterior extension, referred to as the 10th or the 11th tergite. A small basimedial section of the cercus, the supraanal (su) (Tjeder, 1958) is defined by an internal strengthening ridge, the supraanale apodeme (su ap), and a longitudinal apodeme (l ap) (list-like apodeme, Tjeder, 1958) extends from the cercal articulation and runs towards the narrowed tips.

True cerci develop between tergites 10 and 11 (McAlpine, 1981). If the so-called cerci in the Tipulidae and the Trichoceridae develop from lateral elements of the 9th sternum, as found by Dahl (1980), then they cannot be homologous with the blade-like cerci of lower orders, and are therefore misnamed.

THE GENUS PRIONOCERA LOEW

Prionocera Loew, 1844: 170. Type-species, pubescens (monobasic).

Stygeropsis Loew, 1863: 298 (unjustified new name for Prionocera Loew).

Type-species, Prionocera pubescens Loew (automatically).

DIAGNOSIS

Flagellomeres without verticils, slightly to strongly distended ventrodistally giving antenna a serrate appearance; male with distal processes on 9th tergite; female with hypogynial valves broadly rounded distally, extending to or beyond point of separation of long slender cerci.

DESCRIPTION

ADULT. General appearance: a moderately sized pruinose and hairy tipuline; male body length 7.7-13.9 mm, wing length 10.2-16.6 mm; female body length (6.7)* 9.6-17.6 mm, wing length (8.5)10.4-18.0 mm.

MALE: Head: compound eyes separated dorsally by almost twice eye width as seen from above; frons slightly raised behind antennal bases (not a gibbous tubercle), flanked by oval, lens-like structures (pseudo-ocelli); pseudo-ocellus varying (sometimes within same species) from black to strong orange-yellow (267,68); vertex and occiput hairy, quality and quantity of hairs varying with species, vertex longitudinally divided by glabrous darker region; gena heavily pruinose with no or very few scattered short hairs; postgena broadly rounded, densely covered with long hairs; rostrum relatively short, half length of rest of head, with hairs; nasus, if present, small, not longer than broad; palpus short, 5th segment slightly shorter than preceding ones combined, no sensory area on 3rd segment.

Antenna: scape cylindrical, 3 times as long as wide, with scattered long hairs; pedicel small, globular, with scattered shorter hairs dorsally; flagellum 11-segmented, flagellomeres pubescent, without verticils but usually with several hairs dorsally on lower segments; 1st flagellomere slightly to strongly distended distoventrally, succeeding flagellomeres progressively less distended; 10th cylindrical, usually slightly longer than 9th; 11th cylindrical, abruptly smaller, thinner, attached off-center, near dorsal edge of 10th.

Thorax: anterior pronotum darker medially, densely hairy; posterior pronotum concave, recessed beneath anterior edge of prescutum, shiny, glabrous; prescutum laterally, contrastingly yellow in some species; prescutal pit ranging from dusky

* Measurements in brackets are of the syntype of sordida Loew, a small and somewhat shrivelled specimen.

black to shiny deep-orange yellow (267,69); dorsum dominated by three longitudinal stripes defined by slightly lighter, hairy region; middle stripe extending from anterior edge of prescutum to scutal suture, usually narrowly divided longitudinally by lighter glabrous line; lateral stripes extending from prescutal pit to posterior edge of scutum, becoming contiguous behind scutal suture; scutellum pruinose, hairy, flanked by glabrous light orange-yellow (70) tympanal fossae; pleuron pruinose, light to dark gray (264,266), distinguished from that of most Tipulinae by presence of hairs: anepisternum, anepimeron and katepimeron with hairs or bare, katepisternum hairy at least on dorsal half, metepisternum divided into dorsal glabrous metanepisternum and ventral hairy metakatepisternum, metepimeron glabrous, mediotergite of postnotum hairy, anatergite densely hairy, katatergite bare, lighter dorsally, darker ventrally.

Wing: without pattern, varying from almost hyaline to infumed with gray to brown, more strongly infumed in costal and subcostal cells, in base of wing and in pterostigmal region; very narrow hyaline area in costal cell extending from middle of Rs to c-r; oblitative streak (marking oblique to perpendicular wing fold characteristic of Tipulinae), a whitened area broadest and most intense anteriorly at sc-r, usually including proximal half of stigma, extending posteriorly through distal tip of Rs and bases of R₃ and R₄₊₅ through proximal and posterior edges of discal cell; wing membrane without macrotrichia; wing veins with macrotrichia restricted to R₁ and base of 2A; subcosta joined to R₁ by sc-r; c-r usually weakly present; Rs of moderate length for the genus; three branches of radius reaching wing margin: R₁₊₂, R₃ and R₄₊₅; R₂ very short, closing distal end of cell R₁; media apparently arising from cubitus; small brace vein MA obliterated; three branches of media reaching wing margin: M₁, M₂ and M₃; discal cell always closed by medial cross vein, m-m; short element M₁₊₂ making cell M₁ petiolate; m-cu extremely short or absent, meeting discal cell distal to fork of M.

Halter: light yellow-brown to dark yellow-brown (76,78), knob usually darker with dorsal patch of hairs too variable within species for taxonomic use.

Legs: strong orange-yellow to dark yellow-brown (68,78), tips of femora and tibiae often darkened; legs of moderate length, basitarsi shorter than tibiae; tarsal claws toothed or simple, varying with species and even within specimen.

Abdomen: ranging from medium gray to gray-brown (265,61) with darker brown (61,65) dorsal longitudinal stripe, lateral and distal borders of tergites lighter; hairs on abdomen shorter than on head and thorax, anterior half of 2nd sternite bare; segments 1-7 unmodified, each with pair of spiracles in pleural membrane; 8th tergite shorter than 7th, 8th sternite longer than 7th, genitalia consequently tipped dorsally to about 30° above longitudinal axis.

Genitalia: 9th tergite (Figs. 10-28) narrowly fused at base to narrow 9th sternite, membranously joined laterally to gonocoxites, bearing two or three pairs of distal processes and sometimes a single median lobe; processes usually contrastingly lighter distally: **dorsal process** sublateral and most prominent, **apical pincer-like process** on ventral edge of tergite usually beneath dorsal process, **lateral process** a distal prolongation of lateral edge of tergite, single **median lobe** (when present) a broad pale truncate plate between dorsal and apical processes; rectal sclerite small, irregular sclerotization on either side of membranous base of anal segment at attachment to venter of 9th tergite, or fused dorsally forming a narrow sclerotized yoke. Gonocoxites overlain by 9th tergite, membranous dorsally except for an irregular sclerotized fragment (Fig. 3) extending from dorsal mediolateral edge of gonocoxite towards posterior apodeme of sperm pump, attached to latter and narrowly to each other by membranous strands allowing for some movement of aedeagal complex in sagittal plane; ventrally gonocoxites attached anteriorly to very reduced 9th sternite, and connected membranously to each other but separated distally by small sclerotized ventral attachment (infolded flaps, "if" of 8th sternite, Tjeder, 1948) of aedeagal guide. Outer and inner gonostyli (Figs. 28-60) membranously attached to each other at base, possibly functioning like thumb and forefinger in spreading female genitalia during copulation. Gonostyli covered with long hairs on outer surfaces (i.e., lateral on outer

gonostylus, medial on inner gonostylus), with shorter hairs on inner surfaces. Outer gonostylus a fleshy leaf-like lobe more or less concave on medial surface; dorsal and ventral edges defined by position of sclerite when fully extended. Inner gonostylus more heavily sclerotized, differentiated into dorsal crest, glabrous distal beak and smaller, haired proximal beak; distal beak bearing several kinds of sensilla characteristic of, and apparently restricted to, this genus, observable by light microscope: beak tip with what appear to be circular pores covered with a very thin membrane, probably campaniform sensilla (Snodgrass, 1926; Baker, 1978), base of beak in several species bearing several pigmented flat-topped, peg-like sensilla, each on a circular base approximately 8.6 μ in diameter. Aedeagus short, slender tube arising anteriorly on sperm pump, curving closely around its ventral wall, extending posteriorly the length of 9th tergite; aedeagal sheath broadened laterally, extending from base of aedeagus to just below its tip, posterior edge of sheath sometimes marked by tooth-like thickening. Aedeagal guide (Figs. 3-7) a paired structure sheathing aedeagus, narrowly attached to medial, ventrodorsal edge of gonocoxite, with major section (dorsal plate) lying above aedeagus, edges almost meeting, narrowing anteriorly, curving around and attaching to lateral wall of sperm pump. Sperm pump with several apodemes: dorsal apodeme, a moveable, trapezoidal to broadly fan-shaped sclerite (shape of sclerite varying within species), a single rigid posterior apodeme perpendicular to aedeagus, joined to rigid, paired lateral apodemes projecting anteriorly within abdominal cavity.

FEMALE. Similar to male except as follows: slightly larger than male; legs and antennae comparatively shorter; flagellomeres always less distended than in male, becoming progressively smaller and more cylindrical distally, 11th smallest or subequal to 9th and/or 10th, centered on tip of 10th; tarsal claws never toothed.

Genitalia: (Figs. 8, 9, 63-94) 8th tergite and sternite entirely separate, never fused anteriorly as in Dolichocheza (Byers, 1961); 8th sternite with dorsolateral edge variously lobed or sloping, providing useful taxonomic characters. Hypogynial valves borne posteriorly on 8th sternite, separation from sternite marked ventrally by variously shaped membranous region (Figs. 79-94); ratio of length of hypogynial valves to 8th sternite useful for species separation; valves extending posteriorly to or beyond point of separation of cerci, fused proximally, separated distally, inner (medial) surface with posteriorly directed bristles. Ninth sternite membranously joined to 9th tergite, broadly V-shaped, not heavily sclerotized, with narrowed tip projecting hood-like posteriorly beyond opening of common spermathecal duct; genital fork with paired short posterior arms flanking spermathecal duct, longer stem dorsal to oviduct, shape too variable to be useful for species separation. Tenth tergite narrowly extending between cercal bases, lateral edge of tergite straight to broadly curved posterolaterally, a small triangular sclerite more or less membranously separated, lying proximal to cercal base and medial extension of tergite. Longitudinal apodeme (1 ap) ("list-like" apodeme, Tjeder, 1958; Vane-Wright, 1967) extending from mid cercus proximally to dorsolateral edge distally; raised triangular supraanal (su) (Tjeder, 1958) on cercal base, lateral to median extension of 10th tergite bounded by strong oblique internal supraanal apodeme (su ap). Infraanal plate (infra) trapezoidal, shallowly emarginate to almost bilobed distally.

DISCUSSION

The genus Prionocera was defined and named by Loew (1844) principally on the basis of the serrate antennae which lack verticils. This is still the best character for distinguishing Prionocera. In the subgenus Angarotipula of Tipula, the flagellomeres are also without verticils but the segments in the male are broadest medially rather than distally.

Prionocera is also distinguished from most other tipulines by having a hairy head and thorax. Several northern and high altitude crane flies are also quite hairy, for example, Tipula (Vestiplex) arctica, the subgenus Arctotipula and some

high altitude Nephrotoma species (Byers, personal communication). This would seem to indicate that hairiness is a response to the environment and not necessarily an indication of relationship. Tipula (Angarotipula), which is not a hairy subgenus but does have northern species, shares with Prionocera the character of long dense hairs on the anatergite. The anatergite is bare in the other hairy species and subgenera mentioned above.

The compound eyes in Prionocera are comparatively small, allowing for a larger gena, postgena and vertex, and the pseudo-ocelli are very prominent. This is also characteristic of other northern and high altitude crane flies and of the subgenus Angarotipula.

The wings, similar to those of many tipulines, are not distinctly patterned but do have a darker pterostigmal region and a clearly defined paler area along the region of the distal wing fold. In Prionocera this fold is a little more striking than in other tipulines because it tends to be broader and whiter. The wings are almost bare. Macrotrichia are confined to R_1 and the base of 2A. The same holds true for the subgenera Angarotipula and Arctotipula, but most other tipulines also have hairs on branches of the radius, media and along the entire length of 2A.

The male genitalia provide the most striking features that set this genus apart. The sperm pump and the very short aedeagus, which is partially ensheathed by an aedeagal guide, form a compact complex which has limited movement in the sagittal plane. This is in contrast to the much longer thread-like flexible aedeagus and 180° or more rotation possible in most other tipuline genera. In Prionocera movement of the aedeagal complex is restrained by various attachments. The dorsal gonocoxal fragments are attached to the posterior apodeme of the sperm pump and the anterior end of the aedeagal guides are attached to its lateral walls. These are membranous attachments which allow for some pivoting of the pump in the sagittal plane. In Dolichocheza, the aedeagus is longer and more flexible and the pump pivots against the paired lateral attachments of the aedeagal guide (admicular rods, Byers, 1961), but there is no dorsal gonocoxal connection. In most Tipula and Nephrotoma species the sperm pump is completely free and muscle attachments on its apodemes to the body wall allow for almost 180° rotation of the pump in the sagittal plane (Byers, 1961).

The presence of the aedeagal guide in Dolichocheza and Prionocera is probably a plesiomorphic feature of the tipulines. In Prionocera the medial membranous connection between the gonocoxal fragments just posterior to the sperm pump is probably a fore-runner of the sclerotized horizontal connection of the gonocoxites as found in the subgenus Tipula (Angarotipula).

Females of Prionocera show no particular modifications of the basic ground plan of the Tipulinae.

GEOGRAPHIC DISTRIBUTION (Map 1)

The genus Prionocera has a northern circumpolar distribution with southern alpine extensions. In North America it ranges from the Aleutian Islands to Newfoundland. Collections have been made from the low arctic (Victoria Island and the Boothia Peninsula) to as far south as the Sangre de Cristo Range in the southern Rocky Mountains of New Mexico. In the Palearctic region Prionocera has been extensively collected in Fennoscandia and in northern U.S.S.R. (Savtschenko, 1983). The genus is also known from Greenland, England, and northern Europe, extending to the south into Switzerland.

The genus has also been recorded from North Korea (Alexander, 1945) and Laos (French Indo-China, Edwards, 1926). The Laotian specimen, judging from the description, is probably a species of Tipula (Angarotipula).

Prionocera is primarily a boreal genus. It is a characteristic component of the wetlands (muskeg) in the taiga and forest-tundra regions of the boreal zone (Pruitt, 1978) in North America and of the taiga and tundra regions in the Palearctic [Savtschenko, 1983; Lantzov, 1984]. In North America these regions are roughly equivalent to the Canadian and Hudsonian zones respectively of Merriam (Munroe, 1968). Prionocera species occur in the more open bogs and fens of these regions. I found the larvae shallowly submerged among mosses and the previous

year's decaying vegetation, mostly sedges and other small herbaceous plants. The present distribution of this genus closely approximates the extent of the muskeg in the northern hemisphere with a long southern extension into the wetlands of high altitude oroboreal (Hamet-Ahti, 1981) forests in the Rocky Mountains, a smaller southern extension into the Great Lakes-St. Lawrence Forest region in eastern Canada and a broader southern extension into the northern temperate zone in Europe. The evolution and dispersal of this genus is therefore intimately linked with the history and development of the boreal zone.

The boreal flora acquired many of its modern characteristics in the Tertiary period. Eastern Siberia and Alaska are part of the same continental plate and geological evidence suggests that some type of Asian-Alaskan land connection existed from the late Cretaceous until the Pliocene (Matthews, 1979). Lowland boreal forests first appeared in both North America and Asia during the middle to late Miocene. The Beaufort Formation (Miocene) exposed on the western edge of the Canadian Archipelago, is thought to include a representative of the early coniferous forests that may have been fore-runners of the forests now found in the boreal zone (ibid.). It contains a unique and rich assemblage of species from which developed the relatively depauperate boreal biota of today. This formation includes a mixed hardwood-conifer flora in southern Banks Island grading into a diverse assemblage of conifers in a forest-tundra zone in Meighen Island in the north. Recent comparisons of conifer fossils with those from similar sites of Miocene age from Siberia show that this boreal region was of Holarctic extent. The tree species are similar to but not identical with modern species and some of the mosses may be conspecific with extant species. Well-preserved beetle fragments are similar to their counterparts in modern holarctic species (ibid.).

There are as yet no identified Prionocera remains in the fossil record. The earliest fossil Tipulidae recorded from North America are from the White River and Green River beds dated Eocene (Cockerell, 1920; Wilson, 1978). In Europe the oldest fossils are from the Eocene-Oligocene transition (Alexander, 1931; Savtschenko, 1966). In all these fossil beds the family is numerous and already clearly differentiated into subfamilies and genera (Savtschenko, 1966; Brodo, 1967). Tipulids were recently identified from the Paleocene Paskapoo Formation, Alberta (Wighton, personal communication).

The morphological discreteness of this genus coupled with its possession of several presumably plesiomorphic features, suggests to me that Prionocera is indeed an old genus related to the genus Tipula. It must have been in existence at about the same time as the cylindrotomines in the early Tertiary. Furthermore, by analogy with the beetles mentioned above, it is quite likely that Prionocera was well-developed with a holarctic distribution by the late Miocene or early Pliocene. It should be looked for in the Beaufort Formation and in other boreal sites of similar age.

Quaternary events are considered to be primarily responsible for the distributional patterns of extant insects, not their evolutionary patterns. The frequency of climatic changes resulting in successive advances and retreats of the ice were generally faster than the presumed rates of evolution of most northern insects (Matthews, 1979). The individual species of Prionocera, however, are very similar to one another, which suggests a relatively recent origin. Speciation during the Pleistocene cannot be ruled out.

Populations of Prionocera must have survived the drastic temperature fluctuations and encroachments of the ice in some or all of the various refugia postulated (Scudder, 1979). The fragmented wetlands inhabited by Prionocera expanded and merged together with the retreat of the ice. For a time, a Beringian corridor allowed for some cross-migration of species between Asia and North America. Evidence suggests that during the Pleistocene this land bridge was a rather dry tundra-steppe (Young, 1971), yet there might have been scattered, shallow, wet depressions which could have harboured Prionocera. The present transcontinental extent of muskeg has made this "vegetation type" an avenue for transcontinental dispersion. This more recent history probably accounts for the wide distributions of several Prionocera species (see Maps 11, 12, 13, 16, 18, 19). Many other species from quite diverse groups have similar, broad distributions

across the boreal zone (Scudder, 1979).

Insects often fail to inhabit all of the area open to them. Distributions of northern insects are still in a state of flux with species probably still recolonizing the areas glaciated in the most recent Pleistocene advance (Scudder, 1979).

The collection records of Prionocera are too incomplete for any realistic statement about the distribution of some of the rarer species. Species originally thought to have very restricted distributions (e.g., unimicra, oregonica, recta) are now shown to have much broader ranges. Further careful collecting could result in other range extensions. The very short flight season, the often local and not too abundant occurrence of some species coupled with unfavourable collecting seasons often encountered in the north have undoubtedly affected our records.

FLIGHT RECORDS: 9 May-15 August

Prionocera is rare to locally abundant, and where it occurs it is usually one of the first species to appear in the spring.

KEY TO ADULTS OF PRIONOCERA

- 1 Crane flies lacking verticils.....2
- 1' Crane flies with verticils on flagellomeres...most Tipulidae (non Prionocera)
- 2 Flagellomeres broadest distally (Fig. 1); male with posterior processes on tergite 9 (Fig. 10); female with hypogynial valvulae 1/4 or more length of sternite 8, lightly sclerotized (Fig. 63).....Prionocera..3
- 2' Flagellomeres broadest medially; male without posterior processes on tergite 9; female with hypogynial valvulae very short, broad and fleshyTipula (Angarotipula)
- 3 Not conspicuously hairy, hairs on scutellum and mediotergite shorter and less dense than coxal hairs; nasus distinct.....4
- 3' Conspicuously hairy, hairs on scutellum and mediotergite as long and dense as coxal hairs; nasus usually very small or or absent.....16
- 4 Pleuron almost bare, no hairs on anepisternum.....5
- 4' Pleuron hairy, anepisternum with hairs.....7
- 5 Flagellomeres in male strongly distended (Fig. 1), distal width twice basal width; female flagellomeres slightly distended; entire anepimeron bare; tergite 9 (male) with subrectangular dorsal process, no lateral process (Fig. 25); inner gonostylus with characteristic rounded corner distally on broad base, distal beak short, without pigmented sensilla (Figs. 42, 59). Boreal, Holarctictjederi Mannheims
- 5' Flagellomeres not strongly distended, almost cylindrical in female; dorsal anepimeron with hairs, ventral anepimeron bare; tergite 9 (male) with triangular dorsal and lateral processes (Figs. 22, 23); inner gonostylus with small rounded base, long, cylindrical, slightly curved, distal beak with several pigmented sensilla (Figs. 41, 57).....6
- 6 Male with dorsal and lateral processes of tergite 9 subequal, small, triangular; apical process claw-like (Fig. 23); small tooth on tarsal claws. Female with dorsolateral edge of sternite 8 lobed; cerci long, narrow, slightly downcurved near tip (Fig. 74). Base of rostrum usually bare. Arctic and boreal, widespread, Holarctic.....subsericornis (Zett.)
- 6' Male with dorsal process of tergite 9 considerably longer than lateral process, apical process terminating in three small rounded points (Fig. 22); tarsal claws of male simple; rostrum with hairs extending to base. Female unknown. Known only from Abisko, Sweden.....setosa Tjeder

- 7 (4) Rostrum usually contrastingly coloured, dark dorsally, lighter ventro-laterally; if more or less uniformly coloured, then tergite 9 (male) with lateral process subequal to dorsal process.....8
- 7' Rostrum uniformly dark, or tip slightly lighter; tergite 9 (male) with dorsal process always larger than lateral process.....12
- 8 Shiny black to dark brown on vertex and anteriorly on thoracic stripes; flagellomeres strongly distended (Fig. 1) in male, slightly distended in female; tergite 9 (male) with lateral process insignificant (Fig. 14). Female with sloping dorsolateral edge on sternite 8, not lobed (Fig. 66). Boreal, Nearctic.....**electa Alexander**
- 8' Vertex and thoracic stripes entirely pruinose, gray or brownish gray to strong yellowish brown; flagellomeres variable; tergite 9 with lateral process long, triangular. Female with broadly rounded to distinctly lobed dorsolateral edge on sternite 8.....9
- 9 Tergite 9 (male) with dorsal process broad distally, apical process tooth-like, lying beneath dorsal process (Fig. 28); aedeagal guide with dorsal plate flat (Figs. 4,6). Female with conspicuous hairs distolaterally on tergite 10 (Fig. 8); sternite 8 with broadly rounded dorsolateral edge; hypogynial valvulae 0.4 length of sternite 8 (Fig. 78). Known only from the Yukon and a questionable specimen from Sweden.....**woodorum, n. sp.**
- 9' Tergite 9 (male) with dorsal and lateral processes similar, long, triangular; apical processes short, on median projection between, not ventral to, dorsal processes (Figs. 17, 24, 26). Female without conspicuous hairs on tergite 10; hypogynial valvulae 1/2 or more length of sternite 8.....10
- 10 Inner gonostylus broad, short tooth-like distal beak about as big as proximal beak (Fig. 58). Female unknown. Known only from the Kola Peninsula, U.S.S.R.....**subturcica Savtschenko**
- 10' Inner gonostylus with cylindrical distal beak considerably longer than proximal beak.....11
- 11 Obliterative streak and stigma contrasting with each other (Fig. 2); male with dorsal plate of aedeagal guide roundly expanded dorsally, bearing 3 or 4 small teeth (Fig. 7); dorsal process of tergite 9 slightly shorter and broader than lateral process (Fig. 26). Female with dorsolateral lobe on sternite 8; hypogynial valvulae 2/3 length of sternite 8 (Figs. 76, 92). Widespread, Holarctic.....**turcica (Fabricius)**
- 11' Obliterative streak and stigma not strongly contrasting; male with dorsal plate of aedeagal guide subapically expanded in a narrow dorsally curved flange (Fig. 5); dorsal and lateral processes of tergite 9 subequal (Fig. 17); female with rounded dorsolateral edge on sternite 8; hypogynial valvulae 1/2 length of sternite 8 (Figs. 68, 84). Boreal and oroboreal, Nearctic.....**oregonica Alexander**
- 12 (7) 1st flagellomere (both sexes) elongate, 1.5 length of 2nd; dorsum gray; tergite 9 (male) with free medial lobe, dorsal process broader than long; female with dorsolateral lobe on sternite 8.....13
- 12' 1st flagellomere moderate, less than 1.5 length of 2nd; dorsum brown to gray; tergite 9 (male) without free medial lobe, dorsal process squarish or longer than broad; female with rounded to sloping dorsolateral edge on sternite 8, not lobed. (Female of mannheimsi unknown.).....14
- 13 Inner gonostylus with distal beak cylindrical, tip rounded (Figs. 32, 48); female with single subapical dorsal hair (125 X magnification) on hypogynial valvulae. Widespread in Nearctic, with one record from northern Europe.....**dimidiata (Loew)**

- 13' Inner gonostylus with short, sharply pointed distal beak (Fig. 29); female without subapical hair. Known only from subarctic Russia.....
.....**abscondita Lackschewitz**
- 14 Middle thoracic stripe bisected by narrow, longitudinal, light yellowish brown line; tergite 9 (male) with dorsal process small, squarish; lateral process indistinct (Fig.27). Boreal and oroboreal, widespread in Nearctic.
.....**unimicra Alexander**
- 14' Middle thoracic stripe bisected by broad, longitudinal, contrasting, light gray or bluish gray stripe; tergite 9 with dorsal process large, subrectangular, lateral process clearly present.....15
- 15 Inner gonostylus with long, broad, distal beak, proximal beak angular (Figs. 30, 46); dorsum of thorax and abdomen grayish yellowish brown, dorsal abdominal stripe barely evident, tergites not contrastingly edged in pale yellow; female with broadly rounded to slightly lobed dorsolateral edge (Figs. 64, 80). Known only from Point Barrow, Alaska.....**byersi, n. sp.**
- 15' Inner gonostylus similar to recta (Fig. 38) with moderate, subcylindrical distal beak; dorsum of thorax and abdomen rusty grayish brown, dorsal abdominal stripe reddish grayish brown, tergites edged in pale yellow. Female unknown. Known only from Polar Ural, U.S.S.R.....
.....**mannheimsi Savtschenko**
- 16 (3) Pleural sclerites brownish pink to moderate reddish brown (33,43), female small (body length 6.7-11.4 mm, wing length 8.8-10.9 mm); hypogynial valvulae very short, 1/4 length of sternite 8, separated from sternite by small, squarish, membranous region, ventral edge of valvulae narrowly more heavily sclerotized (Figs. 73, 89). Male unknown. Known only from southern Manitoba.....**sordida (Loew)**
- 16' Pleural sclerites bluish gray; female larger (body length 10.3-17.6 mm wing length 12.3-17.5 mm); other characters not as above.....17
- 17 Male with dorsal process of tergite 9 large, longer than broad, lateral process narrow (Fig. 19); inner gonostylus with distal beak cylindrical, small raised bump in middle of lateral surface of base (Figs. 38, 54); female with rounded dorsolateral edge on sternite 8, not lobed; hypogynial valvulae short, 1/3 length of sternite 8, ventral edge with narrow, triangular sclerotization (Figs. 70, 86); hairs on thorax dark brown to yellowish white (most Nearctic specimens with dark hairs); obliterative streak and stigma usually contrasting with each other and with membrane (Fig. 2). Arctic and boreal, Holarctic.....**recta Tjeder**
- 17' Male with dorsal process of tergite 9 short, if longer than broad, then narrow; no lateral process; always with pale hairs on thorax; obliterative streak and stigma not contrasting with each other nor with membrane; combination of other characters not as above.....18
- 18 Tergite 9 with dorsal process broader than long, extending to, or almost to lateral edge of tergite; no nasus.....19
- 18' Tergite 9 with dorsal process about as long as broad, clearly set in from edge of tergite; nasus present or absent.....21
- 19 Tip of rostrum usually pruinose, with several stout, anteriorly projecting hairs; inner gonostylus large with high crest, broadly curved between long cylindrical distal beak and short squarish proximal beak (Figs. 34, 50). Female unknown. Known only from Québec and Labrador.....**naskapi, n. sp.**
- 19' Tip of rostrum shiny, glabrous, without stout hairs projecting anteriorly; inner gonostylus small, with sloping crest, emarginate between short cylindrical beak and triangular proximal beak; female with rounded to sloping dorsolateral edge on sternite 8.....20

- 20 Male with dorsal processes of tergite 9 very broad, space between less than 2/3 width of process; broad, membranous, triangular region mesal and anterior to apical processes (Fig. 16); female with hypogynial valvulae 1/3 length of sternite 8 (Figs. 67, 83); 11th flagellomere smallest. Arctic and boreal, Nearctic.....***ominosa* (Alexander)**
- 20' Male with space between dorsal processes of tergite 9 more than 2/3 width of process; evenly sclerotized region anterior and mesal to apical process (Fig. 21); female with hypogynial valvulae very short, 1/4 or less length of sternite 8 (Figs. 72, 88); 10th & 11th flagellomeres subequal. Arctic and boreal, Palearctic.....***serricornis* (Zetterstedt)**
- 21 Male with distal beak of inner gonostylus broad and flat; divided proximal beak; elliptical, less sclerotized area on lateral surface of base bearing several very short, scattered hairs (Figs. 39, 55); female with hypogynial valves narrowly more heavily sclerotized along ventral edge, bearing single slender subapical hair on dorsal surface; cerci downturned at tip (Figs. 71, 87). Arctic, boreal, Holarctic.....***ringdahli* Tjeder**
- 21' Male with distal beak on inner gonostylus more or less cylindrical, single proximal beak; other characters not as above.....22
- 22 Tergite 9 (male) with apical processes narrow, hook-like, separated by more than process width at base; characteristic circular, raised, densely hairy area on lateral surface of gonostylus base (Figs. 18, 53); female with triangular more heavily sclerotized area ventrally on hypogynial valvulae, no subapical hair dorsally; cerci straight to strongly upturned distally (Figs. 69, 85). Boreal, Holarctic.....***pubescens* Loew**
- 22' Tergite 9 (male) with apical processes broad, flat, separated by less than width of process at base; inner gonostylus with relatively long crest, short beak; no circular raised area on lateral surface of base (Figs. 12, 31, 47). Female unknown. Known only from southern Ontario.....***cryptica*, n. sp.**

DESCRIPTIONS OF SPECIES

***Prionocera abscondita* Lackschewitz**

Prionocera abscondita Lackschewitz, 1933: 136-137, Figs. 3a,b,c, (male terminalia, antennae); Mannheims, 1951: 63-64, Fig. 31 (male terminalia).

DIAGNOSIS

Inner gonostylus with distal beak narrowing abruptly to a sharp point, with several pigmented sensilla, base broadly rounded; hypogynial valves with lateral lobe angular; not conspicuously hairy.

DESCRIPTION (Figs. 10, 29, 63, 79)

ADULT. General appearance: gray to brownish gray with short yellowish white (92) hairs on thorax and abdomen, not conspicuously hairy; male wing length 11.5-12 mm; female wing length 15 mm.

MALE. Head: bluish gray to yellowish gray (191,93), vertex dark grayish brown (62) with short moderate brown (58) hairs; gena pale yellow (89) with scattered very short pale yellow hairs; rostrum mostly dark brown (59), light yellowish brown (76) ventrodistally, proclinate dark brown (59) hairs dorsally, projecting beyond moderate (0.087-0.10 mm) nasus; pseudo-ocellus dark brown (59).

Antenna: moderate brown (58) with dark orange-yellow (72) on pedicel and base of 1st flagellomere; 1st flagellomere long, more than 1.5 length of 2nd; proximal flagellomeres slightly distended ventrodistally, distal width less than twice basal width; 11th flagellomere very slender, 1/2 length of 10th.

Thorax: prescutum laterally not contrastingly yellowish; dorsal stripes brownish gray (64), glabrous; median stripe narrowly bisected by black line anteriorly, fading to light grayish yellowish brown (79) posteriorly, stripes bordered by light grayish yellowish brown (79); postsutural area, scutellum and mediotergite bluish gray to dark gray (191,192), bearing fine pale hairs shorter than coxal hairs; pleuron bluish gray (191) with light grayish olive (109) patches; anepisternum, katepisternum and dorsal 1/2 of anepimeron with hairs, ventral 1/2 of anepimeron and katepimeron bare; anatergite grayish olive (110) katatergite broadly pale yellow (89) dorsally, grayish olive (110) ventrally.

Wings: membrane tinged with light yellowish brown (76), veins moderate yellowish brown (77), stigma, costal and subcostal cells slightly darker than wing membrane; obliterative streak perpendicular to wing axis, weakly indicated, beginning as a pale area in R_1 just proximal to stigma.

Legs: no tooth on tarsal claws.

Abdomen: olive gray (113) with dark brown (59) dorsal longitudinal stripe; segments broadly edged laterally, narrowly edged distally in pale yellow (89); hairs very short.

Genitalia: 9th tergite with dorsal processes broad, rectangular, space between subequal to process width; lateral process short, angular; apical process claw-like; medial lobe present; rectal sclerite small, irregular. Gonocoxites not separated ventrally by protruding membrane; gonocoxal fragment narrow. Outer gonostylus broad, most of medial surface concave, with clearly defined raised edge. Inner gonostylus broad, dorsal crest abruptly narrowing to a sharply pointed distal beak, with several pigmented sensilla, proximal beak short, angled towards outer gonostylus. Aedeagus almost straight distally, small dorsal tooth near tip, more proximal lateral tooth on each side; aedeagal guide with dorsal plates flattened.

FEMALE. Similar to male, except as follows: flagellomeres not distended, lightened to moderate orange-yellow (71) basally; 9th, 10th and 11th shortest, subequal.

Genitalia: sternite 8 with angular lateral lobe on distal edge; hypogynial valves short, 1/3 length of sternite 8, separated from sternite by Y-shaped membranous region with long stem bisecting sternite; valvulae with subdorsal, longitudinal, narrow membranous region, tip broadly rounded, no subapical hairs; (tergite 9 distorted); sternite 9 with medial projection slightly longer than broad; tergite 10 with lateral edge almost straight bearing short, fine hairs; cerci moderately broad, straight, tip slightly downcurved.

TYPE SPECIMENS

Holotype (examined), male, Finland, Trifona, (now U.S.S.R.: Petsamo Distr., Pechenga), No. 436, Hellén, spec. type No. 4820 (ZMH); paratypes (not seen), 1 male, 1 female, Siberia: Polar Ural Karische Tundra, Gouv. Tobolsk, 19 vii 1909, F. Saizew (Leningrad).

The type has the right wing nicked in the middle of the costal region, tarsal claws are missing on the left front leg, and the entire right hind leg is missing. The genitalia had been preserved in balsam on a small plastic slide pinned beneath the specimen. It was necessary to dissolve the balsam and remove the genitalia to glycerine in order to verify that the differences noted were real, and not caused by the orientation of the specimen.

DISCUSSION

Prionocera abscondita is very similar to dimidiata, differing in the sharply pointed inner gonostylus of the male and the more angular lobe on sternite 8 of the female. It has a grayish brown presutural area which contrasts somewhat with the bluish gray postsutural region, whereas dimidiata is usually bluish gray in both regions. However, some older specimens of dimidiata also tend to have a brownish caste to the presutural area but this may be caused by fading. (Specimens which

have been warmed in NaOH lose their dark bluish gray colour and become moderate brown or lighter.)

Mannheims (1951) noted that abscondita is smaller than the European specimens of dimidiata (=absentiva). Prionocera dimidiata however, is quite variable in size in North America, as noted in the discussion of that species, and encompasses the size range of abscondita. No body lengths were given for abscondita because the genitalia had been removed before measurements were taken.

GEOGRAPHIC DISTRIBUTION (Map 2)

This species is only known from the tundra, above or at tree line, whereas its sister species dimidiata has only been collected near Berlin (Lackschewitz, 1933; Mannheims, 1951) in the Palearctic but is widespread in the Nearctic.

FLIGHT RECORDS: 5-19 July

SPECIMENS EXAMINED (2 males [MM], 1 female [F])

PALEARCTIC: **U.S.S.R.:** Murmansk Region, Petsamo Distr., Pechenga, 69°28'N 31°04'E, 1 M (holotype), Hellén (ZMH); Ponoj (=Ponoy), 67°02'N 41°03'E, 1 F, R. Frey (ZMH); Dudinka, 69°27'N 86°13'E, 1 M, Wuorentaus (MAKB).

Prionocera byersi, NEW SPECIES

DIAGNOSIS

Thoracic dorsum predominantly strong yellow-brown (74), longitudinally bisected by broad light bluish gray (190) line, hairs pale, short; nasus present; male flagellomeres not strongly distended; inner gonostylus with distal beak long, broad and flattened.

DESCRIPTION (based on 2 males, 2 females), (Figs. 11, 30, 46, 64, 80).

ADULT. General appearance: head, thorax and abdomen predominantly strong yellow-brown (74), not conspicuously hairy, hairs short, pale orange-yellow to strong yellowish brown (73,74); male wing length 12.2-12.8 mm (holotype 12.2 mm); female wing length 12.9-13.8 mm (allotype 12.9 mm).

MALE. Head: light yellowish brown (76), vertex with a light bluish gray (190) patch medially bisected by a dusky darker line, hairs light orange-yellow to deep yellowish brown (70,75) laterally, finer hairs on raised prominence between pseudo-ocelli; gena grayish yellow (90) to dusky black towards rostrum, with scattered hairs; rostrum dark grayish brown (62), lightened to dark orange-yellow (72) distolaterally near palpus, hairs short, appressed, dark brown (59) dorsally, extending fringe-like beyond nasus, paler and longer laterally; nasus distinct but small (0.075-0.1 mm); pseudo-ocellus moderate orange-yellow (71), flat to almost low-conical.

Antenna: dark brown (59), base of 1st flagellomere lightened to dark orange-yellow (72); 1st flagellomere not conspicuously elongated, subcylindrical, slightly distended ventrodistally, distal width less than 1.5 times medial width; succeeding flagellomeres progressively less distended, 7-10th cylindrical; 11th 1/2 or more length of 10th.

Thorax: prescutum laterally contrastingly yellowish brown (74); dorsal stripes deep yellowish brown (75), median stripe broadly bisected by line of pruinose light bluish gray (190) extending to and broadening across scutellum; stripes bordered by moderate yellowish brown (77); scutellum and mediotergite bluish gray (191) with fine pale hairs, hairs shorter than coxal hairs; pleuron light bluish gray (190), short pale hairs on all segments except for small katapimeron; anatergite bluish gray to yellowish gray (191,93); katatergite broadly light orange-yellow (70) dorsally, dark gray (206) ventrally.

Wings: tinged with light yellowish brown (76), veins moderate orange-yellow (71); costal and subcostal cells and stigma slightly more infumed than membrane; oblitterative streak perpendicular to wing axis, weakly indicated, beginning as a

paler area proximal to stigma.

Legs: tarsal claws with or without tooth.

Abdomen: grayish yellowish brown to moderate yellow-brown (80,70), dorsal longitudinal stripe barely visible; tergites not contrastingly edged distally and laterally; hairs pale, very short, appressed.

Genitalia: 9th tergite with dorsal processes large, subrectangular, longer than broad, separated by slightly more than width of process; lateral process short, truncate; apical process subrectangular with short sharp medially directed tooth; no medial lobe; rectal sclerite small, irregular. Gonocoxites not separated ventrally by protruding membrane; dorsal fragment of gonocoxite broadly triangular, narrowed tips almost meeting medially. Outer gonostylus with broad base, angulated then narrowed dorsally; medial surface concave except for poorly defined raised edge. Inner gonostylus with distal beak long, broad and flattened with several pigmented sensilla near base; proximal beak broad, acutely tipped; no dorsal crest. Aedeagus with tip straight, subapical narrow ring more prominent dorsally. Aedeagal guide with dorsal plate narrow, flat, rectangular, only slightly narrowed proximally.

FEMALE. Similar to male except as follows: 1st flagellomere and base of 2nd with short dark hairs; flagellomeres 2-8 very slightly distended distally; last 3 flagellomeres subequal, slightly longer than 8th.

Genitalia: sternite 8 with broadly rounded to slightly lobed dorsolateral edge; hypogynial valvulae approximately 0.4 times length of 8th sternite, separated from sternite by broadly Y-shaped membranous area with long stem bisecting sternite; valvulae with narrow, triangular, more sclerotized area ventrally, tips broad with very short subapical hair dorsally (125 X magnification) on paratype, none visible on allotype; 9th sternite with median projection relatively short and broad; 10th tergite broadly rounded laterally with short, fine hairs; cerci broad, slightly upturned preapically.

TYPE SPECIMENS

Holotype, male, Alaska, Point Barrow, 17 vii 1953, P.D. Hurd (USNM). Allotype, female, same data. Paratypes, 1 male, 1 female, same data as holotype (CNC, USNM). The holotype lacks most of the left fore leg and both middle legs. The allotype has the right wing nicked before the stigmal area. The genitalia of all four specimens have been removed, softened, placed in glycerine in microvials, and pinned beneath their respective specimens.

VARIATION

On the prescutum of the holotype the strong yellowish brown triangular region does not extend posteriorly as far as the prescutal pit. The holotype does not have a tooth on the tarsal claws; however, there is a distinct small tooth on the claws of the male paratype.

DISCUSSION

I am placing this species in the recta group. A very similar small raised bump occurs on the mid-lateral surface of the inner gonostylus in byersi and recta; a distinctive broad bluish gray streak bisects the thorax of byersi and mannheimsi; and the processes of the 9th tergite are similar in all three species. Prionocera byersi is distinguished by having a well-developed nasus, flagellomeres which are not strongly distended, and it is not a conspicuously hairy species.

GEOGRAPHIC DISTRIBUTION AND FLIGHT RECORD (Map 3)

Prionocera byersi is only known from Point Barrow, Alaska, where it was collected with P. recta on a single day, 17 July 1953.

ETYMOLOGY

This species is named in honour of George W. Byers, in recognition of his outstanding contributions to both crane fly and scorpion fly research.

Prionocera cryptica, NEW SPECIES**DIAGNOSIS**

Inner gonostylus much broader than long, with very long dorsal crest abruptly narrowing to a short cylindrical distal beak; tip of rostrum and nasus with dark brown (59) stripe dorsally bearing dark brown hairs.

DESCRIPTION (based on holotype), (Figs. 12, 31, 47)

ADULT. General appearance: head, thorax and abdomen dark yellow-brown to light yellowish brown (78,76), hairs long, white to light orange-yellow (263,70); male wing length 10.5 mm.

MALE. Head: light yellowish brown (76), vertex dark grayish brown (62), not bisected by a darker line, hairs light orange-yellow (70), long; gena yellowish gray (93) with short scattered hairs; rostrum dark grayish brown (62) with long pale hairs, dark brown (59) stripe dorsally bearing darker hairs, hairs extending beyond moderate nasus (0.075 mm); pseudo-ocellus brownish black (65).

Antenna: dark grayish brown (62), base of 1st flagellomere somewhat lightened; 1st flagellomere not conspicuously elongated, less than 1.5 times 2nd, moderately distended, distal width 1.5 times medial width, succeeding flagellomeres progressively smaller and less distended, (10th & 11th lost).

Thorax: prescutum laterally contrastingly dark orange-yellow (72); dorsal stripes glabrous dark grayish brown (62), median stripe bisected by, and stripes bordered by, light grayish yellowish brown (79); stripes indistinct on postsutural area, postsutural area and scutellum yellow-gray (93), divided by dark brown line; mediotergite light gray, scutellum and mediotergite with long pale hairs; pleuron light bluish gray (190), hairs long, on all segments except for small katepimeron; anatergite light gray (264), katatergite pale yellow (89) dorsally, medium gray (265) ventrally.

Wings: tinged with light yellowish brown (76), veins moderate yellowish brown (77); stigma, costal and subcostal cells scarcely darker than membrane; obliterative streak not strongly contrasting with membrane, beginning as weakening in R_1 just proximal to stigma and continuing somewhat diagonally before wing tip.

Legs: tarsal claws without tooth.

Abdomen: dark orange-yellow (72), broadly bisected dorsally by dark yellow-brown (78) longitudinal stripe; tergites broadly edged laterally with yellowish white (92), no lighter edge distally; hairs yellowish white, erect.

Genitalia: 9th tergite with dorsal process almost conical (holotype slightly distorted, right side of 9th tergite and right dorsal process slightly longer than left); without lateral process; apical process short, broad, with straight posterior edge produced in a medially directed, short, sharp tooth; without medial lobe; rectal sclerite long and thin. Gonocoxites not separated ventrally by protruding membrane; dorsal fragment of gonocoxite broadly triangular, heavily sclerotized at short proximal tip. Outer gonostylus with ventral edge broadly curved, dorsal edge straight, medial surface concave except for narrowly raised, poorly defined edge, broader at tip. Inner gonostylus with elongate crest narrowing abruptly to short cylindrical beak; no pigmented sensilla on beak; proximal beak broad; lateral surface with broad elliptical hairless area bearing several short setae. Aedeagus with tip slightly broadened and bent dorsally, without subapical teeth; aedeagal guide narrow, collar-like distally, abruptly broader subapically, forming rounded "shoulders," dorsal plate broad, flat, narrower towards sperm pump.

FEMALE. unknown.

TYPE SPECIMEN

Holotype, male, Ontario, Bells Corners, 45°17'N, 75°48'W, 9 May 1971, Fenja Brodo (No. 18348 CNC). The type is glued to a point, all legs are broken off, both antennae have been broken but several flagellomeres and tarsomeres and claws from

two legs are glued to the label.

DISCUSSION

This species may be closely related to *P. ringdahli*, sharing with that species the oval patch traversed by short stout setae on the lateral surface of the inner gonostylus. It is differentiated from *ringdahli* by having a nasus, flagellomeres which are only slightly distended, and by differences in the shape of the inner gonostylus.

GEOGRAPHIC DISTRIBUTION AND FLIGHT RECORD (Map 4)

The single specimen of *P. cryptica* was collected south of the boreal region and is the earliest seasonal record for this genus. The holotype was found among a collection of *Tipula* (*Angarotipula*) *illustris* Doane made in a *Typha* and *Carex* marsh under an electrical power line just west of the city limits of Ottawa. I had hoped to find more specimens, and even to rear this species during the course of this study. However despite diligent searching every spring for 13 years, no more specimens were found.

ETYMOLOGY

The surprising find of a single specimen of *Prionocera* in the Ottawa region, which I could not identify, led to my doing a revision of this genus. The name *cryptica* refers to its cryptic and elusive occurrence.

Prionocera dimidiata (Loew)

Stygeropis dimidiata Loew, 1866: 129; 1872: 3; Osten Sacken, 1878: 40; Alexander, 1920a: 199 (includes *subsericornis* and 1 male intergrade *dimidiata* x *subsericornis*).

Prionocera dimidiata; Kertész, 1902: 278; Alexander, 1927b: 215 (includes *P. turcica*); 1942a: 219, Fig. 25c (antenna); 1965a: 19.

Tipula rostellata Doane, 1901: 100.

Prionocera rostellata; Alexander, 1965a: 19. (New synonymy)

Prionocera rostellata churchilliana Alexander, 1942b: 206; 1965a: 19.

(New synonymy)

Prionocera rostellata prominens Alexander, 1942b: 206-207; 1965a: 19.

(New synonymy)

Pachyrhina oslari Dietz, 1918: 112-113.

Prionocera oslari; Alexander, 1965a: 19. (New synonymy)

Prionocera absentiva Mannheims, 1951: 64, Fig. 32 (male terminalia).

(New synonymy)

DIAGNOSIS

Male 9th tergite with dorsal process broadly rectangular, lateral process narrowly angular, median lobe present; 1st flagellomere in both sexes long, 1.5 length of 2nd.

DESCRIPTION (Figs. 3, 4, 13, 32, 48, 65, 81)

ADULT. General appearance: bluish gray to brownish gray dorsally, bluish gray laterally, thorax and abdomen not conspicuously hairy, with yellowish white to dark brown (92,59) hairs; male body length 7.8-11.2 mm, wing length 10.2-14.2 mm; female body length 11.7-16.5 mm, wing length 12.3-16.5 mm.

MALE. Head: vertex dark olive brown to olive black (96,114), usually divided by capillary black line, hairs short, brownish black to light grayish brown (65,60); gena bluish white (189) with scattered short light hairs; rostrum bluish gray to dark brown (191,59), light yellowish brown (76) distolaterally with proclinate brownish black (65) hairs, hairs projecting beyond moderate (0.075-0.15mm) nasus; pseudo-ocellus dark brown to brownish black (59,65).

Antenna: flagellum brownish black (65); 1st flagellomere long, more than 1.5 times 2nd; proximal flagellomeres slightly produced ventrodistally, distal width less than twice basal width; 11th flagellomere relatively long, more than 1/2 length of 10th.

Thorax: prescutal pit brown (191,55); prescutum laterally not contrastingly yellowish; dorsal stripes glabrous, grayish blue to dark bluish gray (186,192), or with brownish gray (64) caste on stripes, median stripe bisected by fine light bluish gray (190) line and stripes bordered by light bluish gray (190) region bearing yellowish white to dark brown (92,59) hairs; postsutural area, scutellum and mediotergite grayish blue to brownish gray (186,64), with fine hairs, not conspicuously hairy; pleuron generally bluish gray (191), hairs yellowish white (92); ventral half of anepimeron and small katapimeron bare; anatergite light olive gray to olive gray (112,113); katatergite grayish yellow to pale yellow (90,89) dorsally, olive gray (113) ventrally.

Wings: infumed with light yellowish brown to grayish yellowish brown (76,80), veins dark orange-yellow to brownish black (72,65), darker distally; costal and subcostal cells and stigma dark orange-yellow to moderate yellowish brown (72,77) not contrasting with membrane; weakly developed oblitative streak extending from distal tip of Rs through proximal end of discal cell.

Legs: tarsal claws with or without tooth, varying within individuals.

Abdomen: bluish gray (191) with dark brown (59) dorsal longitudinal stripe, hairs short, tergites usually edged distally and laterally in pale yellow to grayish yellow (89,90).

Genitalia: tergite 9 with dorsal processes broadly rectangular, slightly convex in dorsal aspect, space between subequal to width of process; lateral process narrow, angular; apical process medially curved, sharply pointed; medial lobe broad, pale, shallowly emarginate distally; rectal sclerite small, irregular. Gonocoxites without protruding membrane ventrally; gonocoxal fragment narrow, gradually attenuated towards sperm pump. Outer gonostylus broad, most of medial surface concave with clearly defined narrow raised edge. Inner gonostylus about as long as broad; dorsal crest gradually narrowing to slender glabrous distal beak; beak rounded at tip, with several (6-12) small, pigmented, sensilla laterally near base; proximal beak small, tooth-like. Aedeagus with small subapical dorsal tooth and occasionally with small lateral tooth, proximal to dorsal tooth. Aedeagal guide with dorsal plate flattened, relatively broad.

FEMALE. Similar to male, except as follows: flagellomeres not produced; 1st flagellomere lightened to strong brown (55) basally; 10th and 11th subequal or 11th slightly longer.

Genitalia: sternite 8 with rounded to somewhat pointed dorsolateral lobe; hypopygnal valves short, 1/3 length of sternite 8, separated from sternite 8 by short Y-shaped membranous region; valvulae with narrow oblique membranous area ventrally near tip, tip almost truncate, bearing single short subapical hair (visible with 125 X magnification); sternite 9 with median projection twice as long as wide; tergite 10 with lateral edge almost straight, bearing short fine hairs; cerci moderately broad, straight or slightly upturned near mid-length.

TYPE SPECIMENS

Loew (1866) described this species from a female collected by Kennicott in Hudson's Bay Territory. A range of measurements (in lines) is given, implying that more than one specimen was seen. There were nine specimens in the "type collection" (MCZ) comprising four different species. For convenience of discussion, I have numbered these specimens from 1-9 (see Appendix B).

The lectotype, here designated (No. 1), is a female which best matches the original description and measurements. It bears the following labels: H.B.T/ 134/ dimidiata m/ TYPE 10319/ Stygeropsis dimidiata. "H.B.T." refers to Hudson Bay Territory, which at the time of this collection referred to a huge tract of land encompassing the Bay. The number "134" was probably given to the specimen by Osten Sacken who sent material to Loew for identification. The hand-written "dimidiata"

m", is in Loew's handwriting (see Osten Sacken, 1903); and "m" is an abbreviation for "mihi" or "mine", indicating that this is indeed a specimen upon which the description was based.

The lectotype is damaged. The head, prothorax and all legs are missing and the tips of both wings are torn. The distinguishing characteristics of this specimen upon which the name dimidiata is based are the rounded dorsolateral lobes on the 8th sternite, the fine yellowish white hairs on the thorax, the lack of hairs on the ventral half of the anepimeron, the bluish gray thoracic stripes, the wing suffused with brown, stigma and costal cell only slightly darker, and a weak obliterative streak.

Of the two other female specimens that I judge to be conspecific with dimidiata and that are part of this type collection, No. 2 has only the "O. Sacken" label and its measurements are too small to be a syntype; No. 3 bears the label "H.B.T." and its measurements are too large. Specimens 4 and 5 are a mating pair of P. turcica labelled "H.B.T./ O. Sacken", therefore quite obviously not the specimens seen by Loew. Specimens Nos. 6, 7, 8 (2 females and 1 male respectively) are P. subserricornis; No. 6 bears the labels: H.B.T./ 134/ "Stygeropsis sp. dup" (sic). The number "134" and the old handwritten generic determination label suggest that No. 6 was the companion specimen to the specimen sent to Loew for determination. Its measurements are larger than those given for the type. Specimen No. 7 bears the label: "Type No. 10319", and measures slightly smaller than the type description. Specimen No. 8 is a male of P. subserricornis. Specimen No. 9 is a female of Tipula sp. labelled: Loew Coll./ Type 10319, and is also somewhat small.

Considering that the so-called type material included four different species, it is not surprising that Alexander also confused the identity of this taxon. In his earlier identifications, Alexander labelled this species dimidiata (Loew), occasionally confusing it with pubescens (Loew). However since 1942, both he and J. Speed Rogers (determinations in UMMZ) called this species rostellata and reserved the name dimidiata for the species here recognized as turcica.

SYNONYMY

Tipula rostellata was described from 2 males and 2 females collected by Morrison in Colorado (no further data) and designated Type no. 151, and deposited in the Washington Agricultural College & S. of S. (Doane, 1901). No specimens bearing that number were located. However, I have seen a female labelled "Colo./ Collection C.V. Riley/ Tipula rostellata Doane Paratype/ A.L. Melander Collection 1961" (USNM), and a male and a female labelled "Colo./ Collection C.V. Riley" (WSU). In the Alexander collection (USNM), slide No. 596, is a male labelled "ex Riley Coll., P. rostellata as Tipula, metatype." There are an additional two females labelled "Colo." (USNM). This Colorado label is identical to the label found on the other specimens mentioned above. I judge all these specimens to be conspecific with dimidiata.

Because I consider rostellata a synonym of dimidiata, I likewise do not recognize its subspecies. They were described from single male specimens collected at Churchill, Manitoba. The genitalia are slide-mounted. Prionocera r. churchilliana is clearly conspecific with dimidiata. The distinguishing feature of P. r. prominens, a "ridge or carina" on the 9th tergite, is the ventral edge of this tergite seen through the semitransparent lateral processes.

Pachyrhina oslari Dietz (1918), male holotype, South Park, Colo., No. 6436, 6/20/16, E.J. Oslar (ANSP); female allotype, South Park, Colorado, No. 6436, 6/18/16, (published as June 16, 1916) E.J. Oslar (ANSP); paratypes: 1 male, South Park, Colo., No. 6436, 6/21/16, E.J. Oslar (ANSP); 1 female, John Smith Ranger Sta., Cochetopa Nat. Forest, July 3, 1913, Colo., A.K. Fisher (ANSP). I have examined these specimens and judge them to be conspecific with dimidiata. An additional female paratype, South Park, Colo., is listed as being deposited in the collection of the United States Biological Survey (Dietz, 1918).

Prionocera absentiva Mannheims (1951), male holotype, Jungfernheide (Berlin), 1889, Peters (listed as being in the Berlin Museum, but not there, pers. comm., Schumann, 1983). Paratypes: 7 males, without locality labels, probably topotypic

(Mannheims, 1951) and labelled by Mannheims "Jungfernheide, 1889, Peters." Five of these paratypes are in the Berlin Museum and three in Bonn. One of the specimens in Bonn must be the holotype.

I have examined two male paratypes, nos. 52 and 53 (MAKB). The genitalia indicate that absentiva is a synonym of dimidiata. The German specimens have yellowish white (92) hairs on the abdomen and pleuron, but the hairs on the head and thoracic dorsum are strong brown (55) and the abdominal tergites lack lighter lateral and distal borders. These variations are found in some North American populations.

VARIATION

Specimens from New Mexico and Colorado tend to be larger than those from Labrador and northern Québec. The darkest specimens are from New Mexico and are predominantly dark bluish gray (192) with abdominal segments having only very narrow, or in some cases no yellow (90) distal and lateral borders, as opposed to the broader and lighter borders found in most other specimens. Also the wings are dusker and hairs on the gonostylus are brownish black (65) rather than the more common deep brown (56) or light orange yellow (70). Populations from the Yukon, Northwest Territories and Alaska tend to be lighter with a brownish caste on the thoracic stripes.

DISCUSSION

This species is very similar to the much rarer palearctic P. abscondita Lackschewitz, which has a more restricted northern distribution. See discussion under that species.

GEOGRAPHIC DISTRIBUTION (Map 5)

Prionocera dimidiata is one of the most common and widespread species of Prionocera in North America. It is found in the subarctic, boreal, and subalpine regions ranging from Alaska to Labrador, south of the Arctic Circle except at the Mackenzie Delta, and ranging southward along the Rocky Mountains as far as the southern Sangre de Cristo Mountains in New Mexico.

In the Palearctic Region this species has only been collected from Jungfernheide (Berlin) (Mannheims, 1951).

In all the regions where I collected dimidiata (Manitoba, Québec and Colorado) this species was found flying among the stems of Carex aquatilis. This sedge seems to be the dominant plant in fens across boreal North America. Females were observed apparently depositing eggs in mud puddles left by old tractor tracks next to Carex stands and also around the stem bases of this sedge.

FLIGHT RECORDS: 29 May-15 August.

This species is locally abundant from late June to the first three weeks of July. It was collected exceptionally early in Yellowknife, N.W.T. (29 May) and late (15 August) from Echo Lake, Colorado.

SPECIMENS EXAMINED (539 males [MM], 208 females [FF])

NEARCTIC: CANADA: ALBERTA: Banff Nat'l Pk., 1 M, 9 vii 55, G.E. Shewell (CNC); 6 MM, 7 vii 55, J.R. McGillis (CNC); Bilby, 53°42'N 114°06'W, 2 MM, 8-25 vi 24, O. Bryant (as dimidiata & sordida, pinned, BMNH slides No. 1441 & 3589, wing & antenna, USNM); Devon (SW Edmonton), 14 MM, 4 FF, 12 vi 80, D.M. Wood (CNC); Edmonton, 3 MM, May, C.F. Adams (PUL); Kananaskis Forest, Seebe Forest Exp. Sta., 1 F, 26 vi 68, H.J. Teskey (CNC), wing, legs, antenna (slide No. 68-32-6, as sordida, Alexander Coll., USNM); Sunwapta Pass, Banff-Jasper Hwy., 6600', 1 M, 1 F, 5-9 vii 55, R. Coyles (CNC). BRITISH COLUMBIA: Atlin, 2200', 3 MM, 1 F, 14-23 vi 55, B.A. Gibbard; Riske Creek, Ballpark Pond, 52°N 122°5'W, 1 M, 10 v 78, R.J. Cannings (SUBC). LABRADOR: Hebron, 2 MM, 10-16 vii 54, J.F. McAlpine (CNC); Hopedale, 1 F, 24 vii 22 (CNC); Greenbush, 37 km NW Schefferville, P.Q., 4 MM, 1 F, 7-11 vii 81, F. Brodo (CNC); Nutak, 1 M, 23 vii 54, E.E. Sterns (CNC); 1 M, 1 F, 23 vii 54, J.F. McAlpine (CNC). MANITOBA: Churchill, 1 M, 1 F, 8-30 vii 52, J.G. Chillcott (CNC);

1 F, 24 vi 48, 1 M, 29 vi 49, L.A. Miller (CNC); 1 M, 1 F, 9-17 vii 49, J.B. Wallis (CNC); 1 F, 25 vi 48, G.E. Shewell (CNC); 2 MM, 1-3 vii 47, T.N. Freeman (CNC); 7 MM, 2 FF, 24 vi-10 vii 77, F. Brodo (CNC); 52 MM, 6 FF, 28 vi-14 vii 78, F. Brodo (CNC); same data 1 M, 1 F, (VIL); 2 MM (OSU); 1 M, 1 F, 29 vi-6 vii 49, (CNC); Eastern Creek, near Churchill, 1 M, 1 F, 25 vi 52, J.G. Chillcott (CNC); Farnworth Lake., near Churchill, 10 MM, 2 FF, 12-26 vi 52, J.G. Chillcott (CNC); Fort Churchill, 1 M, H.E. McClure (Holotype No. 17 CH 41, P. rostellata churchilliana, slide no. 7493, Alexander Coll. USNM); 1 M, H.E. McClure (Holotype no. 3 CH 38, P. rostellata prominens Alexander, slide no. 7494, Alexander Coll. USNM); 30 MM, 10 FF, 3-28 vi 52, J.G. Chillcott (CNC); 2 MM, 23 vi-8 vii 52, C.D. Bird (CNC); 1 M, 1 F, 20 vi 48, Fred Ide (SEM); 11 MM, 2 FF, 20 vi 48, Fred Ide (UMMZ); Mile 505, Hudson Bay Railroad, 2 MM, 13 vi 52, J.G. Chillcott (CNC); 25 mi E Churchill, 13 MM, 6 FF, 29 vi-4 vii 77, F. Brodo (CNC); Warkworth Creek, near Churchill, 31 MM, 4 FF, J.G. Chillcott (CNC). NORTHWEST TERRITORIES: Keewatin Distr., Eskimo Point, 2 FF, 1 vii 50, G.R. Roberts (CNC); Padley (Padlei?, 62°N 96°50'W), 1 F, 22 vii 50, R.A. Hennigar (CNC); Mackenzie Distr., Aklavik, 25 MM, 3 FF, 16-21 vi 53, C.D. Bird (CNC); 1 F, 30 vi 56, R.E. Leech (CNC); Ford Lake, 63°11'N 107°19'W, 1 M, 4 vii 66, G.E. Shewell (CNC); Salmita Mines, 64°05'N 111°15'W, 1 M, 1 vii 53, J.G. Chillcott (CNC); Yellowknife, Kam Lake, 1 M, 2 FF, 20 vi 66, G.E. Shewell (CNC); Yellowknife, 7 MM, 3-6 vi 53, J.G. Chillcott (CNC). ONTARIO: Cape Henrietta Maria, Hudson Bay, 11 MM, 14 FF, 3-6 vii 48 (UMMZ); 3 MM, 9-22 vii 48, W.Y.W. (UMMZ); 1 M, 1 F, 3-6 vii 48 (SEM); Fort Albany, James Bay, 4 MM, 1 F, 10-25 vi 42, F.A. Urquart (UMMZ); Fort Severn, 55°59'N 87°38'W, 1 F, 2 vii 40, C.E. Hope (ROM). QUEBEC: Bradore Bay, 51°28'N 57°14'W, 4 MM, 2 FF, 9-16 vii 30, W.J. Brown (CNC); Fort Chimo, 3 MM, 22-28 vi 48, H.N. Smith (CNC); 3 MM, 23 vi-5 vii 48, R.H. MacLeod (CNC); 1 M, 6 vii 54, J.G. McAlpine (CNC); Rupert House, 51°30'N 78°24'W, 1 F, 18 vi 49, E.J. LeRoux (CNC); Schefferville, 1 M, 7 vii 81, F. Brodo (CNC); 37 km NW Schefferville, Annabel Bog, 66 MM, 1 F, 13-20 vii 81, F. Brodo (CNC); same data: 1 M (CD), 1 M (OSU). YUKON: Kluane, 61°02'N 138°23'W, pond SE of Sims R. bridge, 1 F, 16 vi 79 (ex pupa, emerged 18 vi 79), S.G. Cannings (SUBC); Otter Lake, 130°25'N 62°31'W, 4000', 1 M, 16 vii 60, J.E.H. Martin (CNC); Swim Lakes, 133°N 62°13'W, 3200', 7 MM, 2 FF, 13-18 vi 60, J.E.H. Martin (CNC); Whitehorse, 1 M, 20 vi 49, D.L. Watson (CNC); 1 M, 1 F, 1, 14 vii 49, L.C. Curtis (CNC); 1 F, 30 vi 48, W.R. Mason (CNC); 1 F, 27 vii 49, J.K. Horie (SUBC). "Hudson's Bay Territory," 2 FF, Kennicott (one designated as lectotype of dimidiata) (MCZ).

U.S.A.: ALASKA: Isabel Pass, Mile 206, Richardson Hwy., 2900', 1 M, 1 F, 13-17 vii 62, P.J. Skitsko (CNC); 2 FF, 13 vii 62, R.E. Leech (CNC); Katmai, 4 MM, 2 FF, 10 vi 19, Jas. S. Hine (destroyed in mail, OSU); McKinley Nat'l Pk., No. 16, Horseshoe Lake, 1 F, 26 vi 57, G.W. Byers (SEM); Igiak Bay, 61°43'N 166°08'W, 3 FF, 23 vi-4 vii 52, P.S. Humphrey (UMMZ); Savonoski, Naknek Lake, 1 M, vi 19, J.S. Hine (destroyed in mail, OSU); Unalakleet, 1 F, 17 vi 61, R. Madge (CNC). COLORADO: Boulder Co., Corona Pass, 10,600', 2 MM, 6 vii 61, J.G. Chillcott (CNC); Lefthand Bog, 40°04'N 105°34'W, 10,700', 18 MM, 6 FF, 11-17 vii 79, F. Brodo (CNC); same data, 1 M (SEM), 1 M (CD), 1 F (OSU); North Boulder Creek, 40°02'N 105°34'W, 10,600', 19 MM, 2 FF, 5 vii 79, F. Brodo (CNC); Rainbow Lakes, 40°01'N 105°35'W, 10,100', 42 MM, 14 FF, 2-10 vii 79, F. Brodo (CNC); same data: 1 M, 2 FF (SEM), 2 MM (VIL), 2 MM (OSU); Mt. Research Station, Nederland, 20 MM, 6 FF, 25-29 vi 79, F. Brodo (CNC); Chaffee Co., Buena Vista, 7,800', 1 F, 22-23 vi 61, J.R. Stainer (CNC); Clear Creek Co., Summit Lake, Mt. Evans, 12,800', 6 MM, 24 vii 61, J.R. Chillcott (CNC); 1 M, 24 vii 61, W.R.M. Mason (CNC); Echo Lake, Mt. Evans, 9,600', 1 F, 26 vii 61, B.H. Poole (CNC); 10,600', 2 MM, 13-25 vii 61, C.H. Mann (CNC); 12,000', 1 M, 15 viii 49, R.R. Dreisbach & R.R. Schwab (UMMZ); Floral Park, Berthoud Pass, No. 2, 2 MM, 30 vi 74, George W. Byers (SEM); No. 3, 9 MM, 1 F, 9 vii 74, G.W. Byers & C.W. Young (SEM); Eagle Co., Tennessee Pass, 10,240', 2 MM, 1 F, 9-17 vii 30, J.M. Aldrich (USNM); Grand Co., Middle Fork of Williams Fork River, 11,425', 1 M, 19 vii 29, C.F. Clagg (as rostellata, slide no. 596, Alexander Coll. USNM); Lake Co., South Park, 2 MM, 1 F, 18-21 vi 16, E.J. Oslar (M holotype, F allotype, & M paratype of oslari ANSP); Saguache Co., Cochetopa, Nat. Forest, John Smith Ranger Station, 1 F, 3 vii 13 (paratype of oslari, ANSP); Summit Co.,

Loveland Pass, 12,000', 1 M, 7 viii 61, J.R. Chillcott (CNC); Jackson Co., 10 mi N junction routes 14 & 40, 1 F, 2 vii 62, R. & K. Dreisbach (MSU); Rocky Mountain Nat'l Pk., Cache La Poudre Lake, Continental Divide, 1 M, 14 vii 40, Marian E. Smith (as oslari, slide no. 7090, Alexander Coll. USNM); Marshall Pass, 10,856', 1 M, 28 vii 08, J.M. Aldrich (USNM); Brainerd Lake, 9,500', 1 F, 27 vi 62, R. & K. Dreisbach (MSU); State Creek Ranger Station, 1 M, 10 vii 29, C.F. Clagg (as rostellata, slide no. 596, Alexander Coll. USNM); Colorado, no further data: 1 F, 2 vii 62, Riley coll., A.L. Melander, paratype rostellata, (USNM); 2 FF, (USNM); 1 M, H.K. Morrison, ex Riley coll., (slide no. 596, "metatype" rostellata, Alexander Coll. USNM); 1 M, 1 F, C.V. Riley coll. (WSU); 3 MM, Morrison (coll. Bergenstamm) (NHMV). MINNESOTA: Rochester, 3 MM, 19 vi 22, H.G. Dyar (USNM). NEW MEXICO: Sante Fe Co., no. 5, Aspen Basin, 15 mi NE Sante Fe, 10,300', 21 MM, 2 FF, 16 vi 79, G.W. Byers (SEM); no. 9, Aspen Basin, 17 mi NE Sante Fe, 10,500', 2 MM, 1 F, 22 vi 81, G.W. Byers & S. Teale (SEM). WYOMING: Albany Co., Nash Fork campground, 11 km NW Centennial, 41°21'09"N 106°14'21"W, 3105 m, 1 M, 9 vii 81, Stephen Teale (SEM); Carbon Co., Silver Lake, 30 km Centennial, 2 MM, 1 F, 10-11 vii 81, S. Teale (SEM); Silver Lake campground, Medicine Bow Mts., 10450', 1 M, 18 vii 81, G.W. Byers #2; Sheridan Co., no. 2, 4 MM, 1 F, 13 vii 50, G.W. Byers (UMMZ); Yellowstone Nat'l Pk., 3 FF, 29 v 30, J.S. Alexander (UMMZ); Yellowstone Canyon, 1 M, 4 vii 22, H.G. Dyar (USNM); Yellowstone Lake, 5 MM, 12-27 vii 22, H.G. Dyar (USNM).

PALEARCTIC: **GERMANY (BRD)**: Berlin, Jungfernheide, 2 MM, 1889, Peters (paratypes, absentiva Mannheims) (MAKB).

Prionocera electa Alexander

Prionocera electa Alexander, 1927b: 188-189; 1942a: 219; 1965a: 19.

DIAGNOSIS

Shiny black to shiny dark brown on vertex and anteriorly on thoracic stripes; white obliterative streak contrasting with dark stigma and dusky wing tip; nasus present.

DESCRIPTION (Figs. 14, 33, 49, 66, 82)

ADULT. General appearance: stripes dark, contrasting with lighter background; hairs short, sparse, pale yellow to yellowish white (89,92); male body length 10.0-11.4 mm, wing length 12.1-13.9 mm; female body length 12.1-13.6 mm, wing length 11.8-15.1 mm.

MALE. Head: vertex shiny dark brown to black (59,267), hairs short, dark brown to light yellow-brown (78,76); gena pubescent, yellowish white (92) to brilliant orange-yellow (67) around antennal bases and base of rostrum, sometimes with scattered short dark yellowish brown (78) hairs; rostrum shiny, strong yellowish brown to black (74,267) dorsally, contrastingly lightened to dark orange-yellow (72) laterally, hairs deep brown (56), proclinate, projecting beyond moderate (0.1-0.15 mm) rather broad nasus; rostrum bare posterodorsally; pseudo-ocellus dark brown to black (59,267).

Antenna: flagellum brownish black (65), scape, pedicel and basal 1/2 of 1st flagellomere usually dark orange-yellow (72); 1st flagellomere not conspicuously elongated; 1st to 4th strongly distended distoventrally, distal width twice width at base, succeeding flagellomeres progressively less distended, 10th cylindrical, longer than 9th; 11th minute, less than 1/4 length of 10th.

Thorax: prescutum laterally not contrastingly yellowish; dorsal stripes glabrous, deep brown to black (59,267), shiny anteriorly, becoming pruinose posteriorly; median stripe bisected by narrow line, stripes bordered by light grayish yellowish brown (79); postsutural area and scutellum concolourous with dorsal stripes; scutellum covered with short hairs; mediotergite pruinose with fine hairs; pleuron light bluish gray to bluish gray (190,191); anepisternum sparsely hairy medially; katepisternum hairy on dorsal 1/2; anepimeron sparsely hairy on dorsal 1/2 just below wing, and anteriorly on lower section; katepimeron bare;

anatergite light blue gray to grayish brown (190,61); katatergite light orange-yellow (70) dorsally, dusky grayish brown (61) ventrally.

Wing: membrane yellowish gray (93); veins dark yellowish brown to brownish black (78,65), most veins seamed with moderate yellowish brown (77); costal and subcostal cells and wing base moderate to strong yellow (87,84); stigma contrasting with membrane, distal 1/2 of stigma and bases of radial cells dark yellowish brown (78), proximal 1/2 of stigma pale yellow (89); strongly developed oblitative streak extending from proximal 1/2 of stigma to posterior wing margin, perpendicular to costa.

Legs: tarsal claws toothed.

Abdomen: grayish yellowish brown to deep yellowish brown (80,75) divided longitudinally by dark yellowish brown (78) stripe; segments edged distally and laterally in pale orange-yellow (73); hairs dark brown (59) dorsally, yellowish white (92) ventrally.

Genitalia: 9th tergite more convex than in other species; dorsal processes separated at base by width of process; lateral process insignificant; apical process broad at base, sharply narrowed and curved medially; medial lobe not free, its distal edge contiguous with bases of apical processes; rectal sclerites joined by narrow dorsal extension. Gonocoxites with protruding membrane ventrally; gonocoxal fragment long narrow, attenuated towards sperm pump. Outer gonostylus with broad basal 1/2 concave on medial surface, distal half narrower. Inner gonostylus with no distinct dorsal crest; distal beak lacking peg-like pigmented sensilla; proximal beak small, pointed and lying just proximal to small curved notch. Aedeagus with tip bent ventrally, small subapical dorsal tooth, no lateral tooth. Aedeagal guide extending distally as a sclerotized collar, dorsal plate long, narrow and flat.

FEMALE. Similar to male, except as follows: flagellomeres not distended, 1st flagellomere more extensively pale than in male; last 3 flagellomeres cylindrical, narrower, penultimate fractionally shorter than the other two.

Genitalia: sternite 8 with dorsolateral edge sloping, not lobed; hypogynial valves 1/2 length of sternite 8, separated from sternite by narrow curved membranous region, extending broadly and anteriorly on sternite; valvulae broadly sclerotized ventrally, tip narrowly rounded, with single short subapical hair (visible with 125 X magnification); sternite 9 with medial projection longer than broad; tergite 10 straight-edged with only fine hairs distolaterally; cerci moderately broad, almost straight to tip.

TYPE SPECIMENS

Holotype (examined), male, Hopedale, Labrador, 1 vii 1923, W.W. Perrett (no collector on label) (CNC), left wing and right antenna (slide No. 3590, Alexander Coll. USNM).

This specimen lacks the left fore leg and both hind legs. The 2nd and 3rd flagellomeres of the left antenna are partially fused and distorted.

DISCUSSION

A presumed mating pair of P. electa (male) and P. turcica (female) from the Churchill area, J. G. Chillcott collector, are in the CNC collection. Both these specimens have a strongly pigmented stigmal region preceded by a contrasting oblitative streak giving them a remarkably similar appearance. Whether this actually represents a genuine case of interspecific mating is open to question. Another mismatched pair also presumed to be a mating pair was described as the holotype and allotype of P. fulvicauda Alexander (see discussion under P. oregonica). These are the only recorded incidences of possible attempted interspecific matings in either Prionocera or other crane flies (Byers, 1961, 1983).

GEOGRAPHIC DISTRIBUTION (Map 6)

Prionocera electa appears to be a rare species; it has been found sporadically from Labrador to Churchill, Manitoba.

Larvae from Schefferville were found in saturated moss, and judging from gut contents and fecal pellets, were eating both the moss and the rich algal flora clinging to it.

FLIGHT RECORDS: 16 June-22 July.

SPECIMENS EXAMINED (6 males [MM], 12 females [FF])

NEARCTIC: **CANADA:** LABRADOR: Cartwright, 1 M, 1 F, 2, 20 vii 55, E.E. Sterns (CNC). QUEBEC: Fort Chimo, 1 F, 6 vii 48, R.H. MacLeod, (CNC); Great Whale River, 2 FF, (1 ex pupa), 30 vi, 7 vii 49, J.R. Vockeroth (CNC); Schefferville, 5 FF, 4-18 vii 81, F. Brodo (CNC); same data: 1 F (SEM); 2 MM, 16 vi, 22 vii 48, E.G. Munroe (CNC); MANITOBA: Churchill, 1 M, 1 F, 1 vii 49; 1 M, 26 vi 52, Chillcott, (CNC); Herchmer, 1 M, 1 F, 5, 6 vii 48, J.B. Wallis (CNC).

Prionocera manheimsi Savtschenko

Prionocera manheimsi Savtschenko, 1983: 498.

DIAGNOSIS

Thoracic dorsum predominantly rusty grayish brown, longitudinally bisected by broad light or bluish gray stripe; hairs short; nasus very small; flagellomeres not strongly distended; inner gonostylus with distal beak subcylindrical.

DESCRIPTION (based on Savtschenko, 1983, no figures presented)

ADULT. General appearance: "head, thorax and abdomen predominantly rusty grayish brown, not conspicuously hairy; body length 14 mm; wing length 13 mm."

MALE. Head: "gray with black mid line, sides and vertex rusty-brown, orbits narrow gray; rostrum brown with gray dorsally; barely developed nasus (ant-hill like); hairyness of head not very pronounced."

Antenna: "somewhat serrated, 1st segment (scape) gray; 2nd (pedicel) & first flagellomere reddish with gray; rest of flagellomeres grayish brown."

Thorax: "prothorax grayish brown, laterally and ventrally grayer; prescutum rusty grayish brown with grayish brown longitudinal stripes, middle stripe separated by very wide light or bluish gray stripe crossing scutum and continuing on greater part of scutellum and postscutellum; a not very clearly defined black line visible along mid dorsum from above, longitudinally bisecting light median stripe from anterior edge to top of prescutum; pleura, including meron and 'bowls' (=katepisternum?) light gray or purplish gray; only pleurotergites brownish."

Halter: "reddish-brownish gray with brownish gray bases of stem and knob."

Wings: "relatively narrow, with strong reddish-grayish brown tint; stigma not very noticeable; relatively well defined moon-shaped area (obliterative area) barely reaches behind base of discal cell."

Legs: "femora, tibia and tarsi reddish brown; top of femora browner; tarsi brown."

Abdomen: "gray with reddish-grayish brown dorsal stripe and lighter yellowish stripe on edges of tergites."

Genitalia: "lobes of hypopygium reddish brown; gonostyles and gonopleurites (gonocoxites) as in P. lapponica but dorsal (distal) beak of latter slightly bent; lateral processes of 9th tergite small, tooth-shaped; middle (apical) processes nail-shaped, as in lapponica; dorsal processes elongated, approximately as in recta but shorter with slightly wider and rounded tips pointing upwards."

FEMALE: "unknown."

TYPE SPECIMENS

Male holotype (not seen), U.S.S.R.: Polar Ural, 5 vii 09, Saitsev (Leningrad).

DISCUSSION

This species appears to be very similar to *P. byersi* described above from Alaska. Both *mannheimsi* and *byersi* are distinguished by a broad, longitudinal, light bluish gray stripe on the thoracic dorsum and they have very similar 9th terga, only slightly distended flagellomeres, and are not conspicuously hairy. However, *mannheimsi* differs from *byersi* in the more rusty brown rather than yellowish brown caste to the thorax and in the shape of the gonostyli. The gonostyli of *mannheimsi* were not illustrated but were described as being similar to those of *recta*, whereas the inner gonostylus of *byersi* is clearly different, having a broader and more elongated distal beak.

Savtschenko states that: "If the collection at the Zoological Institute of Academy of Sciences did not have a few specimens of *mannheimsi* from two geographically separated points it could be accounted for as a hybrid of *subserricornis* and *lapponica*." He adds: "The tendency to nasus reduction and the shape of the gonopleurites of the males suggest a close relationship to *lapponica* and *recta* and that is why this species is included in the *serricornis* group. However, the not very strongly distended flagellomeres and relatively weak lowering of the head and thorax suggest a closer relationship to *subserricornis*."

Based on the published description of this species, I am placing it in the *recta* group.

GEOGRAPHIC DISTRIBUTION (Map 7)

"U.S.S.R.: Polar Ural (67°N 65°E); Cape Horgo (74°N 114°E) coastal area of Anabarsk Gulf near the delta of Anabora R. into Laptev's Sea." These areas are typical tundra (Lantzov, 1984).

FLIGHT RECORDS: 27 June-5 July

SPECIMENS EXAMINED: none.

Prionocera naskapi, NEW SPECIES**DIAGNOSIS**

Conspicuously hairy on head and thorax; dorsal process on 9th tergite broader than long, no lateral process, apical processes narrow, hook-like, relatively far apart.

DESCRIPTION (based on 10 males), (Figs. 15, 34, 50)

ADULT. General appearance: head and thorax grayish brown to dark grayish brown (61,62), pleuron light bluish gray (190), hairs on head and thorax conspicuous, dark grayish yellowish brown to light yellowish brown (81,76), varying with individual; male body length 8.9-9.5 mm, wing length 10.7-11.4 mm (holotype 10.7 mm).

MALE. Head: vertex dark grayish brown (62), bisected with longitudinal black line, hairs relatively long; gena light bluish gray (190), with short dark hairs; rostrum entirely dark grayish brown (62) with proclinate short stiff hairs on distal 2/3, hairs appressed distally, projecting beyond bump-like rostral tip, no distinct nasus; pseudo-ocellus brownish black (65).

Antenna: flagellum dark grayish brown to brownish black (62,65) 1st flagellomere with subcylindrical base, distended distoventrally, succeeding flagellomeres distended, almost triangular in lateral outline, distal flagellomeres progressively smaller and less distended, 10th cylindrical, slightly longer than 9th; 11th small, approximately 1/2 length and width of 10th.

Thorax: prescutum laterally not contrastingly yellowish; dorsal stripes dark grayish brown (62), median stripe divided by narrow light yellowish brown (76)

line, becoming duskier anteriorly, stripes bordered by light yellowish brown (76) region bearing long dense hairs, hairs dark grayish yellowish brown to light yellowish brown (81,76); postsutural area, scutellum and mediotergite dark grayish brown to light yellowish brown (62,76), with long hairs; pleuron light bluish gray (190), with long hairs on all but small katepimeron; anatergite light olive gray (112); katatergite dark yellow to light yellow (88,86) dorsally, dark gray (266) ventrally.

Wings: tinged with light brownish gray to light grayish yellowish brown (63,79); veins deep yellowish brown (75); costal and subcostal cells light yellowish brown (76); stigma with distal half slightly darker than proximal half; obliterative streak weakly developed, extending from proximal paler half of stigma, continuing almost perpendicular to costa near wing tip.

Legs: no tooth on tarsal claws.

Abdomen: light gray (264) with dark brown (59) dorsal longitudinal stripe, tergites narrowly edged distally, more broadly edged laterally in pale yellow (89); tergites and sternites with dark yellowish brown to light yellowish brown (78,76), appressed hairs dorsally, more erect laterally, ventrally and dorsally on 1st tergite.

Genitalia: tergite 9 with dorsal process broader than long, slightly tapered distally, separated by width of process or less; no lateral process; medial lobe not distinct, fused to bases of apical processes; apical process narrow, hook-like, close to lateral edge of tergite; rectal sclerite long and thin. Gonocoxites not separated ventrally by protruding membrane; dorsal fragment of gonocoxite narrow. Outer gonostylus almost triangular, ventral edge broadly curved, dorsal edge almost straight, medial surface concave except for raised tip. Inner gonostylus with distinct dorsal crest; narrow cylindrical distal beak without pigmented sensilla; broadly emarginate between distal beak and small rounded proximal beak; mid-lateral (inner) surface with elliptical patch densely covered with short hairs, patch not or hardly raised. Aedeagus with tip straight, slightly elongated dorsal edge, no subapical teeth. Aedeagal guide with narrow, collar-like extension posterior to broadly rounded, almost lobe-like "shoulder"; dorsal plate flat.

FEMALE: unknown.

TYPE SPECIMENS

Holotype, male, Québec, Schefferville, 18 July, 1981, F. Brodo (No. 18350 CNC). Paratypes, 9 males as follows: QUEBEC: Schefferville, 2 MM, 18 vii 81, F. Brodo (CNC); same data, 1 M (SEM); Iron Arm bog, E of Schefferville, 1 M, 18 vii 81, F. Brodo (CNC). LABRADOR: Goose Bay, 4 MM, 11-12 vi 48, W.W. Judd (CNC); same data, 1 M (USNM).

The genitalia of the holotype and of four paratypes (one from Schefferville, three from Goose Bay) have been removed, softened, placed in glycerine in microvials and pinned beneath their respective specimens. The holotype lacks the right fore leg.

VARIATION

The specimens from the Schefferville area, including the holotype, are the darkest. The hairs on the holotype are dark grayish yellowish brown (81); the wing membrane is tinged with light brownish gray (63); the 11th flagellomere is slightly longer than 1/2 the length of the 10th. The specimens from Goose Bay have a more golden brown aspect.

This is one the smaller species of Prionocera, and although the genitalia are somewhat telescoped within the abdomen, the dorsal processes are usually visible and serve to identify this species.

DISCUSSION

Prionocera naskapi is the sister species of P. pubescens. It differs from the latter in the following details: the dorsal process on the 9th tergite is distinctly broader in naskapi and extends closer to the centre of the tergite and

obscures more of the apical process beneath. The nasus is absent except for a minute prominence at the tip of the rostrum. The flagellomeres are less produced and the 11th tends to be slightly longer than in pubescens. The gonocoxal fragment is narrower and bent medially. The inner gonostylus has a distinctly developed crest and an elliptical rather than a rounded, densely hairy patch, which is not raised as in pubescens.

GEOGRAPHIC DISTRIBUTION (Map 8)

In contrast to its sister species P. pubescens, P. naskapi has a very narrow range. It is known only from northeastern Canada: Goose Bay, Labrador, and the Schefferville area, Québec.

FLIGHT RECORDS: 11-18 July.

The very short flight period and the narrow geographic range may be exaggerated by the paucity of collections made in northeastern Canada.

ETYMOLOGY

Following a practice established by C.P. Alexander, I am pleased to name this species after the Naskapi Indians who extensively roamed and still live in Labrador and northern Québec where this species was collected.

Prionocera ominosa (Alexander)

published as Stygeropsis parrii; Alexander, 1919: 8-9, Figs. 7, 12, 23, 24, 26 (wing, male antenna, outer & inner gonostyli, tergite 9, based on a mixed collection of ominosa and recta, Fig. 26, 9th tergite, applies to ominosa); 1965a: 19.

Stygeropsis ominosa Alexander, 1920a: 199.

Prionocera ominosa (Alexander); Alexander, 1965a: 19.

DIAGNOSIS

Very hairy, dorsal stripes brown; no nasus; male with dorsal processes of tergite 9 broad, short, extending to lateral edge of tergite, space between 2/3 or less width of process; apical processes separated by broad membranous V-shaped area; female with dorsolateral edges of sternite 8 sloping; hypogynial valvulae short, 1/3 length of sternite 8; cerci short, broad, almost straight to slightly upturned at tip.

DESCRIPTION (Figs. 16, 35, 51, 67, 83)

ADULT. General appearance: brown with long pale yellow to pale orange-yellow (89,73) hairs on head and thorax; male body length 9.9-11.2 mm, wing length 11.5-14.7 mm; female body length 11.8-16.8 mm, wing length 11.5-16.3 mm.

MALE. Head: vertex light brownish gray (63) with longitudinal black (267) line; hairs on vertex longer than hairs on middle of pronotum; gena light gray to yellow-gray (264,93), with 3 or 4 short hairs; rostrum grayish brown (61), not contrastingly lightened laterally, with fine proclinate hairs not projecting fringe-like beyond tip; no nasus; pseudo-ocellus strong yellowish brown to dark yellowish brown (74,78).

Antenna: flagellomeres moderate brown to brownish black (58,65); 1st flagellomere not noticeably elongated, less than 1.5 length of 2nd, strongly distended distoventrally; flagellomeres 2-9 progressively less distended, triangular in lateral profile, distal width of proximal flagellomeres twice width at base; 10th cylindrical; 11th 1/2 length of 10th.

Thorax: prescutum laterally contrastingly light yellowish brown to moderate orange-yellow (76,71); dorsal stripes glabrous, grayish yellowish brown to dark grayish yellowish brown (80,81), median stripe narrowly bisected by brownish black to light grayish yellowish brown (65,79) line, darker anteriorly, stripes bordered by a light grayish yellowish brown (79) region bearing long hairs; postsutural

area, scutellum and mediotergite concolorous with dorsal stripes and borders or slightly grayer, bearing long hairs. Pleuron light bluish gray to medium gray (190,265), all segments, except small katepimeron, bearing long hairs; anatergite medium gray (265); katatergite light orange-yellow (70) dorsally, olive gray (113) ventrally.

Wings: membrane tinged with light grayish yellowish brown (79), costal and subcostal cells slightly darker; stigma light yellowish brown (76), weakly contrasting with membrane; veins strong yellowish brown (74); obliterative streak not strongly whitened, very narrow at proximal end of stigma, perpendicular to wing axis.

Legs: tarsal claws without tooth.

Abdomen: light grayish brown to grayish yellowish brown (60,80), dorsal longitudinal stripe dark grayish yellowish brown (81); tergites broadly edged laterally, narrowly edged posteriorly in pale orange-yellow to dark orange-yellow (73,72); hairs slightly longer and more prominent ventrally.

Genitalia: tergite 9 with dorsal processes short, broad, rectangular, extending to or almost to lateral edge of tergite, space between less than width of process; no lateral process; apical processes broad with sharply pointed apices, separated at base by membranous V-shaped area; no medial lobe; rectal sclerite small, irregular, lightly sclerotized. Gonocoxites without protruding membrane; gonocoxal fragment broadly triangular. Outer gonostylus broadly oval, medial surface concave, except for narrow, raised, edge, more prominent on dorsal edge. Inner gonostylus with dorsal crest sloping towards short distal beak; distal beak with ridge on medial surface, slightly swollen at tip, without pigmented sensilla; proximal beak small, broadly triangular. Aedeagus narrowly S-shaped (viewed laterally), distal 1/3 bent ventrally, no subapical teeth. Aedeagal guide with membranous, collar-like, posterior extension; dorsal plate broad and flat.

FEMALE. Similar to male, except as follows: 1st flagellomere often lightened to dark orange yellow (72) basally, subcylindrical; proximal flagellomeres somewhat distended giving a serrate appearance; 11th smallest, cylindrical.

Genitalia: sternite 8 with rounded to sloping dorsolateral edge, no distinct lobe; sternite longitudinally divided ventrally by triangular membranous area flanked by heavily pigmented area; hypogynial valvulae short, broadly triangular, 1/3 length of 8th sternite (0.27-0.30, n=10), bearing 1 to 3 subapical hairs (visible with 125 X magnification); sternite 9 with median projection short, about as long as broad; tergite 10 broadly rounded distolaterally, bearing fine hairs; cerci relatively broad, short, straight or gently upturned at tip.

TYPE SPECIMENS

Neotype (designated because the holotype was destroyed in the mail); male, North Fork Pass, Ogilvie Mts. Y. T., 4,300', 19 vi 1962, R. E. Leech (OSU). The neotype lacks the left front leg.

Prionocera ominosa was described from a female, Savonoski, Naknek Lake, Alaska, July 1919, James S. Hine, collector (OSU). When I saw this specimen it had been severely damaged by dermestids with only part of the thorax, both wings, the right antenna (adhering to the thorax), and the right middle leg remaining. A slide (no. 1463) of the left antenna and a leg of this specimen is in the C.P. Alexander slide collection, (USNM). Despite its condition, I could assign other specimens to this species based on the following characteristics: the strongly serrate flagellum, including the 10th segment, and the small size of the 11th; the stigma and obliterative streak not contrasting with the strongly infumed membrane; the general golden brown colour of the thorax, and the large triangular orange-yellow area anterior to the prescutal pit. The brief original description mentioned a somewhat darker specimen than the one described above. This discrepancy could be the result of fading.

SYNONYMY

This species has been referred to as parrii. For a discussion concerning the

legitimacy of that name see Prionocera parrii, Doubtful and Excluded Species.

DISCUSSION

Prionocera ominosa is the sister species of the palearctic P. serricornis. The differences, though minor, are consistent. In ominosa the dorsal process is broader, there is a distinctive triangular sclerotized region between the apical processes (membranous in serricornis) and the hypogynial valves are relatively longer than in serricornis.

In North America ominosa has been confused with recta and ringdahli. All three of these species have long, relatively dense hairs on the head and thorax and strongly distended flagellomeres. Prionocera recta differs from P. ominosa in being bluish gray rather than brownish, having a small nasus, and in the male, a small but distinctly developed lateral process and a long subrectangular dorsal process. Prionocera recta and ominosa have similar inner gonostyli, note especially the distal and proximal beaks (Figs. 35, 38). Males of ringdahli are distinguished by having a broader distal beak and a divided proximal beak on the inner gonostylus and narrower dorsal processes on the 9th tergite, and longer hypogynial valvulae in the female.

GEOGRAPHIC DISTRIBUTION (Map 9)

This is a nearctic species found in the northern boreal and subarctic subregions. It is a conspicuous component of the very early spring fauna in the wetlands of the North. Prionocera ominosa occurs together with, and has been confused with, recta and the rarer ringdahli. I have seen 372 pinned specimens collected from the west coast of Alaska to northeastern Québec, and from as far north as the southern arctic islands, plus a single female from Kamchatka which I judge to belong to this species rather than to the very closely related sister species, serricornis.

FLIGHT RECORDS: 28 May-31 July.

This is one of the earliest Prionocera. Most of the specimens were collected in June to mid July, which may explain why I failed to find this species in either Churchill, Manitoba, or Schefferville, Québec. I was probably in the field too late for this species. Prionocera ominosa is often locally very abundant, as evidenced by the large number of specimens collected from several localities in the Northwest Territories.

SPECIMENS EXAMINED (251 males [MM], 106 females [FF])

NEARCTIC. CANADA: MANITOBA: Churchill, 2 MM, 16, 30 vi 47, T.N. Freeman (CNC); 1 M, 1 F (with attached male terminalia), 15 vi 47, (USNM); Fort Churchill, 3 MM, 3-10 vi 52, J.G. Chillcott (CNC); 3 MM, 3 FF, 16-20 vi 48, Fred Ide (UMMZ); Farnworth L, near Churchill, 1 M, 1 F, 12 vi 52, J.G. Chillcott (CNC); Mile 505 Hudson Bay Railroad, 1 M, 13 vi 52, J.G. Chillcott (CNC); Pikwitonei, 1 F, 31 v 49, J.B. Wallis (CNC). NORTHWEST TERRITORIES: Franklin Distr.: Bathurst Inlet, 4 MM, 13-28 vi 51, C.D. Bird & W.I. Campbell (CNC); Repulse Bay, 1 M, 27 vi 50, P.F. Bruggemann (CNC); 3 MM, 29 vi 50, J.E.H. Martin (CNC); Spence Bay, 11 MM, 3 FF, 30 vi 51, J.G. Chillcott (CNC); 1 M, 27 vi 51, A.E.R. Downe (CNC); Thelon River, 1 F, 22 vii 49 (CNC); Victoria Island, Cambridge Bay, 23 MM, 4 FF, 7-11 vii 50, E.H.N. Smith (CNC); same data, 2 MM, 1 F (OSU); 14 MM, 3 FF, 11-18 vii 50, G.K. Sweatman (CNC); Holman, 1 M, 1 F, 17-18 vi 52, D.P. Gray (CNC); Victoria Island, 71°17'N 114°W, 1 M, 1 F, 1-5 vii 75, G. & M. Wood (CNC). Keewatin Distr.: Baker Lake, 2 MM, 12-14 vii 47, T.N. Freeman (CNC); Chesterfield, 83 MM, 28 FF, 30 vi 24 vii 50, J.G. Chillcott (CNC); 27 MM, 15 FF, 7-31 vii 50, J.R. Vockeroth (CNC); Eskimo Point, 3 MM, 11 FF, 30 vi-5 vii 50, G.R. Roberts (CNC); 8 MM, 6 FF, 29 vi-3 vii 50, G.G. Dilabio (CNC); Mackenzie Distr.: Aklavik, 17 MM, 1 F, 16-20 vi 53, C.D. Bird (CNC); 3 MM, 1 F, 16-29 vi 56, R.E. Leech (CNC); 10 MM, 3 FF, 21 vi 53, J.S. Waterhouse (CNC); Coppermine, 5 MM, 1 F, 18-23 vi 51, S.D. Hicks (CNC); Fort Smith, 1 F, 30 v 50, W.G. Helps (CNC); Muskox Lake, 64°45'N 108°10'W, 3 MM, 9-11 vii 53, J.G. Chillcott (CNC); Salmita Mines, 64°05'N 115°15'W, 16 MM, 1 F, 16-30 vi 53,

J.G. Chillcott (CNC); Yellowknife, 1 M, 1 F, 1-3 vi 53, J.G. Chillcott (CNC). QUEBEC: Payne Bay, 1 M, 25 vi 58, E.E. MacDougall (CNC). YUKON: Hershel Island, 1 M, 8 vii, 53, C.D. Bird (CNC); Ogilvie Mts., North Fork Pass, 4100', 2 MM, 20 vi 62, P.J. Skitso (CNC); 4300', 5 MM, 1 F, 19 vi 62, R.E. Leech (CNC); same data, 1 M (selected as Neotype, OSU); Rampart House, 67°25'N 140°59'W, 1 M, 5 vi 51, C.C. Loon (CNC); Swim Lakes, 133°N 62°13'W, 3200', 1 M, 8 vi 60, J.E.H. Martin (CNC); 1 M, 18 vi 60, E.W. Rockburne (CNC); Whitehorse, 1 F, 28 v 49, L.C. Curtis (CNC); Km. 141 Dempster Hwy., 1 M, 24-28 vi 82, G. & M. Wood (CNC).

U.S.A. ALASKA: Alcan Hwy., Summit Pass, Richardson Hwy., 1 M, 7 vii 49, E.K. Miller (UMMZ); Cape Thompson, Pond 6 Ogotoruk Cr., 55°15'N 159°31'W, 1 F, 15 vi 60, W.C. Hanson (SEM); 1 M, 21 vi 60, J.J. Davis (WSU); Igiak Bay (=Kokechik Bay), 8 MM, 4 FF (including a mating pair), 23 vi-4 vii 52, P.S. Humphrey (UMMZ); W of Kongengevick, Camden Bay, 1 M (no. 438), 1 F (no.434), 4 vii 14, Canadian Arctic Expedition, Frits Johansen (CNC); 1 M, same data, 2 slides, No. 488 (USNM); Mt. McKinley Nat'l Pk., 2600', 1 M, 25 vi 57, G.W. Byers & party (SEM); Prudhoe Bay, 70°18'N 148°21'W, 1 M, 10 vii 71, S. MacLean (SEM); Savonoski, Naknek Lake, 1 F, vii 19, J.S. Hine (ominosa holotype, pinned OSU, ([destroyed in mail]) & slide No. 1463, Alexander Coll. USNM) Umiat, 1 F, 13 vi 47, K.L. Knight (UMMZ); 5 MM, 5 FF, 13-23 vi 47, L.A. Jachowski (UMMZ); 5 MM, (2 MM on slides, Nos. 4960, 4962), C. Schultz (UMMZ).

PALEARCTIC. U.S.S.R. Kamchatka, 1 F, 18-19 vi 17, Y. Wuorentaus (ZMH).

Prionocera oregonica Alexander

Prionocera oregonica Alexander, 1943a: 13-14; 1965a: 19.

Prionocera primoveris Alexander, 1943b: 723-725, Figs. 1 & 2 (wing, tergite 9); 1945: 399; 1965a: 19. (New synonymy)

Prionocera uinticola Alexander, 1948a: 15-17, Fig. 2 (tergite 9); 1965a: 19. (New synonymy)

Prionocera fulvicauda Alexander, 1948b: 121-123; 1965: 19. (New synonymy)

DIAGNOSIS

Male with dorsal plate of aedeagal guide expanded subapically and laterally into a narrow dorsomedially curved flange; female with broadly rounded dorsolateral edge on sternite 8; hypogynial valves 1/2 length of sternite 8, square-tipped, with a single subapical hair (visible with 60 X magnification); cerci very slightly downturned at tip.

DESCRIPTION (Figs. 5, 17, 36, 52, 68, 84)

ADULT. General appearance: grayish brown dorsally, bluish gray laterally, with fine short yellowish white (92) hairs, not conspicuously hairy; male body length 8.3-9.9 mm, wing length 10.4-12.8 mm; female body length 10.1 mm, wing length 11.2-11.8 mm.

MALE. Head: vertex dark yellowish brown to dark olive brown (78,96), usually divided by capillary black line, hairs very short posteriorly, becoming longer anteriorly; gena bluish gray to grayish yellow (191,90) with scattered hairs; rostrum brownish black (65), in some specimens lightened to deep yellowish brown (75) laterally, brownish black (65) proclinate hairs on rostrum and projecting beyond moderate (0.075-0.175 mm) nasus; pseudo-ocellus brownish black (65).

Antenna: flagellum dark grayish brown to brownish black (62,65), flagellomeres only slightly distended ventrally, 11th relatively long, 1/2 or more length of 10th.

Thorax: prescutum laterally not contrastingly yellowish; dorsal stripes glabrous, dark grayish brown (62), median stripe bisected by narrow line and bordered by light grayish yellowish brown to grayish yellowish brown (79,80) region, with fine hairs; postsutural area, scutellum and mediotergite dark grayish brown to brownish black (62,65), not conspicuously hairy; pleuron light bluish gray

to bluish gray (190,191) with fine hairs except on small katepimeron; anatergite brownish gray (64); katatergite pale yellow (89) dorsally, bluish gray (191) ventrally.

Wings: membrane tinged with light grayish yellowish brown to light yellowish brown (79,76); costal cell, subcostal cell and stigma moderate yellowish brown (77); veins dark brown (59) distally; obliterative streak not strongly contrasting with stigma, beginning narrowly at proximal end of stigma and extending somewhat obliquely near wing tip.

Legs: small tooth usually present on tarsal claws; tooth present on holotype.

Abdomen: medium gray (265) with broad dark brown (59) dorsal longitudinal stripe, segments edged in pale yellow to pale orange-yellow (89,73), more broadly edged laterally; hairs short, yellowish white (92).

Genitalia: tergite 9 with dorsal and lateral processes subequal in width at base, long, tapering, and broadly separated; a tapering, ventrally directed, medium projection bearing pair of small apical processes; prominent squarish rectal sclerite. Gonocoxites separated ventrally near base by protruding membrane; gonocoxal fragment broadly triangular. Outer gonostylus subtriangular, without distinct emargination or oblique ridge on either dorsal or ventral edge; medial surface concave except for narrowly raised edge, broader distally. Inner gonostylus with base (including proximal beak) broader than length of distal beak; narrow flange medially, proximal to distal beak; dorsal crest descending almost perpendicularly to long, cylindrical distal beak; without pigmented sensilla. Aedeagus long, usually visible between gonostyli in dried specimens, distal 1/3 straight, tip slightly expanded dorsally, no subapical teeth. Aedeagal guide with dorsal plate relatively narrow, subequal to width of aedeagus, plates widely separated throughout most of their length, subapically expanded in a narrow, dorsomedially curved flange.

FEMALE. Similar to male, except as follows: flagellomeres not distended; 1st flagellomere lightened to moderate yellow-brown (77) basally; 9th, 10th & 11th subequal, slightly narrower than preceeding.

Genitalia: sternite 8 with broadly rounded dorsolateral edge, not lobed; sternite separated from valvulae by narrow membranous region, membrane narrowly extending between hypogynial valvulae and more broadly, anteriorly on sternite 8; hypogynial valvulae 1/2 length of sternite 8, square-tipped, bearing single strong subapical hair (visible with 60 X magnification); sternite 9 with median projection long and thin; tergite 10 broadly rounded distally with fine, inconspicuous hairs; cerci very slightly downturned at tip.

TYPE SPECIMENS

Prionocera oregonica was described from a single male collected in Oregon, Wallawa Mts., Aneroid Lake, 7,500', 25 vi 1929, H.A. Scullen. (The original description and holotype slide incorrectly state "Blue Mts." [Alexander, 1954]).

I examined the holotype slide, No. 7467, containing the male genitalia, an antenna, fore leg and left wing. It is not a very good specimen because the aedeagus and all its associated structures are missing as are the left inner and outer gonostyli. However, the identity of this species is established by, and distinguished from, the very closely related P. turcica by the narrower dorsal process and the shorter apical process of tergite 9, and the longer 11th flagellomere. The slide and the pinned specimen (the latter I have not seen) are in the Alexander Collection, USNM.

SYNONYMY

Prionocera primoveris Alexander was based on a male holotype, and male paratype, Sylvan Lake, Yellowstone, Wyoming, 8,000', 21 vi 1941; a female allotype, 7 males, 1 female paratype, Twogwotee Pass, Grand Teton National Forest, Wyoming, 9,650', 9 vii 1942. All specimens collected by C.P. Alexander (USNM).

The male holotype is glued to a point. I removed and softened the genitalia for study and placed them in a microvial pinned beneath the specimen. I have also seen

the genitalia of the male paratype, Sylvan Lake (slide No. 7273, USNM) which were illustrated in the original description, and a male paratype, Twogwotee Pass, Grand Teton National Forest, 9 vii 1942 (also slide No. 7273, USNM). Alexander distinguished primoveris from oregonica on the basis of their "differing conspicuously in the structure of the male hypopygium." The 9th tergite of primoveris is squashed on the slide and its distal processes are distorted. I am confident, however, that these are the same species because of the similarity of the other structures, especially the unique aedeagal guide.

The publication date of oregonica Alexander is February 18, 1943. It therefore takes priority over primoveris Alexander which was published in November, 1943. It should be noted, however, that the manuscript for primoveris was probably finished first because in the publication of that species Alexander makes no mention of oregonica, but he does compare oregonica with primoveris in the earlier published original description of oregonica.

Prionocera uinticola Alexander was described from a single male collected in Utah, Uinta Mts., Tryol Lake, John C. Fechser & Vasco M. Tanner collectors. I have seen the holotype, slide no. 8463, containing male genitalia (beautifully mounted), antenna, and right wing. The slide and the pinned specimen (the latter not seen) are in the USNM. The differences in the relative lengths of Rs and m-cu (sensu Alexander), and noted by Alexander in the description of uinticola, I judge to fall within the variation observed in oregonica. And the differences in detail of the structures of the hypopygium are distortions caused by flattening of the specimen on the slide.

The description of Prionocera fulvicauda Alexander is based on a mixed collection. The male holotype and female allotype are pinned together with the labels: "R.M.N.P. Col./10,000 ft./ July 18 '41/ C.P. Alexander." There are four male paratopotypes two of which have their genitalia preserved on microscope slides, both numbered 8422. All type material is in the USNM.

The holotype is conspecific with oregonica and therefore must be synonymized under that name. The allotype and the two male paratopotypes are subserricornis. Alexander's description of fulvicauda is based primarily on the slide-mounted specimens of subserricornis, and not on the type specimen. It is not surprising, therefore, that Alexander compared this species with proxima (here synonymized with subserricornis) and that North American specimens of subserricornis have been consistently misidentified as fulvicauda.

VARIATION

Alexander alludes to differences in the details of the structures of the the male terminalia among the species synonymized above. The differences are largely due to distortion and to differential orientation of the slide-mounted specimens. No tooth was observed on the tarsal claws of the single slide-mounted leg of the type.

DISCUSSION

Prionocera oregonica is very closely related to P. turcica (holarctic) and to the recently described P. subturcica from the U.S.S.R. These species are strikingly different from all other Prionocera in the shape of the processes of tergite 9 in the male, particularly the apical process which is in a more dorsal position on a prolongation between the dorsal processes. Prionocera oregonica is distinguished by the narrower and longer dorsal lobes, and by differences in the aedeagal guide (see Figs. 5 & 7). Prionocera oregonica is smaller and duskier than turcica, without a conspicuously lightened rostrum, and the stigma and obliterative streak are not as conspicuous as in turcica. The 11th flagellomere in the male of oregonica is comparatively longer than in turcica. Females of oregonica and turcica can be separated by the relative length of the hypogynial valves to the sternite 8 and by the shape of the ventral membranous region. In oregonica the hypogynial valves are shorter and the membranous area is narrow and perpendicular to the body axis rather than "W-shaped". The female of subturcica is unknown.

The aedeagal guide in oregonica and turcica is expanded dorsally and is thus quite distinct from the simple flattened dorsal plate found in all other Prionocera. (The aedeagal guide in subturcica has not been investigated).

GEOGRAPHICAL DISTRIBUTION (Map 10)

Prionocera oregonica is apparently quite rare and local. It is found in the same ecological habitats as its sister species, P. turcica, in wet sedge meadows flying among the stems of the dominant plant, Carex aquatilis. Prionocera oregonica appeared to be restricted to higher altitudes in the western United States. It was therefore a surprise to find two males of this species in my collection from the Schefferville region, Québec, and a female from Churchill, Manitoba. In these two areas the sister species turcica and oregonica co-exist.

FLIGHT RECORDS: 21 June-9 August.

SPECIMENS EXAMINED (31 males [MM], 3 females [FF])

CANADA: ALBERTA: Waterton Nat'l Pk., Cameron Lake, 5450', 1 M, 9 vii 49, J. Baker (as primoveris, slide No. 7273, Alexander Coll. USNM). BRITISH COLUMBIA: Tweedsmuir Prov. Pk., Heckman Pass, 1 M, 19 vii 78, R.A. Cannings (SUBC). MANITOBA: Churchill, 1 F, 10 vii 77, F. Brodo (CNC). QUÉBEC: Schefferville, 1 M, 28 vi 81, F. Brodo (CNC); 37 km NW Schefferville, Annabel L., 1 M, 14 vii 81, F. Brodo (CNC).

U.S.A.: CALIFORNIA: Shasta Co., Mt. Lassen, Hat Lake, 6450', 1 M, 9 viii 1958, C.P. Alexander (as oregonica, slide No. 7467, Alexander Coll. USNM). COLORADO: Boulder Co., Rainbow Lakes, 10,100', 10 MM, 1 F, 2-10 vii 1979, F. Brodo (CNC); 1 M, 2 vii 79, F. Brodo (SEM); Lefthand Bog, 40°04'N 105°34'W, 1 M, 11 vii 79, F. Brodo (CNC); Mt. Research Station, Nederland, 9500', 1 M, 26 vi 79, F. Brodo (CNC); Rocky Mountain Nat'l. Pk., Dream Lake, 10,000', 1 M, 18 vii 41, C.P. Alexander (fulvicauda holotype, USNM). OREGON: Wallowa Mts., Aneroid Lake, 7500', 1 M, 23 vii 29, H.A. Scullen (oregonica holotype, slide No. 7467, Alexander Coll. USNM). UTAH: Uinta Mts., Tryol Lake, 1 M, Vasco M. Tanner, (uinticola holotype, slide No. 8436, Alexander Coll. USNM). WYOMING: Carbon Co., Silver Lake, 30 km W Centennial, 41°18'45"N 106°21'30"W, 3 MM, 1 F, 10-11 vii 81, S. Teale (SEM); Teton Co., 4 MM, 2-11 vi 48, Wallace-Bauer (CMNH); Grand Teton National Forest, Twogwotee Pass, 9650', 1 M, 9 vii 42, C.P. Alexander (primoveris paratype, slide No. 7273, Alexander Coll. USNM); bog near Moran, 6800', 1 M, 5 vii 41, Alexander (as primoveris, slide No. 7273, Alexander Coll. USNM); Yellowstone Nat'l. Pk., Sylvan Lake, 8000', 2 MM, 21 vi 41, C.P. Alexander (primoveris holotype [pinned], and paratype slide No. 7273, Alexander Coll. USNM).

Prionocera pubescens Loew

Prionocera pubescens Loew, 1844: 170-171, Figs. 30, 31 (male head); Kertész, 1902: 279; Tjeder, 1955: 242-243; Mannheims, 1951: 66-67, Fig. 37 (from Tjeder, 1948, Fig. 14).

Prionocera pubescens; Tjeder (nec Loew), 1948: 95-96.

Stygeropis pubescens (Loew); Osten Sacken, 1886: 182.

Prionocera anderi Tjeder, 1948: 96-98, Fig. 14 (male terminalia) (Synonymy by Mannheims, 1951).

DIAGNOSIS

Male with rounded prominence on lateral surface of inner gonostylus densely covered with short stiff hairs; female with angular dorsolateral lobe on 8th sternite; cerci short, broad, straight or slightly upcurved.

DESCRIPTION (Figs. 18, 37, 53, 69 85)

ADULT. General appearance: grayish brown (61) dorsally, light gray (264) laterally, with long erect yellowish white (92) hairs on head and thorax, shorter hairs on abdomen; male body length 9.2-11.1 mm, wing length 11.3-12.8 mm; female body length 12.1-14.0 mm, wing length 12.3-13.3 mm.

MALE. Head: vertex grayish brown to brownish black (61,65) hairs long; gena yellowish white (92) laterally, dark grayish brown (62) medially, with scattered short hairs; rostrum entirely dark grayish brown (62) with proclinate hairs on distal 2/3, hairs projecting beyond moderate (0.075 mm) nasus; pseudo-ocellus brownish black (65).

Antenna: flagellum dark grayish brown (62), 1st flagellomere with subcylindrical base, strongly produced distoventrally, succeeding flagellomeres more triangular in lateral outline, progressively smaller and less produced; 10th cylindrical, slightly longer than 9th, 11th minute, less than 1/2 length and width of 10th.

Thorax: prescutum laterally brownish black to deep brown (65,56); dorsal stripes dark grayish brown (62), median stripe narrowly divided by light yellowish brown (76), becoming black anteriorly; stripes bordered by light yellowish brown (76) region bearing long dense hairs; postsutural area, scutellum and mediotergite dark grayish brown to light yellowish brown (62,76), bearing long hairs; pleuron bluish white to bluish gray (188,191), anepisternum, katepisternum, entire anepimeron covered with long yellowish white (92) hairs; anatergite grayish yellow (90); katatergite pale yellow (89) dorsally, dark gray (266) ventrally.

Wings: membrane tinged with light grayish yellowish brown (79), costal and subcostal cells and distal half of stigma light yellowish brown (76), stigma not contrasting with membrane; veins deep yellowish brown (75); oblitative streak weakly developed, beginning in paler proximal half of stigma, continuing diagonally near wing tip.

Legs: tarsal claws without tooth.

Abdomen: light bluish gray (190) with dark brown (59) dorsal longitudinal stripe, tergites narrowly edged distally, more broadly edged laterally in pale yellow (89); tergites and sternites with yellowish white hairs (92), hairs appressed dorsally except on 1st tergite, more erect laterally and ventrally.

Genitalia: tergite 9 with dorsal process short, about as long as broad, slightly tapered posteriorly, separated by more than width of process; no lateral process; medial lobe broad, fused to bases of narrow hook-like apical processes; apical processes widely separated; rectal sclerite small, inconspicuous. Gonocoxites without protruding membrane ventrally; dorsal fragment of gonocoxite broadly triangular. Outer gonostylus with broadly curved ventral edge, somewhat emarginate on dorsal edge, medial surface concave with narrow raised edge somewhat broader distally and ventrally. Inner gonostylus with sloping dorsal crest merging gradually with cylindrical distal beak; no pigmented sensilla on beak; broadly emarginate between distal beak and small proximal beak; medial surface of basal area with rounded prominence densely covered with short hairs. Aedeagus with tip straight, no subapical teeth. Aedeagal guide with narrow, collar-like extension posterior to broad, flat, dorsal plate.

FEMALE. Similar to male, except as follows: base of antenna usually lightened, 1st flagellomere subcylindrical; 2nd to 8th slightly distended, giving a serrate appearance; 10th and 11th cylindrical, subequal and smallest.

Genitalia: sternite 8 with narrowly rounded dorsolateral lobe; hypogynial valvulae short, slightly more than 1/3 (0.38-0.42) length of sternite 8, separated from sternite by narrow membranous Y-shaped region; valvulae with broad, triangular, more heavily sclerotized ventral edge, broad tip, no subapical hairs; sternite 9 with short broad median projection; tergite 10 straight edged, not conspicuously hairy; cerci broad, straight to strongly upcurved.

TYPE SPECIMENS

Prionocera pubescens, the type species of this genus, was described by Loew (1844) from a single male collected in the "Posener Gegend." The type, borrowed from ZMHB, lacks wings, legs and 7 flagellomeres on the left antenna. The right antenna is intact. The abdomen is glued to a card pinned below the specimen and the genitalia are below that, in balsam on a small slide.

The specimen bears a faded brown ink, handwritten label "pubescens Lw," followed by the labels: "9147," and "Holotypus designatus Mannheims." The features characteristic of this species are visible in the type specimen. Tergite 9 has slightly damaged dorsal processes probably because of the shrinking of the balsam, but the shapes and broad space between these processes and between the apical processes are diagnostic. The characteristic shape of the inner gonostylus is clearly evident. Other features evident on the type that distinguish this species from closely related species, are the developed nasus, produced flagellomeres and long dense pale hairs on the head and thorax.

SYNONYMY

Prionocera anderi Tjeder was synonymized with P. pubescens Loew by Mannheims (1951) who compared the type of anderi with that of pubescens. Tjeder had mistakenly applied the epithet pubescens to the species subsequently named tjederi.

I examined the type of anderi (Tjeder Collection, ZMLS). It bears the labels: FALUN/ DJUPTJÄRN/ TJEDER, and a red holotype label. The genitalia have not been removed but are clearly recognizable and diagnostic of this species. In addition, I saw three paratypes, two from Leksand, Dalarna, Sweden, collected by E. Klefbeck and one from Abisko, Sweden, collected by Ringdahl (ZMLS). The paratypes have had their genitalia removed and placed in vials alongside the respective pinned specimens. I concur with Mannheims that anderi is conspecific with pubescens.

VARIATION

This is one of the smaller species of Prionocera. The male genitalia tend to be considerably telescoped within the 8th segment making positive identification, without resorting to removing genitalia, difficult. The females are also difficult to recognize, especially when the lobes on the 8th sternite are obscured.

DISCUSSION

Prionocera pubescens and P. naskapi are probably sister species. See discussion under naskapi.

GEOGRAPHIC DISTRIBUTION (Map 11)

This is a broadly ranging species which does not extend into the true tundra zone. In North America its known range is between Alaska and Hudson Bay. In the Palearctic pubescens ranges from England and Western Europe as far east as Yakutsk and Amur in the U.S.S.R. (Savtschenko, 1983).

FLIGHT RECORDS: 10 May-25 July

The earliest seasonal records are from central Europe and the latest records are from northern Fennoscandia.

SPECIMENS EXAMINED (80 males [MM], 21 females [FF])

NEARCTIC: CANADA: ALBERTA: Fawcett, 1 M, 10 vi 34, E.H. Strickland (as sordida, slide No. 3589, Alexander Coll. USNM). MANITOBA: Eastern Creek near Churchill, 1 M, 25 vi 52, J.G. Chillcott (CNC); Churchill, 2 MM, 9 vii 78, F. Brodo (CNC); same data: 1 M (SEM), 1 M (CD); Farnworth Lake near Churchill, 4 MM, 1 F, 12 vi 52, J.G. Chillcott (CNC); Fort Churchill, 3 MM, 20-23 vi 52, C.D. Bird (CNC); 1 M, 24-25 vi 52, J.G. Chillcott (CNC); Gillam, 1 M, 24 vi 49, J.B. Wallis (CNC); Herchmer, 2 MM, 1 F, 29 vi-5 vii 49, J.B. Wallis (CNC); Mile 505, Hudson Bay Railroad, 1 M, 13 vi 52, J.G. Chillcott (CNC). NORTHWEST TERRITORIES: Mackenzie Distr., Fort McPherson, 2 MM, 1 F, 24 vi 57, S.D. Hicks (CNC); Fort Smith, 1 F, 12 vi 50, J.B. Wallis (CNC); Muskox Lake, 64°45'N 108°10'W, 3 MM, 2 FF, 9-11 vii 53,

J.G. Chillcott (CNC); Norman Wells, 1 M, 22 vi 49, W.R.M. Mason (CNC); Salmita Mines, 64°05'N 111°15'W, 16 MM, 1 F, 30 vi-8 vii 53, J.G. Chillcott (CNC). YUKON: Koidern, 3 MM, 2 FF, 31 v 79, G.G.E. Scudder (SUBC).

PALEARCTIC: AUSTRIA: Salzburg, 16-1800 m, 1 M, 3-10 viii 40, Zerny (NHMV).

BELGIUM: PROV. LUXEMBOURG, Vence, 1 M, 29 v 55, Ed. De Laever (MAKB).

CZECHOSLOVAKIA: Bohemia, Asch, 1 M, 26 v 1870, Kowarz (NHMV).

FINLAND (Heikinheimo et al, 1971, 1981): ETALA-HAME: Tammela, 1 F, 28 v 64, Brander (MAKB); Kalvola, 1 F, V.G. Borg (MAKB). KEMIN LAPPI: Ahvenjarvi (=Kussajoki, 67°38'N 25°15'E), 1 F, E. Thunberg (ZMH); Vuosso (=Vuotso?), 1 F, 19 vi 66, Mittendorf (MAKB). INARIN LAPPI: Utsjoki, 60 km S, 1 M, 1 F, 27 vi 58, Fendler (MAKB); same data, 4 MM (ZSM).

GERMANY (B.R.D.): Mosbruch, 1 M, 1 F, in copula, 2 vi 51, Mannheims (MAKB); Kiel, 1 F, Wiedem. (NHMV).

NORWAY: HORDALAND: Noer Haugen, Samnanger, 1 M, 15 v 50, Ekskurjon (ZMUB); Adlandsvingene, Samnanger, 2 MM, 15 v 50, Ekskursjon (ZMUB).

POLAND: Poznan ("Posener Gegund," holotype of pubescens), 1 M, no further data (ZMHB).

SWEDEN: DALARNA: Falun, Djuptjärn, Stora Kopparberg, 1 M, 12 vi 32, Tjeder (anderi holotype, ZMLS); Leksand, NW of Sagmyra, 3 MM, 2 vi 35, E. Klefbeck (anderi paratypes, ZMLS). NORBOTTEN: Granvik, 67°58'N 23°38'E, 8 MM, 1 F, 25 vii 51, J.R. Vockeroth (CNC). ÖSTERGÖTLAND: Vaxmoisen (N. Ljungsbro), 1 M, 26 v 62, K. Ander (ZMLS). TORNE LAPPMARK: Abisko, 5 MM, 20 vi 71, H. Lundberg (BMNH); 6 MM, 1 F, 25 vi-8 vii 51, J.R. Vockeroth (CNC); 1 M, 15 vii 22, Ringdahl (anderi paratype, ZMLS). UPPLAND: Stockholm Region, ("Hlm", "Bhn"), 1 F, no further data (NRS). VÄSTERBOTTEN: Degerfors, 1 M, no further data (ZMLS).

SWITZERLAND: SCHWYZ: Rothenthurn, 1 M, 25 v 80, C. Dufour (CNC).

U.K.: ENGLAND: NW Yorkshire, Austwick Moss, 3 MM, 27 vi 38, C.A. Cheetham (BMNH).

U.S.S.R.: KOLA PENINSULA: Kantalaks (= Kandalaksha), 1 M, R. Frey (ZMH); Kusomen, 1 F, R. Frey (ZMH). LATVIA: Curon, Bathen, 1 M (BMNH), 1 F (MAKB), 27 v 28, Dr. P. Lackschewitz; Curon, Kaluna?, 2 MM, 17 v 32, Dr. P. Lackschewitz (ZHMV, ZMLS); Curon, Palt Moor?, 2 MM, 27-29 v 20, Dr. P. Lackschewitz (MAKB, ZMLS); Lettland, Euxküll am Schwanensee, 1 F, 10 v 36 (MAKB).

Prionocera recta Tjeder

published as Stygeropsis parrii; Alexander, 1919: 8-9, Figs. 7, 12, 23, 24, 26. (Description based on a mixed collection of P. omissa and P. recta. The Figures apply to P. omissa.)

published as Prionocera serricornis; Lackschewitz, 1933: 138-139, Figs. 4a,b,c (male terminalia, antennae) (nec Zetterstedt, 1838).

Prionocera recta Tjeder, 1948: 92-93, Fig. 4G (male head & antenna), Fig. 11 (male terminalia); 1955: 242-243; Mannheims, 1951: 65-66, Fig. 35 (from Tjeder, 1948, Fig. 11).

Prionocera lapponica Tjeder, 1948: 93-94, Fig. 4H (male head & antenna), Fig. 12 (male terminalia); 1955: 242-243; Mannheims, 1951: 66, Fig. 36 (from Tjeder, 1948, Fig. 12). (New synonymy)

Prionocera lackschewitzi Mannheims, 1951: 71. (New synonymy)

Prionocera gracilistyla Alexander, 1956: 123-125; 1965a: 19. (New synonymy)

DIAGNOSIS

A dark gray fly with long hairs on head and thorax, hairs ranging from yellowish white to deep brown (92,56) (darker specimens from central Canadian arctic); flagellomeres distended in both sexes, more evident in male; nasus small or reduced to minute knob. Male: tergite 9 with large subrectangular dorsal process, lateral process smaller and narrower; inner gonostylus with cylindrical distal beak. Female: cerci and hypogynial valvulae relatively short and broad; sternite 8 with broadly rounded dorsolateral edge.

DESCRIPTION (Figs. 2, 19, 38, 54, 70, 86)

ADULT. General appearance: predominantly gray with long yellowish white to deep brown (92,56) hairs on head, thorax and abdomen; male body length 9.4-13.9 mm, wing length 13.1-16.5 mm; female body length 13.0-17.6 mm, wing length 14.2-17.5 mm.

MALE. Head: vertex light brownish gray to dark gray (63,266), with longitudinal brownish black to black (65,267) line, usually expanded medially; hairs long, as long as hairs on postgena; gena light gray to brownish gray (264,64) with several hairs near antennal sockets; rostrum dark grayish brown (62), not lightened laterally or ventally, covered with long stiff proclinate hairs, hairs projecting beyond nasus; nasus minute knob-like to small rectangular (up to 0.1 mm); pseudo-ocellus moderate orange-yellow to dark yellowish brown (71,78), very prominent in some specimens.

Antenna: flagellomeres dark brown to brownish black (59,65) 1st flagellomere slightly longer than 2nd with cylindrical base and strong distoventral dilation; proximal flagellomeres also strongly distended distoventrally, triangular in lateral profile, distal width twice width at base; distal flagellomeres progressively less distended; 10th cylindrical; 11th abruptly smaller, cylindrical, 1/3 to 1/2 length and width of 10th.

Thorax: prescutum laterally not contrastingly yellowish; dorsal stripes brownish gray to black (64,267), occasionally dark brown (59); median stripe sometimes shiny black anteriorly, bisected by narrow line, lateral stripes entirely pruinose, bordered by medium gray (265) region bearing long hairs; midline of median stripe with scattered, shorter hairs; postsutural area and scutellum concolorous with dorsal stripes and borders or slightly grayer, with long hairs; pleuron light bluish gray to dark bluish gray (190,192), bearing long hairs except on small katepimeron; anatergite dark gray (266), katatergite dark gray (266), sometimes strong brown (55) to strong yellow (84) dorsally.

Wings: membrane tinged with light grayish brown (60), bases of outer radial cells somewhat darker; veins deep brown to dark brown (56,59); subcostal cell and stigma light yellowish brown (76), costal cell slightly paler; obliterative streak contrasting strongly with stigma and membrane, almost perpendicular to costa, near wing tip.

Legs: tarsal claws simple or with small tooth.

Abdomen: brownish gray to dark grayish brown (64,62), dorsal longitudinal stripe dark grayish yellowish brown (81); tergites very narrowly edged with light orange-yellow (70); hairs long (0.25 mm or longer), erect, often paler than on head and thorax.

Genitalia: tergite 9 with dorsal process longer than broad, slightly widened distally, with abundant, relatively short curved hairs; space between dorsal processes subequal or broader than width of process; lateral process small, narrowly angular or truncate, shorter than dorsal process; apical process broad, with short, sharp, medially directed tooth; medial lobe not free, fused to bases of apical processes; rectal sclerites large, rectangular, sometimes connected medially by narrow dorsal sclerotization. Gonocoxites without protruding membrane ventrally; gonocoxal fragment broadly triangular. Outer gonostylus broad at base, narrowing distally, medial surface concave except for poorly defined narrow raised edge. Inner gonostylus without distinct dorsal crest; distal beak slender, cylindrical, bearing lightly pigmented sensilla ventrolaterally; small squarish to triangular proximal beak; small bump on mid-lateral surface of inner gonostylus (more pronounced in palearctic specimens). Aedeagus with midsection straight, ventrally curved tip with pigmented and/or thickened subapical rim, no subapical teeth. Aedeagal guide membranous posteriorly, dorsal plate flat, relatively broad, broadly attached to sperm pump.

FEMALE. Similar to male, except as follows: scape and 1st flagellomere often lightened to dark orange-yellow (72) basally, 1st flagellomere slightly constricted subapically; flagellomeres 2-8 somewhat distended distoventrally, giving a serrate appearance; last two flagellomeres narrower, cylindrical, and subequal.

Genitalia: sternite 8 with rounded dorsolateral edge, not lobed, divided longitudinally by irregular weakly sclerotized area extending from base of hypogynial valvulae to 2/3 length of sternite; hypogynial valvulae short, 1/3 length of sternite 8, with narrow, triangular, more heavily sclerotized region ventrally, tip broad, straight, bearing two subapical hairs (visible at 60 X magnification); sternite 9 with median projection relatively short and broad; tergite 10 rounded posterolaterally, bearing short hairs; cerci relatively shorter, broader, and almost straight.

TYPE SPECIMENS

Holotype, male, Lappland, Torne Lpm., Jebrenjokk, 22 vii 26, O. Ringdahl, in Tjeder Collection (ZMLS).

The type which I saw in 1983 lacked a collector's label. The genitalia had been removed to a genitalia vial placed beside the pinned specimen. Unfortunately the 9th tergite, the sperm pump and the aedeagal complex were badly damaged; however, the gonostyli were intact and are very distinctive for this species. The pinned portion of the type is in good condition lacking only the tip of the left wing and tarsal segments of the left hind leg.

SYNONYMY

Prionocera lapponica was described from a single male collected in Swedish Lapland, Lule Lappmark, Sarek, Pate, 10 vii 1907 by B. Poppius. The type, which I borrowed from NRS, had had the genitalia removed and preserved in balsam on a small slide pinned beneath the specimen. The aedeagus and associated structures, the right pair of gonostyli, and only half of the 9th tergite are preserved, the latter in lateral aspect with the processes obscured or broken. The left wing is glued to a card and only the middle and hind legs of the right side are intact.

Tjeder differentiated recta from lapponica primarily by colour and by differences in the shape of the processes of tergite 9. The differences noted fall within the range of variation observed in this species.

Prionocera recta and P. lapponica were described consecutively in the same paper (Tjeder, 1948). I am designating recta rather than lapponica as the name for this species, because it has page priority and because the type of recta is in slightly better condition and the the description and illustrations are more typical of this species.

Prionocera lackschewitzi Mannheims was a renaming, by Mannheims (1951), of a species which had been previously illustrated and described by Lackschewitz (1933), but had been misidentified by Lackschewitz as "serricornis". Tjeder (1948:90) had noted that this taxon was either a new species or conspecific with P. lapponica, but not having seen any of Lackschewitz's material, Tjeder declined to deal with it. Mannheims (1951:71) noted that according to the description and figures given by Lackschewitz (1933:138-39, Figs. 4a,b,c) this species differed from lapponica Tjeder in the shape of the dorsal process of the 9th tergite. In P. lapponica, the dorsal process is described as being somewhat conical whereas in lackschewitzi it is slightly broadened medially. Mannheims did not compare lackschewitzi to recta. The rather minor differences noted in the shape of the dorsal process falls well within the general variation of P. recta.

Mannheims designated as a "lectotype" for lackschewitzi the first specimen listed by Lackschewitz (1933:139) under "serricornis", i.e., Fennia: Kuusamo, 1 male, (R. Frey, M.H.). The specimen which I borrowed from ZMH bore the following labels: Kuusamo/ R.Frey/ 897/ Prionocera serricornis Ztt. det. Laksch./ Mus. Hel. N:o 1547/ Prionocera serricornis, 2(?) Zett./ Mus. Zool. Helsinki Loan No.D 5463/ Prionocera lackschewitzi Mannh. (J.M ?), det. Bo Tjeder. Only one specimen of "serricornis" from Kuusamo, collected by Frey and deposited in Helsinki was listed by Lackschewitz (1933). Therefore, the specimen which I saw must be the one designated as lectotype by Mannheims. It was damaged, but enough of the genitalia was intact to show unequivocally (after being softened in KOH and lactic acid) that it does not correspond to the description and figures given by Lackschewitz for

"serricornis" but, ironically, does correspond to his "P. anceps," now recognized as being P. serricornis Zetterstedt.

This was an unfortunate designation. Mannheims was actually selecting a holotype and not a lectotype, this being the first formal recognition of the existence and naming of a new species. Moreover, the specimen in question was apparently never seen by Mannheims.

Prionocera gracilistyla was described from a male holotype, Point Barrow, Alaska, June-August, 1950, N.A. Webber, Collector's No. 2644, a female allotype, 27 vii 1949, Weber, No. 2514 and 8 males and 1 female paratopotypes, July 10-23, 1952, P.D. Hurd. All specimens are deposited in the USNM.

The type, which I examined, was in good condition except that only the right hind leg is complete. The genitalia have not been removed but the distinctive dorsal and lateral processes on the 9th tergite were clearly visible. The specimen bears whitish hairs on the head and thorax, and the nasus is reduced to a small bump. I am confident that this specimen is conspecific with P. recta.

VARIATION

The most striking variation in this species is in hair colour. The Scaninavian and Russian specimens, including the type, have long yellowish white (92) hairs on the head and thorax with shorter hairs of the same colour on the abdomen. Most North American specimens have dark hairs ranging from light brown to deep brown (57,56), with abdominal hairs also brown but several shades lighter. The darker hairs look coarser and give these specimens a much more bristly appearance. The Alaskan specimens, including those described as gracilistyla, have hairs ranging from yelliowish white to light orange-yellow (92,70). Some specimens with pale hairs were found among collections of the darker haired specimens from several localities across the Canadian Arctic.

The genus Prionocera is also distinguished by its glabrous venation; therefore, it was surprising to find several palearctic specimens of recta (2 from Finland, the Norbotten specimen from Sweden and several Russian specimens from Tobolsk) with scattered hairs on R₃ and R₄₊₅. The tarsal claws are simple on all nearctic specimens. On most of the Russian specimens there is a small tooth, but only on one of each pair of claws on a leg.

As in all species of Prionocera, there are differences in the shapes and angles of the processes of tergite 9 in the males. These differences may be exaggerated by differential orientation and drying of the specimen.

The inner gonostylus has a small rounded ridge on the mid-lateral surface which is more pronounced in the Palearctic and Alaskan specimens.

DISCUSSION

Savtschenko considers recta to be closely related to mannheimsi, and I suggest that these two species together with byersi make up a natural assemblage, the recta species group. This group appears to be related to the dimidiata group rather than to the ringdahli group, based on characters of the male genitalia (see Phylogeny Section and discussion under mannheimsi.)

Prionocera recta has been confused with ominosa, serricornis and ringdahli. These four species have long hairs on the head and thorax, distended flagellomeres and the nasus reduced or entirely absent, characters which I believe to be less reliable phylogenetically because they are too variable. Males of recta are recognized by the long dorsal lobes and distinct lateral lobes on the 9th tergite. The other species have relatively shorter dorsal lobes and lack lateral lobes. Females of recta are distinguished from those of ominosa and serricornis by the presence of a small nasus bearing a fringe of projecting hairs, and from ringdahli by relatively shorter hypogynial valvulae and cerci which are relatively broader, shorter and almost straight, rather than downcurved at the tip.

GEOGRAPHIC DISTRIBUTION (Map 12)

This is one of the more northern, and also one of the more widespread species. It has been collected across boreal and subarctic North America and Russia. It was taken in the gray willow (Salix cinerea) region in Lappland (Tjeder, 1948:94).

FLIGHT RECORDS: 2 June-11 August

Most flies were collected from the middle of June to the end of July.

SPECIMENS EXAMINED (278 males [MM], 131 females [FF])

NEARCTIC: **CANADA:** NORTHWEST TERRITORIES: Franklin Distr., Baffin I., coast, Camp Kungovik, 65°35'N, 5 MM, 8 FF, 13-16 vii 29, J.D. Soper (CNC); Frobisher Bay, 2 MM, 2 FF, 24 vi-2 vii 48, T.N. Freeman (CNC); 1 M, 2 FF, 2 vi 48, F.G. Dilabio (CNC); 1 M, 10-11 viii 59, E.G. Munroe (CNC); Nettiiling L., 1 M, 1 F, 23 vi 25, J.D. Soper (CNC); Boothia Peninsula, Lady Melville L., 69°25'N 93°15'W, 2 MM, 1 F, 3 vii 51, J.G. Chillcott (CNC); Spence Bay, 29 MM, 10 FF, 25 vi-6 vii 51, J.G. Chillcott (CNC); 24 MM, 5 FF, 27 vi-21 vii 51, A.E.R. Downe (CNC); same data, 2 MM (OSU); Victoria I., Bernard Harbour, 68°46'N 114°42'W, 2 MM, Nos. 822, 828, vii-viii 15, 1 M, No. 423, 1-14 vii 16, Canadian Arctic Expedition, Frits Johansen (CNC); Cambridge Bay, 17 MM, 7 FF, 8-18 vii 50, E.H.N. Smith (CNC); 15 MM, 4 FF, 11 vii 50, B.A. Gibbard & G.K. Sweatman (CNC); Holman, 12 MM, 17-18 vi 52, D.P. Gray (CNC); 71°17'N 114°W, 9 MM, 5 FF, 25-30 vi 75, G. & M. Wood (CNC). Keewatin Distr.: Baker Lake, 1 M, 1 F, 14, 26 vii 47, T.N. Freeman (CNC); Chesterfield, 6 MM, 3-22 vii 50, J.R. Vockeroth (CNC); 14 MM, 5 FF, 4-15 vii 50, J.G. Chillcott (CNC); Padley (Padlei?, 61°55'N 96°40'W), 1 M, 2 FF, 2 vii 50, R.A. Hennigar (CNC); Southampton I., Coral Harbour, 59 MM, 36 FF, 18 vi-1 vii 52, P.R. Ehrlich (CNC); same data, 1 M, 1 F (SEM), 1 M (VIL); 7 MM, 11 FF, 1-5 vii 48, G.E. Shewell (CNC); Seahorse Point, 1 M, 17 vi 38, British Canadian Expedition 36-39, T.H. Manning (BMNH); 64°15'N 89°30'W, 1 M, 22 vii 50, J.G. Chillcott (CNC); Melville Peninsula, Repulse Bay, 18 MM, 4 FF, 25 vi-24 vii 50, J.E.H. Martin (CNC); same data, 1 M (VIL); 8 MM, 3 FF, 26-30 vi 50, P.F. Bruggemann (CNC). Mackenzie Distr.: Aklavik, 1 F, 16 vi 56, E.F. Cashman (CNC); 1 F, 16 vi 56, R.E. Leech (CNC); Coppermine, 3 MM, 3 FF, 18 vi-14 vii 51, S.D. Hicks (CNC); 1 M, 4 viii 48, H.T. Sacklette (CNC); Salmita Mines, 64°05'N 111°15'W, 1 M, 1 F, 18 vi 53, J.G. Chillcott (CNC). QUEBEC: Sugluck, 2 FF, 28 vi 54 H. Huckel (CNC). YUKON TERRITORY: Dickson L., Mt. Mye, 133°08'N 62°21'W, 5,000', 1 M, 14 vi 60, E.W. Rockburne (CNC); 60-75 mi N Rampart House (67°25'N 140°59'W), 1 M, 24-26 vi 12, J.M. Jessup, (J.M. Aldrich coll., USNM); km 155 Demster Hwy., 3 MM, 22-24 vi 82, G. & M. Wood (CNC).

U.S.A.: ALASKA: Alcan Hwy., Summit Pass, Richardson Hwy., No. 17, S of Isabel Pass before Denali Hwy., 1 M, 7 vi 49, E.K. Miller (SEM); Anchorage, 1 F, 2 vi 51, R.S. Bigelow (CNC); Collinson Pt. (69°59'N 144°54'W), No. 1195, 1 M, 22-23 vi 14, Canadian Arctic Expedition, Frits Johansen (CNC); Igiak Bay (=Kokechik Bay), 2 MM, 15 vi, 17 vii 52, P.S. Humphrey (UMMZ); Umiat, 69°22'N 152°08'W, 1 M, 5 vi 47, Knight (UMMZ); Ogotoruk Cr., Cape Thompson, CH 123 Pond 6, No. 1137, 68°05'N 165°45'W., 1 F, 15 vi 60, W.C. Hanson (WSU); Point Barrow, 1 M, 5 FF, 10-23 vii 52, P.D. Hurd (gracilistyla paratypes, USNM); 3 MM, 6 FF, 17-23 vii 53, P.D. Hurd (USNM); 1 M, 27 vii 49, N.A. Weber (gracilistyla paratype, slide No. 9592, Alexander Coll. USNM) 1 M, 1 F, Nos. 2649, 2652, vi-viii 50, N.A. Weber, (BMNH); 1 M (No. 4, no date) 1 F, 18 vii 1882, John Murdock (USNM).

PALEARCTIC: **FINLAND:** ENONTEKION LAPPI: Le Saana, 1 M, 30 vi 62, Björn Federley (ZMH). INARIN LAPPI: Inari See, 1 F, 19 vi 66, Mittendorf (MAKB).

SWEDEN: LULE LAPPMARK: Sarek, Parte, 1 M, 10 vii 07, B. Poppius (lapponica holotype, NRS). NORBOTTEN: 67°58'N 23°38'E, 1 M, 25 vii 51, J.R. Vockeroth (CNC). TORNE LAPPMARK: Abisko, Mt. Lullenhatjamo Snowfield, 1 F, 3 vii 71, H. Lundberg (BMNH); Jebrenjokk, 1 M, 22 vii 26, O. Ringdahl (recta holotype, ZMLS).

U.S.S.R.: POLAR URAL, Gouv. Tobolsk, 1 M, 9 vi 09, F. Saizew (MAKB). TAYMYR: near Dikson, 11 MM, 5 vii-9 viii 79, V.I. Lantsov, (CNC); 1 M, 27 vii 82, Chertlob (CNC)

Prionocera ringdahli Tjeder

Prionocera ringdahli Tjeder, 1948: 90-91, Fig. 10 (male terminalia); 1955: 242-243.

DIAGNOSIS

A conspicuously hairy fly, hairs always whitish. Male: tergite 9 with small squarish dorsal lobe, no lateral lobe; inner gonostylus with broad, flat distal beak, divided proximal beak. Female: hypogynial valves relatively long; cerci narrow, slightly downcurved at tip.

DESCRIPTION (Figs. 6, 20, 39, 55, 71, 87)

ADULT. General description: a gray fly, usually with brownish caste on thorax, hairs long, pale yellow (89); male body length 9.1-10.9 mm, wing length 11.3-14.3 mm; female body length 10.4-12.5 mm, wing length 14.2-14.4 mm.

MALE. Head: vertex grayish brown to medium brown (61,58), usually divided by capillary black line, hairs long, erect, proclinate distally; gena light gray to dark gray (264,265) with scattered short hairs; rostrum medium gray to brownish black (265,65), not lightened laterally, with long fine proclinate hairs, hairs projecting beyond rostrum, nasus small to absent; pseudo-ocellus light orange-yellow to black (70,267).

Antenna: flagellum medium brown to dark brown (58,59), usually lightened to medium brown (58) basally; 1st flagellomere slightly longer than 2nd, cylindrical with strong distoventral dilation; succeeding flagellomeres progressively less distended distoventrally, distal width of proximal flagellomeres twice width at base; 10th & 11th flagellomeres cylindrical, 11th 1/2 width and length of 10th.

Thorax: prescutum laterally not contrastingly yellowish; dorsal stripes glabrous, medium gray to dark brown (265,59), median stripe bisected by black to light brownish gray (267,63) line; stripes bordered by light gray to grayish brown (264,61) region, bearing long hairs, hairs shorter and reclinate anteriorly around median stripe, longer and erect posteriorly; postsutural area, scutellum and mediotergite medium gray to brownish gray (265,64) with long hairs; pleuron light gray to dark gray (264,266) with long hairs on all pleural segments except on small katepimeron; anatergite medium gray to olive gray (265,113); katatergite medium gray to dark gray (265, 266), broadly edged dorsally with pale yellow (89).

Wings: membrane tinged with light yellowish brown (76), costal and subcostal cells somewhat darker; veins strong yellowish brown to dark grayish brown (74,62); stigma strong yellowish brown to deep yellowish brown (74,75) distally, colourless proximally; obliterate streak broad anteriorly, including proximal half of stigma, inconspicuous posteriorly because of almost hyaline membrane.

Legs: tarsal claw usually without tooth.

Abdomen: light olive gray to grayish yellowish brown (112,80) with dark yellowish brown (78) dorsal longitudinal stripe; tergites narrowly edged distally, more broadly edged laterally with pale yellow to light orange-yellow (89,70); hairs erect ventrally, recumbent and shorter medially on all tergites.

Genitalia: tergite 9 with dorsal process small, squarish; lateral process very small or absent; apical process relatively narrow, abruptly and sharply curved medially; median lobe broadly fused to bases of apical processes; rectal sclerite long, thin, rectangular. Gonocoxites sometimes with protruding membrane ventrally; gonocoxal fragment broadly triangular. Outer gonostylus with broad base, narrowing distally, medial surface concave except for narrow raised edge. Inner gonostylus with long, broad, flatish distal beak, without pigmented sensilla; no dorsal crest; divided proximal beaks: squarish medial section abundantly haired; conical lateral section, somewhat more distal, with finer, shorter hairs; oval membranous area on mid-lateral surface bearing several short, stout hairs. Aedeagus with tip curved dorsally, bearing subapical lateral tooth. Aedeagal guide with parallel-sided narrow membranous tip, dorsal plate broad and flat.

FEMALE. Similar to male except as follows: entire antenna usually lighter than in male; 1st flagellomere slightly constricted subapically; succeeding flagellomeres slightly distended distoventrally giving a serrate appearance; last three flagellomeres smaller, cylindrical and subequal.

Genitalia: sternite 8 with broadly rounded to distinctly lobed dorsolateral edge; hypogynial valvulae relatively long, 0.4 to 0.45 length of sternite 8, tip broad, bearing single, slender, subapical hair (125 X magnification); ventral edges of valvulae narrowly sclerotized; sternite 9 with medium projection relatively long and broad; 10th tergite with rounded posterolateral edge, bearing fine hairs; cerci relatively long, narrow and slightly downcurved at tip.

TYPE SPECIMENS

Holotype, male, Abisko, labelled 4 vii 1917, (published as "1919," Tjeder, 1948), O. Ringdahl, Tjeder Collection (ZMLS).

The type, which I borrowed in 1983, does not bear a collector's label. The genitalia had been removed to a vial on a separate pin. The left gonostyli are missing. The pinned part of the specimen has lost the right flagellum beyond the first segment, the middle left leg and four tarsomeres of the right hind leg.

VARIATION

The Scandinavian populations tend to have a small but distinct nasus and a more hyaline wing membrane (making the stigma a little more evident) and sternite 8 in the female is usually broadly rounded rather than lobed. By contrast, specimens from North America and U.S.S.R (Dikson area) usually lack a nasus and the wing membrane is more infumed making the stigma a little less evident, and sternite 8 in the female usually has an angular lobe on its dorsolateral edge.

The tarsal claws of the male are usually simple. However, a minute tooth occasionally is found near the base of a claw. The presence of such a tooth is not correlated with the leg position (i.e., front, middle or hind leg) nor with the claw position (medial or lateral).

DISCUSSION

I consider ringdahli to be most closely related to cryptica on the basis of a similar sensory area on the inner gonostylus. However, this species looks very much like, and has been confused with ominosa, recta and serricornis. Males of ringdahli can be distinguished by a smaller, squarish dorsal process on tergite 9 and a broader, flatter distal beak on the inner gonostylus. Females of ringdahli can be distinguished by their relatively larger hypogynial valves and cerci which are downcurved at the tip.

GEOGRAPHIC DISTRIBUTION (Map 13)

This is one of the more northerly species, not extending southward much beyond tree line. It has been collected from coast to coast in North America but is only sparsely represented in collections from northern Fennoscandia and Russia.

FLIGHT RECORDS: 16 June-26 July.

Prionocera ringdahli is apparently less common than other Prionocera species found in the same regions and seems to have a somewhat shorter flight period.

SPECIMENS EXAMINED (61 males [MM], 37 females [FF])

NEARCTIC. CANADA: NORTHWEST TERRITORIES: Franklin Distr., Boothia Peninsula, Lady Melville Lake, 69°25'N 93°15'W, 1 M, 3 vii 51, J.G. Chillcott (CNC); Repulse Bay, 1 M, 4 vii 50, J.E.H. Martin (CNC); Spence Bay, 2 MM, 5-8 vii 51, J.G. Chillcott (CNC); same data, 1 M, 1 F (OSU); Victoria I., Cambridge Bay, 1 F, 26 vii 50, G.K. Sweatman (CNC); 71°17'N 114°W, 1 M, 25-30 vi 75, G. & M. Wood (CNC). Keewatin Distr., Baker Lake, 1 F, 14 vii 47, T.N. Freeman (CNC); Chesterfield, 2 MM, 1 F, 12-26 vii 50, J.G. Chillcott (CNC); same data, 1 M (VIL); 1 M, 29 vii 50, J.R. Vockeroth (VIL); Southampton I., Coral Harbour, 7 MM, 10 FF, 30 vi-13 vii 48, G.E. Shewell (CNC); same data: 1 M, 1 F (USNM); same data: 4 MM, 25-27 vi 52, P.R.

Ehrlich (CNC); 1 M (VIL). Mackenzie Distr.; Nr. Beechey L., 65°14'N 106°50'W, 1 M, 11 vii 66, G.E. Shewell (CNC); Coppermine, 2 FF, 14 vii 51, S.D. Hicks (CNC); Ford Lake, 63°11'N 107°19'W, 1 F, 2 vii 66, G.E. Shewell (CNC); Muskox L., 64°45'N 108°10'W, 5 MM, 1 F, 11-25 vii 53, J.G. Chillcott (CNC). QUEBEC: Payne Bay (=Bellin), 1 F, 21 vii 58, E.E. MacDougal (CNC). YUKON: North Fork Crossing, Mi 42, Peel Pkt. Rd., 1 M, 25 vi 62, R.E. Leech (CNC).

U.S.A. ALASKA: Igiak Bay, 61°43'N 166°08'W, 7 MM, 5 FF, 2-19 vii 52, P.S. Humphrey (UMMZ); Isabel Pass Mi 206 Richardson Hwy., 2900', 63°20'N 145°30'W, 2 MM, 13 vii 62, R.E. Leech (CNC); Mt. McKinley Nat'l Pk., 2600', 1 M, 26 vi 57, G.W. Byers & party (SEM); No. 16, Horseshoe Lake, 1550', 4 MM, 2 FF, 26 vi 57, G.W. Byers (SEM); Nome, 2 MM, 2 FF, 2-9 vii 51, D.P. Whillans (CNC); Prince of Wales, 55°40'N 133°W, 1 F, 21 vii 26, D. Jenness (CNC); Prudhoe Bay, 70°18'N 148°21'W, 1 M, 2 vii 71, Cat. No. 239, Stephen F. McLean (SEM); Umiat, 69°25'N 152°20'W, 1 M, 13 vii 47, C. Schultz (UMMZ); Unalakleet, 63°52'N 160°50'W, 2 MM, 16 vi 61, B.S. Heming (CNC); shore of Arctic, 69°40'N 141°W, 1 F, 27-30 vii 12, J.M. Jessup (USNM).

PALEARCTIC. **FINLAND:** ENONTEKION LAPPI: Le Pikko Malla, 1 F, 3 vii 62, Björn Federly (ZMH). INARIN LAPPI: Utsjoki, 1 M, 1812, R. Frey (MAKB). KEMIN LAPPI: Kittilä, 1 M, R. Frey (ZMH); n Vuossa (Vuotsa?), 1 F, 19 vi 66, Mittendorf (MAKB).

SWEDEN: NORBOTTEN: w Haparanda, 2 MM, 1 F, 17 vi 66, Mittendorf (MAKB). TORNE LAPPMARK: Abisko, 4 MM, 4 FF, 27 vi-1 vii 51, J.R. Vockeroth (CNC). LAPPLAND: Halmjäni, 1 M, 2 vii 55, Birger Jensen (MAKB); Stoedalen, 1 M, 2 vii 55, Birger Jensen (MAKB).

U.S.S.R.: KOLA PENINSULA: Ponoj (67°02'N 41°03'E), no. 4459, 1 M, (ZMH).

Prionocera serricornis (Zetterstedt)

Tipula serricornis Zetterstedt, 1838: 843; 1851: 3969-3970; Wallengren, 1882: 17.

Stygeropsis serricornis; Mik, 1889: 102.

Prionocera serricornis; Kertész, 1902: 279; Wahlgren, 1905: 124; Tjeder, 1948: 88-90, Fig. 1 (male terminalia), Fig. 4 (male head), Fig. 9 (male terminalia; Mannheims, 1951: 64-65, Fig. 33 (from Tjeder, 1948, Fig. 9).

Prionocera serricornis; Lackschewitz (nec Zetterstedt), 1933: 138-139.

Prionocera anceps Lackschewitz, 1933: 141, Fig. 6 (male terminalia, antennae). (Synonymy by Tjeder, 1948: 88).

DIAGNOSIS

Very hairy; dorsal stripes brown; no nasus; male with dorsal process of tergite 9 short, broad, extending almost to edge of tergite, space between 2/3 or more width of process; apical processes separated by evenly sclerotized area; female with dorsolateral edge of sternite 8 sloping, not lobed; hypogynial valvulae very short, broadly triangular, less than 1/4 length of sternite 8; cerci short, broad, slightly upturned.

DESCRIPTION (Figs. 21, 40, 56, 72, 88)

ADULT. General description: distinctly brownish with hairs on head and thorax long, pale yellow to pale orange-yellow (89,73); male body length 9.9-11.4 mm, wing length 11.6-14.4 mm; female body length 10.8-14.6 mm, wing length 12.3-15.4 mm.

MALE. Head: vertex medium gray to light brownish gray (265,63), usually traversed by darker capillary line broadened medially, hairs long, subequal to coxal hairs; gena light gray to medium gray (264,265), with two or three very short scattered hairs; rostrum grayish brown to dark grayish brown (61,62), light orange-yellow to deep yellowish brown (70,75) distally, not lightened ventrolaterally, with finer proclinate hairs not projecting fringe-like beyond tip; no nasus; pseudo-ocellus deep yellow-brown to brownish black (75,65).

Antenna: flagellomeres moderate brown to brownish black (58,65), 1st only slightly longer than 2nd, subcylindrical base, strongly distended distoventrally; flagellomeres 2-9 triangular in lateral profile, distal width of lower

flagellomeres twice width at base; 10th cylindrical; 11th tiny, cylindrical, less than 1/3 length of 10th.

Thorax: prescutum laterally contrastingly light yellowish brown to moderate orange-yellow (76,71); dorsal stripes glabrous, dark grayish yellowish brown to brownish black (81,65), median stripe narrowly bisected with brownish black to black (65,267) line, darker anteriorly, stripes bordered by light grayish yellowish brown to moderate yellowish brown (79,77) region bearing long pale hairs; postsutural area, scutellum and mediotergite concolorous with dorsal stripes and borders or slightly grayer, with long hairs; pleuron light bluish gray to medium gray (190,265), bearing long hairs, except for small katepimeron; anatergite medium gray (265), katatergite light orange-yellow (70) dorsally, olive gray (113) ventrally.

Wings: membrane tinged with light grayish yellowish brown (79), costal and subcostal cells slightly darker; veins strong yellowish brown (74); stigma slightly darker than membrane; obliterative streak not strongly developed, broadly whitened at proximal end of stigma, narrower and less conspicuous posteriorly, running almost perpendicularly near wing tip.

Legs: tarsal claws without tooth.

Abdomen: light grayish brown to grayish yellowish brown (60,80), dorsal longitudinal stripe dark grayish yellowish brown (81), tergites broadly edged laterally, narrowly edged posteriorly, in pale orange to dark orange-yellow (73,72); hairs slightly longer and more prominent ventrally.

Genitalia: tergite 9 with dorsal process short, broad, extending laterally almost to edge of tergite, space between 2/3 or more width of process; no lateral process; apical processes broad, with sharply pointed apices, separated at base by broad sclerotized area; rectal sclerite small, irregular, lightly sclerotized. Gonocoxites without protruding membrane ventrally; gonocoxal fragment broadly triangular. Outer gonostylus broadly oval, medial surface concave except for narrow, poorly defined raised edge, more prominent distally. Inner gonostylus with dorsal crest sloping towards short, subcylindrical distal beak; distal beak not ridged on medial surface, no pigmented sensilla; proximal beak small, broadly triangular. Aedeagus narrowly S-shaped (viewed laterally), distal 1/3 bent ventrally, no subapical teeth. Aedeagal guide with short membranous collar distally, dorsal plate flat, relatively broad.

FEMALE. Similar to male, except as follows: pedicel and base of 1st flagellomere usually lightened to dark orange-yellow (72), 1st flagellomere subcylindrical; succeeding flagellomeres slightly distended distally, giving serrate appearance; 10th & 11th subequal, smallest and cylindrical.

Genitalia: sternite 8 with rounded to sloping dorsolateral edge, not lobed, longitudinally divided by narrow membranous area, broadening anteriorly and flanked by heavily pigmented area; hypogynial valvulae short, less than 1/4 (0.15-0.23, n=5) length of sternite 8, triangular, bearing 1 or 2 subapical hairs distally (visible at 125 X magnification); sternite 9 with median projection short, about as long as broad; tergite 10 rounded distolaterally, without conspicuous hairs; cerci relatively broad, slightly upturned distally.

TYPE SPECIMENS

The original description was apparently based on three males from the following three localities: Sweden, Lapponia Tornensi, Juckasjervi, 25 June; Karungi, in *Salix* flowers, 27 May; and Finland, Alten, western alpine, 6 August. The specimen illustrated and designated as the lectotype by Tjeder (1948:88) was "the single (male) specimen of *Tipula serricornis*" which remained in the Zetterstedt collection (ZMLS). Tjeder noted the lack of data accompanying this specimen, and that it had sustained damage by "mites," and he noted "it agrees perfectly with Zetterstedt's description as far as can be judged from the specimen."

I examined the lectotype in 1983. Only part of the thorax and wings remain on the pin. The genitalia were in balsam, on a small plastic slide, pinned beneath the specimen. I removed them to glycerine in a genitalia vial because the specimen

had been mounted laterally and important features were obscured. Zetterstedt described this fly as having four erect light coloured lobes distally on the anal segment. This is puzzling because this specimen has only two dorsal and no lateral processes. It must be assumed that Zetterstedt counted the apical processes which lie beneath the dorsal processes and are usually overlooked.

A headless specimen labelled "T. serricornis Zetterstedt, Alten," also in the Zetterstedt collection and which may be the male from Finland referred to above, was determined as Tipula subnodicornis Zetterstedt by Tjeder (1948:90). I concur that this is not a Prionocera.

SYNONYMY

Lackschewitz (1933), having misapplied the name serricornis to the taxon here recognized as recta, described anceps as a new species. Tjeder (1948) recognized anceps as a synonym of serricornis, and I concur.

I have seen the first two specimens listed as anceps by Lackschewitz (ZMH). They bear the following labels: (1) Lapponia/ J. Sahlbg./ 168/ Prionocera turcica/ PRIONOCERA ANCEPS NOV. SP. LACKSCH./ Syntype and (2), Lapponia/ J. Sahlbg./ 124/ Prionocera serricornis / PRIONOCERA ANCEPS NOV. SP. LACKSCH./ syntype. The genitalia of specimen no. 124 are mounted on a small plastic slide pinned beneath the rest of the specimen.

DISCUSSION

Prionocera serricornis is the sister species of the nearctic P. ominosa. They differ most noticeably in the configuration of the 9th tergite. See discussion under ominosa.

In the Palearctic region Prionocera serricornis is likely to be confused with P. recta and P. ringdahli, which also have long dense hairs and distended flagellomeres. The short broad distal process and lack of a lateral process distinguish males of serricornis, and females are distinguished by their very short, triangular hypogynial valves.

GEOGRAPHIC DISTRIBUTION (Map 14)

This species is restricted to the Palearctic. I have seen specimens from northern Fennoscandia to Dudinka, U.S.S.R. (near 86°E 69°N). (A female from Kamchatka, having the last two flagellomeres subequal, and relatively longer hypogynial valvulae, is here considered to be P. ominosa.) Savtschenko records this species from Murmansk, Arkhangelsk, Novaya Zemlya, Novosibirsk and Yakutsk.

Prionocera serricornis has been collected in the lower gray willow (Salix cinerea) and birch region (Tjeder, 1948).

FLIGHT RECORDS: 5 May-10 June.

SPECIMENS EXAMINED (15 males [MM], 13 females [FF])

PALEARCTIC: **FINLAND:** ENONTEKION LAPPI: Le Iso Mallo, 2 MM, 28 vi-5 vii 62, Meinander (BONN, HEL). INARIN LAPPI: Ailigas, 2 MM, vii 58, Fendler (ZSM); Ivalo Li, 1 M, E. Thuneberg (ZMH). KEMIN LAPPI: Montell Muonia, 68°N 23°30'E, 1 F, 5 v 25 (MAKB). KOILLISMAA: Kuusamo, 1 M, R. Frey (lectotype of lackschewitzii, ZMH); Kuusamo Lehto, 2 MM, 3 FF, 18 vi 58, Fendler (MAKB).

SWEDEN: TORNE LAPPMARK: Abisko, 2 MM, 1 F, 30 vi-2 vii 55, Birger Jensen (MAKB); 1 F, 10 vii 51, J.R. Vockeroth (CNC); Masugnsbyn, 2 MM, 31 v 11, B. Poppius (ZMH); Lapland, 2 FF, A. Roman (NRS). UPPLAND: Upl. Pwg., 1 M, no further data (NRS); 2 MM, J. Sahlberg (syntypes of P. anceps ZMH); 1 F, no further data (NRS).

U.S.S.R.: ARCHANGELSK: Archangelsk, 2 FF, R. Frey (ZMH). KOLA PENINSULA: Kusomen, 1 M, R. Frey (ZMH). KRASNOYARSKIY: Dudinka, 1 F, Wuorentaus (ZMH).

Prionocera setosa Tjeder

Prionocera setosa Tjeder, 1948: 86-88, Fig. 8 (male terminalia); 1955: 242-243; Mannheims, 1951: 63, Fig. 30 (from Tjeder, 1948, Fig. 8).

DIAGNOSIS

Sparsely hairy, more than half of pleuron bare; tergite 9 with narrowly triangular dorsal process, tiny dorsolateral lateral process, apical process with three small rounded points on broadened tip.

DESCRIPTION (Fig. 22 from Tjeder, 1948).

ADULT. General appearance: brownish gray, sparsely hairy, hairs on head and thorax short, yellowish white (92); male wing length 12.32 mm.

MALE. Head: vertex dark yellowish brown (78), divided by capillary black (267) line, hairs short, stiff, brownish black (65); gena light gray laterally to dark yellow brown (264,78) medially, with inconspicuous short hairs; rostrum dark grayish brown (62) dorsally, lightened to deep brown (56) laterally; brownish black (65) hairs on rostrum dorsally, projecting fringe-like beyond moderate (0.1 mm) nasus, lateral hairs paler, longer; pseudo-ocellus dark brown (59).

Antenna: flagellum brownish black (65), flagellomeres slightly distended ventro-distally, distal width less than twice basal width, 1st flagellomere 1.5 length of 2nd; 11th relatively long, 0.7 length of 10th.

Thorax: prescutum laterally not contrastingly yellowish; dorsal stripes glabrous, middle stripe dark yellowish brown (78), bisected by narrow line, lateral stripes dark grayish yellowish brown (81), stripes bordered by grayish yellowish brown (80) region bearing short yellowish white (92) hairs; postsutural area, scutellum and mediotergite light to dark gray (264,266), with short hairs; pleuron light gray (264), almost bare, no hairs on anepisternum, lower half of anepimeron, and katepimeron; anatergite grayish yellow (90); katatergite pale yellow (89) dorsally, bluish gray (191) ventrally.

Wings: membrane tinged with light yellowish brown (76), costal and subcostal cells slightly darker; stigma slightly darker than membrane; oblitative streak not strongly developed, beginning narrowly at Rs and running somewhat diagonally near wing tip.

Legs: no tooth on tarsal claws.

Abdomen: light grayish yellowish brown (79) with deep brown (56) dorsal longitudinal stripe; segments very narrowly edged in pale orange-yellow (73) distally, more broadly edged laterally; hairs short, yellowish white (92).

Genitalia: (based on description and figures of Tjeder, 1948: 86-87). Tergite 9 with dorsal process narrow, triangular, somewhat medially bent, lateral process small, tooth-like, set in from tergite edge, apical process terminating in three small rounded points on broadened tip; medial lobe broad, lying between dorsal and apical processes. Outer and inner gonostyli as in subserricornis (Fig. 41). Outer gonostylus somewhat slender with rounded apex. Inner gonostylus with broadly rounded basal section subequal in length to distal beak; long, narrow, cylindrical slightly curved distal beak apparently with several small pigmented sensilla along proximal edge; dorsal crest broadly rounded; proximal beak small, flattened lobe on lateral surface (see Fig. 57). Aedeagus with small dorsal constriction distally, subapical dorsal tooth, no lateral tooth. Aedeagal guide with distal tip narrowly membranous; dorsal plate flat, short and narrow, subtended by small sclerotized attachment to sperm pump.

FEMALE. unknown.

TYPE SPECIMEN

Holotype, male, Abisko, 4 vii 1917, O. Ringdahl, Tjeder Collection, (ZMLS).

The type, which I saw in 1983, had no collector's label. The genitalia had been removed, and placed in a genitalia vial on a separate pin. (Unfortunately this vial could not be located, Dr. Roy Danielsson, pers. comm.). Only the left hind

leg remains on the pinned specimen. Small patches of minute silvery scale-like, highly reflective material are stuck to the pleural segments of the abdomen.

DISCUSSION

Prionocera setosa is most closely related to subserricornis, as pointed out by Tjeder (1948). It is distinguished from subserricornis by the dorsal lobe on tergite 9 of the male being longer than the lateral lobe. Both species have a distinctive and very similar inner gonostylus and a similar medial lobe on the 9th tergite. They are both sparsely hairy, the pleuron being more than half bare. They have a moderate nasus, and the flagellomeres in the male are only slightly distended, less so in the female.

Tjeder described setosa as being "hairy (on the) thorax sides, (and) the coxae have a long and denser (hairiness). Analogous (hairiness) occurs also in (proxima) but hardly so dense as in this species." The specimen which I saw had almost a bare pleuron similar to subserricornis, except for hairs on the katapisternum and a few straggly hairs below the wing base on the anepimeron. The coxae, contrary to the original description, are no more hairy than in subserricornis.

MATERIAL EXAMINED (Map 15)

SWEDEN: TORNE LAPPMARK: Abisko, male (holotype), 4 vii 17, O. Ringdahl (ZMLS).

Prionocera sordida (Loew)

Stygeropsis sordida Loew, 1863: 298; 1864: 182; Osten Sacken, 1878:40; Alexander, 1919: 9.

Prionocera sordida; Kertész, 1902: 279; Alexander, 1936: 274 (possibly misidentified); 1942a: 220; 1965a: 19.

DIAGNOSIS

A very small brown hairy fly known only from the female. Dorsolateral edge of 8th sternite rounded, not lobed; hypogynial valvulae short, triangular with a narrow sclerotization ventrally; cerci slightly to strongly upturned distally.

DESCRIPTION (Figs. 73, 89)

ADULT. General appearance: deep yellowish brown with abundant long pale yellow (89) hairs; small, body length 6.7-11.4 mm, wing length 8.8-10.9 mm.

FEMALE. Head: vertex light grayish brown to light brown (60,57), divided by moderate brown (58) line, hairy, posterior hairs longer; gena yellowish gray (93), pubescent, lacking hairs; rostrum moderate brown (58) to light yellowish brown (76) distally, not contrastingly lightened laterally, with proclinate hairs, hairs projecting beyond moderate (0.075 mm) nasus; pseudo-ocellus strong brown (55).

Antenna: flagellum moderate brown (58); scape, pedicel, 1st and 2nd flagellomeres with several longer darker hairs dorsally; 1st less than 1.5 length of 2nd, somewhat constricted medially; 2nd and 3rd slightly distended ventrodistally, succeeding segments progressively smaller, more nearly cylindrical; 10th & 11th smallest, subequal.

Thorax: prescutum laterally not contrastingly yellowish; dorsal stripes glabrous, deep yellowish brown (75), median stripe bisected by paler line, stripes bordered by light yellowish brown (76) bearing pale hairs; postsutural area, scutellum and mediotergite concolorous with dorsal stripes, bearing long pale hairs; pleuron brownish pink (33) to moderate reddish brown (43) on katapisternum, sclerites with long pale hairs except for small katapimeron; hairs; anatergite dusky moderate reddish brown (43); katatergite broadly pale orange-yellow (73) dorsally, dusky moderate reddish brown (43) ventrally.

Wings: membrane tinged with light grayish yellowish brown (79), veins brownish orange (54); stigma, costal and subcostal cells very slightly darker than membrane; obliterative streak not strongly contrasting with membrane, beginning in proximal half of stigma, crossing wing obliquely near tip.

Abdomen: light brown to moderate brown (57,58), segments bordered with yellowish white (92) distally and laterally; darker dorsal stripe not apparent.

Genitalia: sternite 8 with dorsolateral edge broadly rounded, not lobed; hypogynial valvulae short, 1/4 length of sternite 8, separated from sternite by small squarish membranous region; valvulae triangular in lateral profile, tip pointed, ventral edge narrowly sclerotized, no subapical hairs; sternite 9 with short broad medial projection; tergite 10 not rounded laterally, inconspicuously hairy; cerci moderately broad, slightly to strongly upturned.

TYPE SPECIMENS

Loew (1863) described sordida from a female sent to him by Osten Sacken. Two females, each labelled "Type no. 10320", and bearing green labels "Winnip/Kennic" (collected by Kennicott in Winnipeg), are in the MCZ. The smaller specimen also bears a handwritten label "sordida/ m", probably written by Loew (see Osten Sacken, 1903). However, according to the measurements given in the type description (see Appendix C), the larger specimen fits the description more closely and has accordingly been selected as the lectotype.

The lectotype has no legs, and only the scape and pedicel remain on the left antenna, but the right antenna is intact. The paralectotype lacks both fore legs and the mid right leg has lost the tarsomeres. The right antenna is intact but only the scape and pedicel remain on the left; the tip of the ovipositor has broken off. Both specimens have had the genitalia removed, softened, placed in glycerine in microvials, and pinned beneath them.

DISCUSSION

The two specimens of Prionocera sordida are the smallest and palest specimens seen in this genus. Since females are generally the larger sex, it is likely that the male will be even smaller. Loew, in naming this species, described a dark fly, hence the name "sordida." This discrepancy between the description and the specimens at hand may be the result of fading.

Females in this genus are difficult to identify. The syntypes of sordida are similar to females of several other species; therefore, it was necessary to dissect the genitalia for a more detailed study. Prionocera sordida, because of its long hairs, nasus, weakly developed obliterative streak, short hypogynial valvulae, upturned cerci and small size, is very similar to P. pubescens. However, it differs from the latter in having a small squarish membranous region proximal to a much narrower sclerotization on broadly triangular hypogynial valvulae.

It should be noted that the females of both cryptica and naskapi (the sister species of pubescens) are still not known. It is possible that sordida may be found to be conspecific with one of these species.

SPECIMENS EXAMINED

CANADA: MANITOBA: Winnipeg, Kennicott, 2 females (MCZ).

Prionocera subserricornis (Zetterstedt)

- Tipula subserricornis Zetterstedt, 1851: 3970-3971; Wallengren, 1882: 18.
Prionocera subserricornis; Lackschewitz (nec Zetterstedt), 1933: 139-141.
Prionocera subserricornis; Tjeder, 1948: 83-85, Fig. 6 (male terminalia); 1955: 242-243; Mannheims, 1951: 61-62, Fig. 28 (from Tjeder, 1948, Fig. 6); Kloet & Hincks, 1976: 1.
Prionocera turcica; Bergroth (nec Fabricius, 1781), 1889: 120; Kertész, 1902: 279.
Prionocera proxima Lackschewitz, 1933: 135-136, Fig. 2 (male terminalia, antennae); Tjeder, 1948: 85-86, Fig. 7 (male terminalia); 1955: 242-243; Mannheims, 1951: 62-63, Fig. 29 (from Tjeder, 1948, Fig. 7). (New synonymy)

DIAGNOSIS

Male 9th tergite with very short triangular dorsal and lateral processes, medial lobe present; female with rounded dorsolateral lobe on 8th sternite, cerci narrow, downturned distally; pleuron almost bare.

DESCRIPTION (Figs. 23, 41, 57, 74, 90)

ADULT. General appearance: bluish gray to brownish gray with short, sparse yellowish white (92) hairs; male body length 9.7-12.3 mm, wing length 10.5-13.5 mm; female body length 11.3-15.5 mm, wing length 11.6-17.6 mm.

MALE. Head: vertex dark yellowish brown to olive brown (78,96), usually divided by capillary black (267) line, hairs short, stiff, brownish black (65); gena yellowish white to light yellow (92,86) with inconspicuous short hairs; rostrum dark grayish brown to brownish black (62,65), lightened to moderate orange-yellow (71) laterally on most specimens; rostrum with short, stiff brownish black (65) hairs dorsally on distal 2/3, longer hairs projecting beyond moderate (0.125-0.175 mm) nasus, lateral hairs paler and longer; pseudo-ocellus dark yellowish brown to brownish black (78,65).

Antenna: flagellum brownish black (65), flagellomeres slightly distended ventrodistally, distal width less than twice basal width; 1st flagellomere 1.5 or less length of 2nd; 11th very narrow, 1/2 length and width of 10th.

Thorax: prescutum laterally not contrastingly yellowish; dorsal stripes glabrous, dark bluish gray to dark yellow brown (192,78), median stripe bisected by narrow line, stripes bordered by bluish gray (191) or yellowish gray (93) region bearing short hairs; postsutural area, scutellum and mediotergite concolorous with dorsal stripes, bearing short, pale hairs; pleuron light bluish gray to bluish gray (190,191), almost bare, no hairs on katepimeron nor on lower half of anepimeron; anatergite dark grayish yellow to pale yellow (91,89); katatergite pale yellow (89) dorsally, light bluish gray (190) ventrally.

Wings: membrane tinged with light yellowish brown (76), including costal and subcostal cells; veins and stigma deep yellowish brown to dark orange yellow (75,72). Obliterative streak weakly developed in most North American specimens, beginning narrowly at R_1 and running obliquely near wing tip; in European specimens proximal 1/2 of stigma yellowish white (92) included in a broader obliterative streak, bases of radial cells more strongly infumed, emphasizing streak.

Legs: tarsal claws with small tooth near base.

Abdomen: bluish gray (191) with deep brown (56) dorsal longitudinal stripe; segments edged in pale orange-yellow to grayish yellow (73,90); hairs short.

Genitalia: tergite 9 with dorsal and lateral processes subequal, small, triangular; dorsal process somewhat bent medially; apical process narrow, sharply curved medially; medial lobe short, broad, lying between dorsal and apical processes; rectal sclerite long, narrow, weakly sclerotized. Gonocoxites with small protruding membrane ventrally and proximally; gonocoxal fragment narrowly triangular. Outer gonostylus varying from subtriangular to broadly emarginate on dorsal edge, almost L-shaped in some specimens; medial surface concave, with a raised edge, broader distally. Inner gonostylus with broadly rounded basal section subequal in length to distal beak; long, narrow, cylindrical, slightly curved distal beak, with several (7-12) small pigmented sensilla along proximal edge; dorsal crest broadly rounded; proximal beak small, flattened acute lobe on lateral surface. Aedeagus almost straight distally, with small dorsal tooth near tip, sometimes with smaller lateral tooth proximal to dorsal tooth. Aedeagal guide narrowly membranous at tip, dorsal plate flat, broader than aedeagus plus sheath.

FEMALE. Similar to male, except as follows: flagellomeres cylindrical, not distended; pedicel distally and base of 1st flagellomere lightened to strong brown (55); 10th and 11th slightly narrower than preceding, subequal in length and width.

Genitalia: sternite 8 with rounded dorsolateral lobe, sternite separated from hypogynial valvulae by narrow W-shaped membranous region; hypogynial valves 1/2 length of sternite 8, evenly sclerotized ventrally, tip broad, square-edged, single

subapical dorsal hair extending beyond hypogynial valves (visible with 60 X magnification); sternite 9 with medial projection longer than broad; tergite 10 with lateral edge almost straight, not hairy; cerci relatively long, narrow, downcurved at tip.

TYPE SPECIMENS

Tipula subserricornis Zetterstedt was described from a male and a female from boreal Scandinavia. Only the male, labelled: "INTER SUUL et KONCSTUE/ Ing. Alp. Norv./ 16-7 40" was found, and selected by Tjeder (1948: 83) as the lectotype.

When I studied this specimen in 1983 it had signs of insect damage (dermestid larval hairs clinging to the specimen and frass stuck to the pin). The genitalia were embedded in balsam on a small plastic slide pinned beneath the rest of the specimen. Both antennae were broken; no flagellomeres remained on the right antenna and only the 1st remained on the left. All legs but the left front leg were missing, and only the right wing remained showing a stigma moderately contrasting with the oblitative streak.

SYNONYMY

Lackschewitz (1933) described P. proxima as new, having misapplied the name "subserricornis Zetterstedt" to another species. (The latter species was subsequently named tjederi by Mannheims [1951]). The description of proxima was based on many specimens collected in Germany, Austria, Finland and U.S.S.R. I have seen nine of the syntypes upon which Lackschewitz based his description and I judge this species to be conspecific with subserricornis Zetterstedt. The lectotype of proxima, selected by Mannheims (1951), is a male from Germany, Insel Usedom, Ahlbeck, 14-22 viii 23, Zerny (NHMV).

VARIATION

I had the advantage of studying a broadly ranging series of specimens, collected across North America from the west coast of Alaska to the east coast of Labrador, and from England, Sweden, Finland, Germany, and Russia. My conclusion is that only one species is involved here. Prionocera subserricornis was differentiated from P. proxima by Tjeder (1948) on the basis of an angulated outer gonostylus, both a single dorsal and a pair of lateral subapical teeth on the aedeagus, and a larger movable apodeme on the sperm pump. Some, but not all, of the northern Fennoscandian specimens have a distinctly angulated outer gonostylus, as in the type of subserricornis. But several specimens from Abisko are not angulated and are of the "proxima" type, while others seem to be intermediates between the two. Two specimens from Finland (Hailuoto and Kittilä) among Lackschewitz's proxima material have a distinctly angulated outer gonostylus suggesting that Lackschewitz, also, considered this to be variation within a single species.

Most specimens examined from both the Palearctic and Nearctic have a very slight lateral thickening on the aedeagus just proximal to the more pronounced dorsal tooth. This thickening marks the distal end of a membranous aedeagal sheath. In some specimens it is more pronounced, hence more tooth-like. However, I do not find this to be correlated with the angulated outer gonostylus as suggested by Tjeder.

The blade of the movable apodeme varies in shape from broadly rectangular to more fan-shaped.

The palearctic specimens tend to have clearer wings and a more contrasting oblitative streak and stigma, with more of R_1 included in the oblitative streak. In most nearctic specimens the oblitative streak starts just posterior to R_1 and the wing membrane is more infumed. Several European specimens (Sweden, U.S.S.R.) have a more infumed wing and a weaker oblitative streak, similar to most North American specimens.

There are many minor variations in the width, length, and angle of of the dorsal and lateral processes of tergite 9. As in other species of Prionocera, differential drying tends to exaggerate these differences.

The rostrum is contrastingly lightened laterally in most nearctic specimens and

more or less concolorous in most palearctic specimens. Examples of both types can be found in each population. In several Swedish and Alaskan specimens the dorsal rostral hairs are longer and paler, similar to rather than contrasting with the lateral and ventral rostral hairs.

Savtschenko (1983) also differentiated subsericornis from proxima on the basis of an angulated outer gonostylus and mentioned a slightly longer and narrower proximal beak on the inner gonostylus and an abruptly smaller apical process and hairier dorsal and lateral processes on tergite 9. These distinctions are not evident in the material that I have seen.

DISCUSSION

Prionocera subsericornis is probably closely related to P. setosa, judging from Tjeder's illustrations (1948:87). It differs most strikingly from the latter in the shape of the processes on tergite 9.

The dorsal and lateral processes of P. subsericornis may be homologous to the mediiodistal and laterodistal corners respectively of the dorsal process of such species as dimidiata, ominosa, serricornis and unimicra. If this is the case, there are no true lateral processes in this species.

GEOGRAPHIC DISTRIBUTION (Map 16)

This is one of the more widely dispersed species. In North America it tends to be found south of tree-line, from western Alaska to Labrador, and as far south as the Rocky Mountains in Colorado. In Europe it extends as far south as southern England, Germany and Poland. I have seen a single specimen from Kamchatka.

I have collected this species in wet sedge meadows and over hummocky moss tundra.

Savtschenko (1983) distinguishes between proxima and subsericornis; however, their distributions in the U.S.S.R. are almost identical. He records these taxa from Murmanskaya, Komi A.S.S.R., Leningradskaya, Altayskoye, Krasnoyarskiy Krey, Yakutskaya, Koryakskiy Nats. Okrug., Kuril Islands, Tuvinskaya, Amurskaya, Sakhalin Island and from the Ukraine.

It is found in marshy areas (Tjeder, 1948).

FLIGHT RECORDS: 8 June-2 August (9 September)

Most specimens were collected from the middle of June to the end of July. The two unusually late records from Germany may represent a facultative second generation.

SPECIMENS EXAMINED (138 males [MM], 67 females [FF])

NEARCTIC. CANADA: ALBERTA: Bilby 1 M, 22 vi 24, O. Bryant (UMMZ); Nordegg, 1 F, 5 vii 21, J. McDonnough (CNC). LABRADOR: Nutak, 1 F, 23 vii 54, E.E. Sterns (CNC); 1 M, 23 vii 54, J.F. McAlpine (CNC). MANITOBA: Churchill, 5 MM, 1 F, 12-13 vii 78, F. Brodo (CNC); 6 MM, 2 FF, 25 vi-9 vii 77, F. Brodo (CNC); 6 MM, 2 FF, 12-29 vii 52, J.G. Chillcott (CNC); 2 MM, 1 F, 13 vii 50, J.A. Shemanchuk (CNC); 3 MM, 8 vi 49, J.B. Wallis (CNC); 1 M, 4 FF, 19-29 vii 50, H.J. Teskey (CNC); 1 M, 22 vi 49 (no further data) (CNC); 1 M, 14 vii 51 (no further data) (CNC); 25 mi E Churchill, 15 MM, 6 FF, 1-4 vii 77, F. Brodo (CNC); Fort Churchill, 2 MM, 23 vi 52, C.D. Bird (CNC); 14 MM, 5 FF, 20 vi-10 vii 52, J.G. Chillcott (CNC); Warkworth Creek, near Churchill, 19 MM, 7 FF, 21 vi-7 vii 52, J.G. Chillcott (CNC). NORTHWEST TERRITORIES: Mackenzie Distr.: Aklavik, 2 MM, 1 F, 29 vi-23 vii 56, R.E. Leech (CNC); 4 MM, 1 F, 17-21 vi 53, C.D. Bird (CNC); Yellowknife, 1 F, 29 vi 49, R.R. Hall (CNC); 1 F, 16 vii 49, Fr. Ebner (CNC); 1 M, 20 vi 66, G.E. Shewell (CNC); near Wholdaia Lake, 61°01'N 103°40'W, 1 F, 6 vii 66, J.G. Chillcott (CNC). ONTARIO: James Bay, Fort Albany, 7 MM, 2 FF, 10 vi-2 vii 42, F.A. Urquart (UMMZ). QUEBEC: Poste de la Baleine, Ile de la Passe, 3 MM, 8 vii 71, (in alcohol) (MPUL); Rupert House, 51°30'N 78°45'W, 1 F, 30 vii 49, E.J. LeRoux (CNC). YUKON: Gravel Lake, km 626 Klondike Hwy, 63°49'N 137°54'W, 2 MM, 2 vii 79, S.G. Cannings (SUBC); Swim Lakes, 133°N 62°13'W, 3200', 1 M, 18 vi 60, E.W. Rockburne (CNC). "Hudson Bay Territory", 2 MM, 1 F, Osten Sacken (MCZ).

U.S.A.: ALASKA: Igiak Bay, 2 FF, 2 vii 52, P.S. Humphrey (UMMZ); Katmai, 1 F, 10 vi 19, J. Hine (OSU, destroyed in mail); King Salmon, Naknek R., 4 MM, 1 F, 20-23 vii 52, W.R. Mason (CNC); same data, 2 MM, 2 FF (OSU); 1 F, 19 vii 52, J.B. Hartley (CNC); Kotzebue, 4 MM, 27 vi 56, P.R. Ehrlich (SEM); McKinley Nat'l. Pk., 10 MM, 20-26 vi 57, G.W. Byers (SEM); Savonoski, Naknek L., 2 MM, 1 F, vi 19, J. Hine (OSU, destroyed in mail). COLORADO: Chaffee Co., No. 4, Cottonwood Lake, 9600', 10 mi W Buena Vista, 1 F, 17 viii 65, G.W. Byers (SEM); Rocky Mt. Nat'l. Pk., Dream L., 10,000', 2 MM, 1 F, 18 vii 41, C.P. Alexander (allotype and paratypes of fulvicauda Alexander, paratypes on two slides, No. 6462, Alexander Coll. USNM).

PALEARCTIC: **AUSTRIA:** no further data, 1 M, 1869, Schiner (NHMV).

FINLAND: ENONTEKION LAPPI: Le Iso Mallo, 1 M, 1 F, 28 vi 62, M. Meinander (ZMH); Kilpisjärvi, 60 km SO, 3 MM, 2 FF, 3 vii 58, Fendler (MAKB); same data, 2 MM (ZSM); Le Markkina, 1 F, 2 vii 62, M. Meinander (ZMH); Le Palojoensuu, 3 MM, 2 vii 62, M. Meinander (ZMH). INARIN LAPPI: Utsjoki, 1 M, R. Frey (MAKB). KEMIN LAPPI: Enare (=Inari), 1 M, Hellén (ZMH); Kittilä, 1 M, A. Nyman (ZMH). POHJOIS-POHJANMAA: Hailuoto, 1 M, Wuorentaus (ZMH); Tervola, 1 F, L. Johnsson (ZMH). VARSINAIS-SUOMI: Ab Korpo Jurmo, 1 M, 9 viii 60, K.M. Meinander (ZMH); Kuustö, 1 M, Lundström (ZMH).

GERMANY (B.R.D.): Dachau, 1 M, 12 ix 15, Kai (ZSM); Hamburg, 1 M, 1 F, 7 v, 8 vi 46, O. Kröber (MAKB); (Hamburg?) Stadtpark, 1 F, 10 v 46 (MAKB); Insel Usedom, Ahlbeck, 1 M, 14-22 viii 23, Zerny (lectotype proxima, Mannheims, 1951) (NHMV); Rheinland, 1 F, viii-xi 46, E. Schmidt (MAKB).

NORWAY: HORDALAND: Hardangervidda, Vivelí-Veigdalen, Eidfjord, lak. nr. D VI, 1000 m, 1 M (alcohol), 22 vii 67, K. Bjorklund (ZMUB); 1 F (alcohol) same data, lak. nr. 60, 280m, 17 vii 67, J. Wieken (ZMUB).

POLAND: Rothenberg a. Oder (=Czerwiensk), 1 F, 10 v 46 (MAKB).

SWEDEN: NORBOTTEN: Granvik, 1 M, 1 F, 26 vii 51, Vockeroth (CNC); Haparanda, 3 MM, 2 FF, 17 vi 66, Mittendorf (MAKB); Lovikka, 5 FF, 23 vii 51, Vockeroth (CNC); 67°58'N 23°38'E, 1 F, 25 vii 51, Vockeroth (CNC). TORNE LAPPMARK: Abisko, 4 MM, 2 FF, 23 vi-8 vii 51, J.R. Vockeroth (CNC); Karesuando, 2 FF, 25 vii 51, Vockeroth (CNC). UPPLAND: Hlm (=Stockholm region), 1 M (NRS). VÄSTERGÖTLAND: Göteborg, 2 MM, 7 vii 66, Mittendorf (MAKB). Lappland, no further data, 1 M, (NRS).

U.K.: ENGLAND: Catfield, 1 M, 9 viii 20, J.J.F. -X. King (BMNH).

U.S.S.R.: AMUR: Bai Hadschi oder Kaiserhofen, 1 M, 1 F, 9 viii 1854, Schrenk (NHMV). KAMCHATKA: Bolscherjetsk, 1 M, 2 FF, 27 vi-7 viii 17, Y. Wuorentaus (ZMH). LATVIA: Curon, Paplakia (=Kurland, Paplaka), 1 M, 25 v 27, Lackschewitz (MAKB). MURMANSK: Trifona (=Pechanga), 2 MM, Hellén (ZMH). TRANSBAIKAL: Pjestschanka bei Tschita, 1 F, vi, vii 18, H. Frieb (NHMV). URAL CENTR., Sojmonowsk, 1 M, 18 vi 08, Max Bartel (NHMV).

Prionocera subturcica Savtschenko

Prionocera subturcica Satschenko, 1983, 490-491, Fig. 193 (male terminalia).

DIAGNOSIS

Male 9th tergite broadly emarginate between long, tapering dorsal and lateral processes; inner gonostylus broad with short, tooth-like wide distal beak.

DESCRIPTION (based on translation and figures of Savtschenko, 1983, Figs. 24, 58).

ADULT. General appearance: "similar to P. turcica. Male body length 12 mm; wing length 13.5 mm."

MALE. Genitalia: tergite 9 wider than in P. turcica, dorsal and lateral processes triangular, broadly separated at base; dorsal process broadly rounded distally, shorter and broader than lateral process; apical process small, tooth-like, borne on very short median projection between dorsal processes; no median lobe. Inner gonostylus with massive median ridge on broad base; dorsal

crest sloping towards short, broad, tooth-like distal beak; proximal beak about as large and extending as far as distal beak, equidistant between base and tip of distal beak.

TYPE SPECIMEN

Male holotype, U.S.S.R.: Murmansk Oblast, Kola Peninsula, Khibin Mountain region, watershed of Lake Vudavr, 13 vi 36, Fridolin (Zoological Institute, Academy of Science, U.S.S.R.), (Map 17).

DISCUSSION

I have not seen any specimens of subturcica, but according to its description and illustrations (Savtschenko, 1983), this species is close to but quite distinct from both turcica and oregonica. The apical processes of subturcica are described as extending well beyond the dorsal processes in contrast to the situation in turcica. I found this character to be quite variable in turcica, depending upon the amount of curvature of the median projection and not necessarily on its length.

In subturcica the inner gonostylus is described as "with clearly widening distal beak (turcica has a narrower distal beak). (The) tip of (the) distal beak looks like the tip of a spear (small and sharp) and is clearly distinct from the rest of the sclerite (turcica has an inner gonostylus that gradually narrows to a long blunt dorsal beak)." To maintain uniformity in descriptions, I am interpreting the distal beak to be restricted to the narrowed portion of the gonostylus. The aedeagal guide should be studied in this species to determine its relationship to that of the other species in the turcica group.

SPECIMENS EXAMINED none.

Prionocera tjederi Mannheims

published as Prionocera subserricornis; Lackschewitz, 1933: 139-141, Fig. 5 (male genitalia, antennae), (nec Zetterstedt, 1851).

published as Prionocera pubescens; Tjeder, 1948: 95-96, Fig. 13 (male terminalia), (nec Loew, 1844).

Prionocera tjederi Mannheims, 1951: 70-71, Fig. 38 (from Tjeder, 1948, Fig. 13); Tjeder, 1955: 242-243.

DIAGNOSIS

An almost clear-winged fly with stigma and oblitative streak contrasting with membrane; pleuron almost bare, no hairs on anepisternum, anepimeron and katepimeron; flagellomeres distended; inner gonostylus of male with protruding, almost circular ventrodiscal edge.

DESCRIPTION (Figs. 25, 42, 59, 75, 91)

ADULT. General appearance: dark gray to dark brown with short yellowish white (92) hairs, not conspicuously hairy; male body length 8.3-12.5 mm, wing length 11.3-16.3 mm; female body length 13.7-17.5 mm, wing length 14.7-17.6 mm.

MALE. Head: vertex dark yellow-brown (78), sometimes divided by darker capillary line, hairs short, shorter than coxal hairs; gena light bluish gray (190) with scattered short hairs; rostrum dark grayish yellowish brown to brownish black (81, 193), sometimes lightened to deep yellow-brown (75) laterally, with long proclinate hairs dorsally and projecting beyond comparatively large (0.175-0.225 mm) nasus; pseudo-ocellus medium yellow-brown to dark grayish yellowish brown (77, 81).

Antenna: flagellum dark yellowish brown to brownish black (78, 65); 1st flagellomere less than 1.5 length of 2nd, lightened basally, abruptly distended ventrodistally, dark hairs on dorsal edge; proximal flagellomeres strongly produced ventrodistally; 10th cylindrical, longer than 9th; 11th tiny, 1/4 length of 10th.

Thorax: prescutum laterally contrastingly light orange-yellow to strong brown (70,55); dorsal stripes dark yellowish brown to dark gray to blackish blue (78,266,188), median stripe narrowly bisected by lighter capillary line, stripes bordered by dark gray to light gray (266,264) region bearing short hairs; postsutural area, scutellum and mediotergite concolorous with dorsal stripes, with short hairs, not conspicuously hairy; pleuron light bluish gray to dark grayish blue (190,187), almost bare; katepisternum with hairs, no hairs on anepisternum, anepimeron nor katepimeron; anatergite light grayish brown to dark grayish brown (60,62); katatergite pale yellow (89) dorsally, bluish gray (191) ventrally.

Wings: membrane tinged with yellow-gray (93), costal and subcostal cells grayish yellow (90); veins dark yellowish brown (78); stigma deep yellowish brown (75) distally, paler proximally; obliterative streak including proximal part of stigma, contrasting with membrane, almost perpendicular to wing axis.

Legs: tarsal claws with sharp basal tooth.

Abdomen: light brownish gray to bluish gray (63,191) with dark brown (59) dorsal longitudinal stripe; segments edged in pale yellow to grayish yellow (89,90); hairs short, appressed.

Genitalia: tergite 9 (obscured by 8th segment in dried specimens, usually only tips of dorsal processes visible); dorsal process slightly longer than broad; no lateral process; apical process broad at base, sharply narrowed and medially curved distally; medial lobe broadly fused to bases of apical processes; rectal sclerite triangular. Gonocoxites without protruding membrane ventrally; gonocoxal fragment broad, subtended by small squarish sclerite. Outer gonostylus broadly but shallowly emarginate on dorsal edge, concave medially except for slightly raised distal tip. Inner gonostylus with basal region longer than broad, with a protruding, rounded distal edge, lateral surface with prominent ridge distal to broad depression; dorsal crest gently sloping towards short, narrow distal beak; no pigmented sensilla; proximal beak broad. Aedeagus curved ventrally at tip (viewed laterally), without subapical teeth. Aedeagal guide projecting collar-like posteriorly, usually visible beyond distal edge of gonocoxites, dorsal plate flat, broad.

FEMALE. Similar to male, except as follows: 1st flagellomere shorter than scape, often narrowed proximal to expanded tip; succeeding flagellomeres slightly distended ventrodistally, giving a serrate appearance; 10th & 11th narrower, cylindrical and subequal.

Genitalia: sternite 8 with dorsolateral edge broadly rounded, not lobed; hypogynial valvulae short, 1/3 length of sternite 8, separated from sternite by very narrow, short membranous region; ventral edge of valvulae narrowly sclerotized, single short subapical hair dorsally near rounded tip (visible with 125 X magnification); sternite 9 with medial projection short and broad; tergite 10 rounded laterally, not conspicuously hairy; cerci relatively short, broad, slightly upturned at tip.

TYPE SPECIMENS

Holotype, male, Sweden, Dalarna, Orsa, Ö. Rådsjön, 14 vi 1937, Bo Tjeder, (ZMLS).

This species had been misidentified, redescribed and illustrated as *P. pubescens* by Tjeder (1948), based on two males collected in the province of Dalarna, Sweden. Mannheims (1951) recognized this as a new species and selected the male from Orsa as "lectotype." The specimens so selected should have been designated the holotype because Mannheims was the original author of a new species.

The male genitalia of the "lectotype" were in a vial on a pin labelled "*Prionocera tjederi*, Lectotype, Orsa Ö. Rådsjön." Accompanying the genitalia, on a separate pin, there was a male specimen from which the genitalia had been removed, bearing the labels: "Dir. LIMA, TANDALEN, E. DAHL/ *Prionocera pubescens* det Bo Tjeder/ (red label) Lectotypus male, *Prionocera Tjederi* Mnhs., design. 1952, Mannheims." This latter specimen is not the one specifically selected as

"lectotype" by Mannheims (1951:71). I have, therefore, seen only the genitalia of the type of tjederi and not the rest of that specimen.

SYNONYMY

Lackschewitz (1933) misidentified this species as subserricornis Zetterstedt and suggested that it is conspecific with Prionocera pubescens Loew. Tjeder (1948), having had the benefit of studying Zetterstedt's types, correctly identified P. subserricornis and distinguished it from this taxon which he presumed to be P. pubescens (Loew). It was unfortunate that he was unable to study Loew's type material.

VARIATION

The European specimens tend to be darker gray and with less of a brownish tinge on the thorax. Tjeder attributes the darker colouration of his specimen from Lima to its being "somewhat immature." But I have found that teneral specimens are paler (usually light to medium brown) than specimens which have fully matured.

DISCUSSION

Prionocera tjederi has often been confused with pubescens, as noted above. Tergite 9 of these two species are very similar. Prionocera tjederi can be distinguished by the inner gonostylus which has a very characteristic, rounded, and somewhat protruding, ventrodiscal edge and a strong ridge on its lateral surface. In addition, tjederi is almost bare and has a relatively large nasus, whereas pubescens is conspicuously hairy and its nasus is very small and knob-like.

GEOGRAPHIC DISTRIBUTION (Map 18)

Prionocera tjederi does not seem to be as abundant or as widespread as some of the other holarctic species of Prionocera. In North America it has not been collected east of Hudson Bay, and never in great numbers. I have only seen Palearctic material from Sweden and Finland. Lackschewitz cited specimens (as subserricornis) from Germany, Austria, East Baltic and Estland (Estonia) and U.S.S.R. However he did not know P. pubescens, a species which extends further south and is easily confused with tjederi (see above), hence his citations are suspect.

The Swedish specimens were collected in bogs of Sphagnum, Carex and Eriophorum (Tjeder, 1948).

FLIGHT RECORDS: 5 June-31 July.

SPECIMENS EXAMINED (21 males, 12 females)

NEARCTIC. CANADA: NORTHWEST TERRITORIES: Mackenzie Distr.: near Beechey Lake, 65°14'N 106°50'W, 1 M, 11 vii 66, G.E. Shewell (CNC); Fort McPherson, 3 MM, 3 FF, 24-26 vi 57, R. Hurley (CNC); 2 MM, 24 vi 57, S.D. Hicks (CNC); Muskox Lake, 64°45'N 108°10'W, 2 MM, 1 F, 12, 31 vii 53, J.G. Chillcott (CNC); same data, 1 M (SEM); Salmita Mines, 64°05'N 111°15'W, 2 MM, 1 F, 24 vi - 4 vii 53, J.G. Chillcott (CNC).

U.S.A.: ALASKA: Umiat, 1 F, 5 vi 47, Knight, Schultz (UMMZ).

PALEARCTIC. FINLAND: ENONTEKION LAPPI: 60 km S Kilpisjarvi (=Enontekiö), 1 M, 3 vii 58, Fendler (MAKB). ETELA-HÄME: Koijarvi, 1 F, 16 vi 64 (MAKB); Somero, 1 M, 21 vii 64, J. Kuusinen (MAKB). INARIN LAPPI: Enari (=Enare, Inari), 1 M, 4 vii 56, Nylander (ZMH). KEMIN LAPPI: Muonio, 1 M, Palmen (MAKB); Pallastunturit, 1 F, 26 vii 51, J. Kaisila (ZMH).

SWEDEN. DALARNA: Lima, Tandalen, 1 M, 30 vi 31 (no date with specimen, lacking genitalia, as pubescens, Tjeder, 1948:95), E. Dahl (ZMLS); Orsa, Ø. Rådsjön, 1 M, 14 vi 37 (no date nor collector with specimen, genitalia only, in vial), Bo Tjeder (ZMLS). LYCKSELE LAPPMARK: 50 km N Storuman, 2 MM, 1 F, 15 vi 66, Mittendorf (MAKB). TORNE LAPPMARK: Abisko, 1 M, 22 vi 51, J.R. Vockeroth (CNC). NORBOTTEN: 67°58'N 23°31'E, 2 MM, 2 FF, 25 vii 51, J.R. Vockeroth (CNC); Pajola Rutjarvi, 1 F, 22 vii 51, J.R. Vockeroth (CNC).

Prionocera turcica (Fabricius)

Tipula turcica Fabricius, 1781: 237; 1787: 322; 1794: 237; 1805: 27.

Prionocera turcica; Kertész, 1902: 279; Lackschewitz, 1933: 133-135, Figs. 1a,b,c (male terminalia, antennae); Tjeder, 1948: 81-82, Fig. 5 (male terminalia); 1955: 242-243; Mannheims, 1951: 60-61, Fig. 27 (from Tjeder, 1948, Fig. 5); 1963: 39; Kloet & Hincks, 1976: 1.

Tipula diana Meigen, 1818: 189, Tab. VI, Fig. 8 (female); 1851: 149-150; Zetterstedt, 1851: 3966-3967; Wallengren, 1882: 17.

Stygeropsis diana; Schiner, 1864: 521; Mik, 1889: 101-103.

Prionocera subserricornis; Bergroth (nec Zetterstedt), 1889: 120; Mik, 1890: 154; Kertész, 1902: 279; Wahlgren, 1905: 124.

Prionocera pubescens; Schiner (nec Loew), 1864: 521.

DIAGNOSIS

Male 9th tergite broadly emarginate between long, tapering dorsal and lateral processes, dorsal process slightly broader at base than lateral process; dorsal plate of aedeagus expanded dorsally bearing 3 or 4 small irregular teeth; female with broad dorsolateral lobe on sternite 8; hypogynial valvulae 2/3 length of sternite 8, broad distally, bearing one or more subapical hairs.

DESCRIPTION (Figs. 7, 26, 43, 60, 76, 92)

ADULT. General appearance: predominantly gray to grayish brown with short pale yellowish white (92) hairs, not conspicuously hairy; male body length 7.6-13.6 mm, wing length 10.5-16.7 mm; female body length 12.3-16.0 mm, wing length 14.2-17.3 mm.

MALE. Head: vertex dark yellowish brown (78), usually divided by capillary black line, hairs yellowish white to grayish yellow (92,90), shorter than coxal hairs; gena pale yellow, pale orange-yellow or light gray (89,73,264), with very short scattered hairs; rostrum dark grayish brown to dark brown (62,59) dorsally, contrastingly lightened to dark orange-yellow (72) laterally, hairs brownish black (65) projecting beyond comparatively large (0.10-0.15 mm) nasus; pseudo-ocellus black to dark grayish brown (267,62).

Antenna: dark grayish brown to brownish black (62,65), flagellomeres only slightly distended; 1st less than 1.5 length of 2nd; 11th 1/3 length of 10th.

Thorax: prescutum laterally not contrastingly yellowish; dorsal stripes glabrous, dark gray to dark grayish brown (266,62), median stripe usually brownish, narrowly bisected with light grayish yellowish brown to light gray (79,264) line, stripes bordered by light bluish gray to light grayish yellowish brown (190,79) region bearing hairs; postsutural area, scutellum and mediotergite concolorous with lateral stripes, not conspicuously hairy; pleuron light bluish gray (190), epimeron and parts of episternum sometimes pale orange-yellow (73), hairs on all pleural sclerites except katepimeron; anatergite grayish brown to light yellowish brown (61,76); katatergite pale yellow (89) dorsally, bluish gray (191) ventrally.

Wings: membrane tinged with light grayish yellowish brown to light yellowish brown (79,76); costal and subcostal cells, wing tip and seams of veins slightly darker; stigma strong yellowish brown to moderate yellowish brown (74,77), contrasting with membrane; obliterative streak broadly whitened posterior to R₁, contrasting with membrane, extending obliquely near infumated wing tip.

Legs: tooth on tarsal claws.

Abdomen: medium gray (265) with dark brown (59) dorsal longitudinal stripe; segments edged in pale yellow to moderate yellow (89,87), more broadly edged laterally; hairs short, yellowish white (92).

Genitalia: tergite 9 with dorsal and lateral processes long, tapering, broadly separated at base; dorsal process slightly shorter and broader than lateral process; apical process small, tooth-like, borne on median projection between dorsal processes; no median lobe; 3 rectal sclerites: long, thin, lateral sclerite on each side, broader single dorsal sclerite. Gonocoxites with conspicuous protruding membrane ventrally; gonocoxal fragment long, narrow, gradually attenuated towards sperm pump. Outer gonostylus elongate, shallowly emarginate on ventral edge, usually with short oblique lateral ridge proximal to broad tip; medial surface concave except for narrow raised edge, broader distally. Inner gonostylus with basal region (including proximal beak) broader than length of distal beak; narrow flange medially proximal to distal beak; dorsal crest sloping towards long, cylindrical distal beak; without pigmented sensilla. Aedeagus long, usually visible between gonostyli in dried specimens; tip straight, slightly expanded dorsally, no subapical teeth. Aedeagal guide with membranous distoventral tip; dorsal plate with semicircular dorsal expansion armed with 3 or 4 small irregular teeth.

FEMALE. Similar to male except as follows: flagellomeres not distended, 1st flagellomere lightened to strong brown (55) basally; 10th, 11th, and sometimes 9th subequal, smallest.

Genitalia: with broad dorsolateral lobe on sternite 8; hypogynial valvulae long, 2/3 or more length of sternite 8, separated from sternite by narrow membranous region with short broad median extension; tips of valvulae broad, with 1 or 2 subapical dorsal hairs, distal hair visible (60 X magnification) beyond tip; sternite 9 with median projection long, thin, often angulated toward cerci; tergite 10 rounded posterolaterally, not conspicuously hairy; cerci slightly downturned at tip.

TYPE SPECIMENS

Tipula turcica was apparently described from a single specimen from "Kiliae Dom Daldorf" (= Daldorf collection, Kiel, Germany) (Fabricius, 1787). According to Zimsen (1964) only the pin with the original label remains in the Fabricius collection in Kiel.

The identity of this species is well established (Lackschewitz, 1933; Tjeder, 1948; Mannheims, 1951) and, therefore, according to the International Code of Zoological Nomenclature, Revised ed., (Art. 75a), designation of a neotype is not necessary.

SYNONYMY

The specific name Diana was suggested by Hoffmannsegg and published by Meigen (1818) as a replacement name because the epithet turcica was deemed to be unsuitable, as it implied occurrence of the species in Turkey. That this name change is not valid has been recognized for some time (see above).

DISCUSSION

Prionocera turcica is very easily confused with the far less common Prionocera oregonica and subturcica. See the discussions of those species. Prionocera oregonica and P. turcica have overlapping distributions in eastern North America which is strong evidence for their genetic isolation.

Prionocera turcica has been frequently misidentified in North American collections as P. dimidiata; a male and female of turcica, pinned together, were mistakenly included with the type series of dimidiata. In addition, a female turcica pinned together with a male electa suggests that these species may attempt to interbreed.

GEOGRAPHIC DISTRIBUTION (Map 19)

Prionocera turcica is widespread, occurring from the northern edge of the northern boreal region south through the hemiboreal region. It apparently does not

extend into the arctic region but it does extend southward into the northern temperate region in Germany and Switzerland.

I have collected turcica in wet shrubby areas in the moss tundra of Churchill and Schefferville, especially in the shade of Alnus and Betula.

Savtschenko (1983) records this species from the following districts in the U.S.S.R.: Murmanskaya, Kareliskaya, Archangelsk, Leningradskaya, Novgordoskya, Voronechskaya, Tumenskaya, Sverdlovskaya, Novosibirskaya, Altayskoye, Krasnoyrskiy Krey, Tuvinskaya, Yakutskaya, Irkutskaya, Byratskay, Magadanskay, and from the Ukraine, Armenia, Kazakhstan and from Czeckoslovakia.

FLIGHT RECORDS: 23 May-15 August.

SPECIMENS EXAMINED (133 males [MM], 87 females [FF])

NEARCTIC: CANADA: ALBERTA: Banff Nat'l Pk., 1 M, 7 vii 55, J.R. McGillis (CNC); Bilby, 53°42'N 114°06' W, 1 M, 25 vi 24, O. Bryant (UMMZ); 1 M, 5 viii 24, O. Bryant (as dimidiata, slide No. 1441, Alexander Coll. USNM); Kananaskis Environmental Science Centre, 2 MM, 6 vi-20 vii 70, G. Pritchard (CAL); Kananaskis Valley, 1 F, 15 vi 68, H. Teskey (CNC & slide No. 1441, Alexander Coll. USNM); Nordegg, 1 F, 12 vi 21, J. McDunnough (CNC); Wabamun, 1 F, 10 vii 31, E.H. Strickland (as dimidiata, slide No. 1441, Alexander Coll. USNM). BRITISH COLUMBIA: Atlin, 2200', 1 M, 3 FF, 23-25 vi 55, H. Huckel (CNC); Quesnel, 1 F, 16 vi 49, G.J. Spence (SUBC). MANITOBA: Churchill, 2 MM, 26 vi-10 vii 77, F. Brodo (CNC); 6 MM, 2 FF, 5-16 vii 78, F. Brodo (CNC); same data, 1 M, 1 F (CD), 2 MM (VIL); 1 F, 7 vii 49, J.A. Shemanchuk (CNC); 2 MM, 28 vi-4 vii 47, T.N. Freeman (CNC); 2 MM, 1 F, 31 vi-23 vii 50, H.J. Teskey (CNC); 1 M, 4 vii 47, B. Hocking (CNC); 1 M, 29 vi 49, L.A. Miller (as dimidiata, slide No. 1441, Alexander Coll. USNM); 1 F, 9 vii 33, A.T. Harper (CNC); 1 F, "emergence area D", no further data (CNC); 1 M, 1 F, 4 vii 49 (CNC); 25 mi E Churchill, 1 M, 10 vii 77, F. Brodo (CNC); Farnworth Lake near Churchill, 1 M, 26 vi 52, J.G. Chillcott (CNC); 1 F (pinned with M of P. electa), 26 vi 52, J.G. Chillcott (CNC); Fort Churchill, 1 M, 12 vi 52, J.G. Chillcott (CNC); 1 F, 8 vii 52, C.D. Bird (CNC); 1 M, C.E. McClure (as dimidiata, slide No. 1441, Alexander Coll. USNM); Herchmer, 2 MM, 29 vi-5 vii 49, J.B. Wallis (CNC). NEWFOUNDLAND: St. Anthony, 2 MM, 3 FF, 20 vi-2 vii 51, J.B. Wallis (CNC). NORTHWEST TERRITORIES: Mackenzie Distr.: Fort Smith, 1 F, 8 vi 50, W.G. Helps (CNC); Norman Wells, 2 MM, 22 vi 49, W.R.M. Mason (CNC); 1 M, 12 vi 49, S.D. Hicks (CNC); Yellowknife, 1 F, 8 vii 49, Fr. Ebner (CNC). ONTARIO: Ft. Severn, 56°N, 1 M, 1 F, 15 vii 40, C.E. Hope (1 M UMMZ, 1 F ROM); James Bay, Ft. Albany, 10 MM, 3 FF, 10-29 vi 42, F.A. Urquart (UMMZ, slides Nos. 4949, 4950). QUEBEC: Poste de la Baleine (Great Whale River), 1 F, 7 vii 49, J.R. Vockeroth (CNC); 2 MM, 1 vii 68 (MPUL); Saguenay, Rivière au Tonnerre (Thunder R.), 1 M, 16 vi 30, W.J. Brown (CNC); Schefferville, 8 MM, 3 FF, 3-10 vii 81, F. Brodo (CNC); same data, 1 M (SEM); 1 F (OSU); 11 km E. Schefferville, 2 FF, 15 vii 81, F. Brodo (CNC); 26 km SE Schefferville, Astray L., 4 MM, 2 FF, 1-5 vii 81, F. Brodo (CNC); 37 km NW Schefferville, Annabel L., 1 M, 3 FF, 25 vi-13 vii 81, F. Brodo (CNC); same data, 1 M (OSU). SASKATCHEWAN: Prince Albert, 2 MM, 26 vi-1 vii 54, W.J. Turnock (CNC). YUKON: Swim Lakes, 133°N 62°13'W, 3200', 3 MM, 9-15 vi 60, J.E.H. Martin (CNC); Watson Lake, 1 F, 17 vi 48, Mason & Hughes (CNC). "Hudson Bay Territory," 1 M, 1 F, (mating pair), Osten Sacken (MCZ).

U.S.A.: ALASKA: Fairbanks, 2 FF, 26 vi-1 vii 78, B. Wright (NSMH); King Salmon, Naknek R., 1 F, 16 vii 52, W.R. Mason (CNC).

PALEARCTIC: AUSTRIA: no further data, 1 F, Egger. (NHMV).

FAEROE ISLANDS: Thorshavn, Oven Aagen, 1 M, 1 F, 27 vi 26, Krugger (MAKB).

GERMANY (B.R.D.): Bamberg, 2 MM (no further data) (ZSM); Kiel, 1 F, Wiedem. (NHMV); Mosbruch, 2 MM, 2 vi 51, Mannheims (MAKB); Mosbruch, Eifel, 1 F, 23 vi 53 (MAKB); Uerdingen, 1 M, Riedel (NHMV).

GERMANY (D.D.R.): Dessau, 1 M (ZSM); Frankfurt am Oder, 1 M, M.P. Riedel (NHMV); 1 M (no further data) (ZSM).

FINLAND: ETALA-HAME: Tammela, 1 F, 15 viii 65, Mannheims (MAKB); Urjala, 1 M, 1 F, 5, 23 vi 64, T. Brander (MAKB). KEMIN LAPPI: Muonio, 1 F, R. Frey (ZMH).

VARSINAIS-SUOMI: Karislojo, 1 M, R. Frey (ZMH); 1 M, J. Sahlb (ZMH); 1 F, Forsius (ZMH); 1 M, Hellén (ZMH).

ICELAND: Husavik, Klinkow, 2 MM, vii (NRS).

NORWAY: HORDALAND: Hardangervidda, Viveli-Veigdalen, Eidfjord, lak. nr. D III, 1000 m, 9 MM, 2 FF (alcohol), 21 vii 67, F. Röhoode (ZMUB); same data, lak. nr. D V & D VI, 1000 m, 2 FF, 22 vii 67, K. Bjöklund (ZMUB); same data, lak. nr. D III, 1000 m, 6 MM, 21 vii 67, T. Nielson (ZMUB). NORDLAND: Fauske, 1 M, 26, vi 66, Mittendorf (MAKB).

SWEDEN: LYKSELE LAPPMARK: 50 km N Storuman, 1 F, 15 vi 66, Mittendorf (MAKB). NORBOTTEN: Granvik, 2 MM, 1 F, 26 vii 51, J.R. Vockeroth (CNC); W Haparanda, 1 M, 17 vi 66, Mittendorf (MAKB); Lovikka, 3 MM, 7 FF, 23 vii 51, J.R. Vockeroth (CNC); Pajala Anttis, 1 F, 23 vii 51, J.R. Vockeroth (CNC); Pajala Rutijarvi, 1 M, 22 vii 51, J.R. Vockeroth (CNC); Muodoslompola, 2 MM, 2 FF, 26 vii 51, J.R. Vockeroth (CNC). ÖSTERGÖTLAND, 1 M (NRS). SKANE: 1 F, no further data (NRS). TORNE LAPPMARK: Abisko, 14 MM, 5 FF, 22 vi-10 vii 51, J.R. Vockeroth (CNC); Karesuando, 1 M, 11, 25 vii 51, J.R. Vockeroth (CNC).

SWITZERLAND: Neüchatel, Cachot La Brévine, 1000 m, (alcohol), 1 M, 15 vii 67, C. Dufour (CNC).

U.K.: ENGLAND: Hampshire, New Forest, Brockenhurst, 1 F, 23 v 69, R. Lane (BMNH); Norfolk, Catfield, 1 M, 7 viii 20, J.J.F. -X. King (USNM); Surrey, Black Pond, Oxshott, 1 M, 31 vii 22, F.W. Champion (USNM); Yorkshire, Austwick Mobb, 1 M, 27 vi 38, C.A. Cheetham (BMNH). SCOTLAND: Monach Isles, 2 MM, 2 FF, 24-26 vii 70, G. Collis (BMNH).

Prionocera unimicra (Alexander)

Stygeropis unimicra Alexander, 1915: 128-129.

Prionocera unimicra; Alexander, 1965a: 19.

Prionocera broweriana Alexander, 1961: 79-81; 1965a: 19. (New synonymy)

DIAGNOSIS

Dorsal stripes brown; ventral half of anepimeron bare or almost so; wing with stigma and oblitterative streak contrasting with membrane; male with flagellomeres moderately distended, 1st not elongated, 11th less than 1/2 10th; female with broadly sloping dorsolateral edge on sternite 8.

DESCRIPTION (Figs. 27, 44, 61, 77, 93)

ADULT. General appearance: more brownish than gray dorsally; hairs light orange-yellow to yellowish white (70,92), not conspicuously hairy; male body length 7.8-9.4 mm, wing length 11.2-11.7 mm; female body length 9.6-11.7 mm, wing length 10.4-12.7 mm.

MALE. Head: vertex moderate yellowish brown (75) usually divided by capillary black line, hairs almost as long as hairs on postgena; gena light orange-yellow (70), bare; rostrum dark grayish brown (62) dorsally to moderate brown (58) laterally, hairs dark brown to light orange-yellow (59,70), projecting beyond moderate nasus (0.075-0.15 mm); pseudo-ocellus dark orange-yellow (72).

Antenna: flagellum deep brown (56), lightened to brownish orange (54) basally, proximal 2 or 3 flagellomeres distended, succeeding flagellomeres almost cylindrical; 1st less than 1.5 times length of 2nd; 11th less than 1/2 length of 10th.

Thorax: prescutum laterally contrastingly deep yellowish brown to dark yellow brown (75,78); dorsal stripes dark yellowish brown (78), glabrous; median stripe bisected by narrow line, stripes bordered by light grayish yellowish brown to light yellowish brown (79,76), with moderately long hairs; postsutural area, scutellum and mediotergite concolorous with dorsal stripes, bearing moderately long hairs; pleuron bluish gray (191), anepisternum, katepisternum and dorsal 1/2 of enepimeron hairy, ventral 1/2 of anepimeron and katepimeron bare; anatergite light olive gray

to olive gray (112,113); katatergite pale yellow (89) dorsally, pruinose dark gray (266) ventrally.

Wing: membrane tinged with light yellowish brown (76), costal and subcostal cells and wing base slightly darker; veins and distal 1/2 of stigma deep yellowish brown to dark yellowish brown (75,78); obliterative streak well developed, including pale proximal 1/2 of stigma, running obliquely near wing tip.

Legs: no tooth on tarsal claws.

Abdomen: with segments deep yellowish brown (75) medially, often fading to moderate orange-yellow (71) distally, bordered laterally with yellowish white (92); hairs short, light orange-yellow (70).

Genitalia: tergite 9 with dorsal process squarish or slightly broader at base, space between subequal to width of process; lateral process very small or lacking; apical process narrow, medially curved, sharply pointed; median lobe lacking; rectal sclerite small, irregular. Gonocoxites without protruding membrane; gonocoxal fragment broadly triangular. Outer gonostylus triangular, tip usually bent in dried specimens; medial surface entirely concave, without distinct raised edge. Inner gonostylus with basal region (including proximal beak) longer than broad with small bump on mid-lateral surface; no distinct dorsal crest; distal beak moderately broad and long, without pigmented sensilla. Aedeagus with tip straight (viewed laterally), no subapical teeth. Aedeagal guide with semi-transparent narrow membranous tip; dorsal plate flat, narrowing midway towards sperm pump.

FEMALE. Similar to male except as follows: flagellomeres not distended; 10th and 11th (and sometimes 9th) subequal, narrower than preceding.

Genitalia: sternite 8 with dorsolateral edge sloping, not lobed; hypogynial valvulae 1/2 length of sternite 8, separated from sternite by broad Y-shaped region; ventral edge of valvulae broadly and heavily sclerotized, tips blunt, no subapical dorsal hairs; sternite 9 with median projection subequal in length and width; tergite 10 rounded laterally, not conspicuously hairy; cerci almost straight.

TYPE SPECIMENS

Holotype, male, Colorado, C.V. Riley collection, and slide 1-21-42 D, Type, Cat. No. 19979 (USNM). The pinned portion of the type lacks left legs, the tarsal claws of the right hind leg are missing, and the right wing is torn in the stigmal region. The slide-mounted genitalia show the features of the 9th tergite beautifully, but the dorsolateral orientation obscures some of the features of the gonostyli.

SYNONYMY

Prionocera broweriana was described from a single male collected in Maine, Penobscot Co., Passadumkeag bog, 26 vi 1944, A.E. Brower (Alexander slide collection, USNM). The genitalia, left wing and all left legs are on one slide and the right wing, an antenna and right fore leg are on a second slide. I have not seen the pinned portion of this specimen.

The genitalia are somewhat squashed. Only the dorsal processes of the 9th tergite are clearly recognizable. The lateral and apical processes are obscured. The aedeagus and aedeagal guide show the distinctive characteristics of this species; therefore, I am confident that this species is conspecific with *unimicra*. The contrasting obliterative streak and stigma in the wings are clearly evident, as are the moderately distended lower flagellomeres.

In this specimen the petiole of cell M_1 is longer than m , as noted by Alexander; however, the reverse is the case in several other specimens of this species.

DISCUSSION

The specimens from Labrador and northern Québec have wing veins which are darker than those of the western specimens, giving the wing a duskier appearance.

GEOGRAPHIC DISTRIBUTION (Map 20)

Prionocera unimicra, described from a unique male collected in Colorado, is now known to have a widespread distribution in the boreal zone. It extends from the Yukon to mainland Labrador and southwards along the Rocky Mountains at least as far as Boulder County, Colorado. The range of this species is similar to that of the much more commonly collected dimidiata. In fact these two species have been collected together in the same fens in both Colorado and Schefferville, Québec. It apparently does not extend into the Arctic and is restricted to North America.

FLIGHT RECORDS: 24 May-17 July.

SPECIMENS EXAMINED (100 males [MM], 17 females [FF])

NEARCTIC. CANADA. ALBERTA: Banff Nat'l Pk., Sunwapta Pass, 6700', 2 MM, 9 vi 55, Shewell (CNC); Sunwapta Pass, Jasper Hwy., 6600', 1 M, 5 vii 55, R. Coyles (CNC); Seebe, Kananaskis Env. Sci. Centre, 7 MM, 4-16 vi 70, G. Pritchard (CAL). **LABRADOR:** Cartwright, 2 MM, 26 vi 55, E.F. Cashman (CNC); Goose Bay, 7 MM, 3 FF, 5 vi 48, W.W. Judd (CNC); 1 M, 9 vi 48, H.C. Friesen (CNC). **MANITOBA:** Churchill, 2 MM, 17, 23 vi 48, G. Shewell (CNC); 1 F, 4 vii 49, L.A. Miller (CNC); 10 MM, 1 F, 3 vi-12 vii 52, J.G. Chillcott (CNC); 1 F, 21 vi 47, T.M. Freeman (CNC); 3 MM, 4 FF, 1-12 vii 78, F. Brodo (CNC); Herchmer, 1 M, 29 vi 49, J.B. Wallis (CNC); Ninette, 1 F, 7 v 48, J.F. McAlpine. **NEW BRUNSWICK:** Kouchibouguac Nat'l Pk., 2 MM, 24 v 77, B. Cooper (CNC). **NORTHWEST TERRITORIES:** Mackenzie Distr.: Salmita Mines, 64°05'N 111°15'W, 2 MM, 30 vi, 1 vii 53, J.G. Chillcott (CNC). **NOVA SCOTIA:** Halifax Co., Hubbards Bog, 5 MM, 24 v 79, B. Wright (NSMH). **ONTARIO:** Moose Factory, 1 F, 9 vi 49, D.P. Williams (CNC). **QUEBEC:** Fort Chimo, 2 MM, 21 vi 48, H.N. Smith (CNC); 3 MM, 21 vi 48, R.H. Macleod; Pt. Harrington (Harrington Harbour ?, 50°29'N 59°28'W), 1 M, 30 vi 49, D.P. Williams (CNC); 37 km NW Schefferville, 18 MM, 3 FF, 25 vi-13 vii 81, F. Brodo (CNC); same data, 1 F, (SEM), 1 M (CD). **YUKON:** Koidern, km. 1874, 61°58'N 140°25'W, 1 M (alcohol), 29 v 80, R. Cannings, (SUBC).

U.S.A.: **COLORADO:** Boulder Co., 40°04'N 105°34'W, 25 MM, 2 FF, 27 vi-11 vii 79, F. Brodo (CNC); same data, 2 MM (VIL); 1 M, C.V. Riley coll. (no further data) (holotype of unimicra, USNM). **MAINE:** Penobscot Co., Passadumkeag bog, 1 M, 26 vi 44, A.E. Brower (holotype of broweriana, No. 11,114, 2 slides, Alexander Coll., USNM).

Prionocera woodorum, NEW SPECIES**DIAGNOSIS**

Wings dusky, stigma and oblitative streak prominent; male with outer gonostylus broadly curved, almost L-shaped, covered with dark hairs; female with long pale hairs laterally on tergite 10.

DESCRIPTION (based on 4 males, 6 females), (Figs 8, 9, 28, 45, 62, 78, 94)

ADULT. General appearance: head and thorax brownish gray to dark grayish brown (64,62) dorsally, hairs short, yellowish white (92), not conspicuously hairy; wings dusky, stigma and oblitative streak strongly contrasting with each other; male body length 9.6-11.1 mm, wing length 13.6-16.0 mm (holotype 14.6 mm); female body length 13.4-14.1 mm, wing length 14.8-18.0 mm (allotype 17.1 mm).

MALE. Head: vertex light gray to light grayish brown (264,60), broadly bisected by brownish black (65) line, dorsal hairs short, proclinate; gena predominantly light gray (264) with short inconspicuous pale hairs; rostrum dark grayish brown (62) dorsally, lightened to dark orange-yellow (72) ventrolaterally, hairs shorter, darker and proclinate dorsally, projecting fringe-like beyond moderate (0.125-0.15 mm) nasus, hairs longer and paler laterally; pseudo-ocellus black (267).

Antenna: relatively long, brownish black to black (65,267), pedicel and base of 1st flagellomere lightened to brownish orange (54); scape and dorsally on 1st flagellomere hairs short, dark; 1st flagellomere only slightly longer than 2nd;

proximal flagellomeres distended, distal width twice width at base; 11th $1/3$ or less length of 10th.

Thorax: prescutum laterally not contrastingly yellowish; dorsal stripes anterior to transverse suture dark grayish brown (62), median stripe narrowly divided by narrow light line becoming blackish anteriorly, stripes bordered by light gray to light grayish yellowish brown (264,79) region, not conspicuously hairy; short pale hairs bordering stripes; postsutural area, scutellum and mediotergite gray, bearing short hairs; pleuron light bluish gray to dark bluish gray (190,192) with pale hairs on each sclerite, except small katepimeron; anatergite light olive gray (112); katatergite broadly light yellow (86) dorsally, dark gray (266) ventrally.

Wings: membrane tinged with medium gray (264), veins at least distally, brownish black (65); costal and subcostal cells infused with moderate orange-yellow (71); distal $1/2$ of stigma brownish black (65), dark colour diffusing into wing tip; obliterative streak broad, contrastingly whitened, including proximal $1/2$ of stigma and part of radius, almost perpendicular to wing axis.

Legs: tarsal claws with long narrow tooth close to base.

Abdomen: medium gray to grayish yellowish brown (265,80), dorsal longitudinal stripe brownish black (65), tergites narrowly edged distally, more broadly edged laterally in pale yellow (89); hairs short, pale yellow proximally, brownish black (65) on tergites 8 & 9.

Genitalia: tergite 9 broadly emarginate between dorsal and lateral processes; dorsal process longer than wide, slender, truncated distally; lateral process slender, triangular; apical process long, narrow, claw-like, sharply curved medially, lying beneath dorsal process; medial lobe shallowly emarginate, fused to bases of apical processes; rectal sclerite relatively broad. Gonocoxites conspicuously hairy, separated medioventrally by small membranous lobe; gonocoxal fragment broadly triangular. Outer gonostylus broadly curved, almost L-shaped, extending posteriorly beyond inner gonostylus, very hairy, medial surface concave except for broad raised edge distally. Inner gonostylus with broad basal region (including small, angular, proximal beak), no dorsal crest, long slender, cylindrical distal beak without pigmented sensilla. Aedeagus with tip curved dorsally, bearing single medial subapical tooth and smaller, more proximal sublateral tooth. Aedeagal guide membranous distally; dorsal plate flat, narrow, parallel-sided, abruptly curving and narrowing close to sperm pump.

FEMALE. Similar to male except as follows: pedicel and most of 1st flagellomere lightened to moderate orange-yellow (71), scape covered with moderately long hairs, pedicel with shorter hairs, flagellomeres 1-3 with scattered short hairs dorsally, flagellomeres subcylindrical, 9th, 10th & 11th narrower, subequal.

Genitalia: sternite 8 with broadly rounded dorsolateral edge; hypogynial valvulae moderately long, 0.4 length of sternite 8, separated from sternite by broad membranous region; valvulae subtriangular, ventral edges broadly sclerotized, with single strong subapical hair dorsally (visible with 60 X magnification); sternite 9 with median projection long and narrow; tergite 10 gently rounded laterally, bearing long conspicuous pale hairs; cerci relatively narrow, slightly downcurved at tip.

TYPE SPECIMENS

Holotype, male (No. 18351 CNC), and 1 male paratype, Yukon, Barlow Lake, km 612, Klondike Hwy., 20 vi 82, G. & M. Wood (CNC). Allotype, female, and 1 male & 1 female paratype, Yukon, km 141, Dempster Hwy., 24-28 vi 82, G. & M. Wood (CNC). Additional paratypes: NORTHWEST TERRITORIES: Mackenzie Distr.: Aklavik, 1 male, 16 vi 53, J.S. Waterhouse (CNC); 1 female, 25 vi 56, R.E. Leech (CNC).

The genitalia of the holotype, allotype, and the male paratype from Aklavik have been removed, softened, placed in glycerine in microvials and pinned beneath their respective specimens. The 11th flagellomere on the holotype is very short, $1/4$ the length of the 10th. Only the dorsal stripe has a brownish caste; the lateral

stripe is grayish and flanked by a large dark bluish gray spot. The holotype lacks the left fore leg, and the allotype the left hind leg.

DISCUSSION

A female from Abisko, Torne Lappmark, Sweden, 8 vii 51, J.R. Vockeroth, (CNC), appears to belong to this species. However, because of its single occurrence in the Palearctic, and because of the following differences, I am not designating it as a paratype. 1.- Several of the distal veins are deformed. 2.- Only the last two flagellomeres are narrower and subequal. 3.- The subapical hair on the hypogynial valvulae is lacking.

The phylogenetic affinities of this species are not clear. On the basis of a strongly contrasting oblitative streak and stigma I am tentatively placing this species with electa and tjederi. Some specimens of subsericornis from northern Fennoscandia have a very similarly angulated outer gonostylus.

VARIATION

The male from Aklavik is teneral and so is a little lighter than other specimens, and its flagellomeres are shrivelled.

GEOGRAPHIC DISTRIBUTION (Map 21)

This fly has only been collected in the Yukon and in Aklavik, Northwest Territories, with a questionable record from Lapland, Sweden. Prionocera woodorum may have been isolated in the Yukon refugium.

FLIGHT RECORDS: 16-28 June (8 July, Sweden)

This seems to be an extremely early spring species which may explain its absence in other collections.

ETYMOLOGY

This species is named for its collectors, Grace and Monty Wood, in recognition not only of their team work in the field but also their respective contributions to Diptera research, particularly their contributions to the Manual of Nearctic Diptera, Volumes I and II.

DOUBTFUL AND EXCLUDED SPECIES

Prionocera bergrothi (Williston) nomen dubium

Stygeropis bergrothi Williston, 1893: 64.

Prionocera bergrothi; Kertész, 1902: 278; Alexander, 1965a: 19.

Williston based his description on a single male collected in Alaska and listed as being deposited in the University of Kansas collection. Unfortunately this specimen is not there (Byers et al., 1962; Byers, pers. comm.), and furthermore has been lost for many years (Alexander, 1919: 9c).

The description of bergrothi is very general and could pertain to at least six of the eight species known to occur in Alaska. Therefore I consider bergrothi a nomen dubium.

Prionocera parrii (Kirby) nomen dubium

Ctenophora parrii Kirby, 1824: 218; Ross, 1826: 112.
Stygeropis parrii; Osten Sacken, 1878: 40; 1886: 183; Alexander, 1919: 8c-9c, Figs. 7, 12, 23, 24, 26 (wing, antennae, male genitalia); Pierre, 1924: 20.
Tipula parrii; Lundbeck, 1898: 265; Kertész, 1902: 278; Aldrich, 1905: 103.
Prionocera parrii; Kertész, 1902: 278; Meijere, 1910: 46; Mannheims, 1951: 71; Alexander, 1965a: 19.

The original description by Kirby was based on a single female probably collected near Winter Harbour, Melville Island, Northwest Territories (Pilot of Arctic Canada, 1970). I have not seen any Prionocera collected that far north in the Nearctic, but this is undoubtedly due to the movements of collectors. At least three species can be expected to occur there: P. ominosa, P. recta and P. ringdahli (see Figs. 9, 12, 13).

Kirby described parrii as having serrate antennae. He presumed that the male would have bipectinate antennae, hence he placed this species in Ctenophora. However, the wood-boring Ctenophora is not an arctic genus. Serrated antennae, however, are a distinctive feature of the decidedly northern genus Prionocera. In those species in which the male has very strongly serrate antennae, the female antenna is moderately serrate also, and this is true of the three Prionocera species mentioned above.

The wings of parrii were described as being "brownish towards their apex, at the exterior margin is a white spot crowned by a black one." This description could apply to recta or to ringdahli but not to ominosa because in the latter the oblitterative streak and stigma are barely evident.

Alexander (1919: 8c-9c) redescribed and illustrated what he understood to be Stygeropis parrii (Kirby) from 10 specimens collected by the Canadian Arctic Expedition, 1913-1918. Six of these specimens are in the CNC and an additional male is slide-mounted and part of the Alexander collection given by Dr. Alexander to the USNM in 1982. This is a mixed collection of recta and ominosa. The diagrams, probably based on the slide-mounted specimen from Kongenevik, Camden Bay, pertain to ominosa (Alexander), but the written description seems to be a composite of both species. The description of the thorax and abdomen is that of recta but the description of the wing is that of ominosa. Subsequent workers, it should be noted, have used the name parrii for the species here recognized as ominosa, basing their identifications on the genitalia diagrams of Alexander.

Alexander never had the opportunity to study the type of parrii (Alexander, 1956: 124). When I visited the British Museum in 1979, a search was made by Dr. Tony Hudson, and the type could not be located.

In view of the fact that the type has been lost for over half a century, no specimens of Prionocera have been seen from the type locality, and the original description of parrii could pertain to several species but probably not to the one designated as parrii by Alexander, I consider parrii a nomen dubium.

Tipula (Angarotipula) illustris Doane

Stygeropis fuscipennis Loew, 1865: 129; Osten Sacken, 1878: 40; Alexander, 1919: 817, 933; 1920a: 199.
Prionocera fuscipennis (Loew); Kertész, 1902: 278; Alexander, 1920b: 978, 996; 1927c: 215; 1942a: 220; Proctor, 1946: 330.
Tipula illustris Doane; Alexander, 1948a: 23 (preoccupied by T. fuscipennis Curtis, 1834); 1961: 81; 1962: 10; 1965a: 19; 1965b: 337; 1967: 21.
Pachyrhina hybrida Dietz, 1918: 113.
Prionocera hybrida (Dietz); Alexander, 1965a: 19 (New Synonymy).

I compared the type of Pachyrhina hybrida Dietz (ANSP) with the type of Stygeropis fuscipennis Loew (MCZ) and I judge them to be conspecific.

PHYLOGENY OF THE GENUS PRIONOCERA

There were three questions which I was attempting to answer by this study. 1. Is Prionocera a monophyletic genus? 2. How is Prionocera related to the other genera in the subfamily Tipulinae? 3. What might be the phylogenetic arrangement within the Prionocera?

Prionocera was compared with representatives of all North American tipuline genera (Brachypremna, Ctenophora, Dolichocheza, Holorusia, Leptotarsus, Megistocera, Nephrotoma) and fourteen subgenera of Tipula. The methods which I used for selecting characters and determining their polarity were essentially those detailed by Oosterbroek (1980). But as he pointed out, there are no satisfactory criteria to separate phylogenetically important characters from unimportant characters, and both the direction of polarity and the distinction of a synapomorphy from parallel development is often difficult, if not impossible.

A suggested phylogeny of Prionocera is presented in a cladogram (Fig. 95). The synapomorphous characters are numbered 1-23 and are explained below. Only the turcica and dimidiata groups are presented with any degree of confidence.

The species in this genus I found to be remarkably similar to each other and some species pairs were initially very difficult to tell apart. Prionocera is quite clearly monophyletic. The synapomorphies which distinguish this genus are:

(1) the distally distended flagellomeres without verticils (Fig. 1),
 (2) three sets of characteristic processes on the ninth tergite in the male (Figs. 10-28), and (3) the rather simple and characteristic inner gonostylus with its glabrous distal beak covered with distinctive sensory structures (Figs. 46-62).

(4) A much more pronounced distension of the flagellomeres is suggested as a synapomorphy of the ringdahli group and the five otherwise unaligned species. However, this is a weak synapomorphy because this character state could have developed more than once in the group in question and it also occurs in recta.

The turcica group is distinguished by two strong synapomorphies.

(5) Elongate, triangular dorsal and lateral processes project posteriorly on the ninth tergite (Figs. 17, 24, 26). Shorter processes distinguish all the other Prionocera species.

(6) The apical processes are close together on a median projection and thus between rather than below the dorsal processes.

(7) The dorsally expanded aedeagal guide is unique to turcica and oregonica (Figs. 5 & 7). The morphology of this plate is unknown in subturcica. A simple unadorned dorsal plate of the aedeagal guide is common in all other tipulines (Figs. 4 & 6).

(8) The narrow flange just below the distal beak of the inner gonostylus is a synapomorphy of turcica and oregonica (Figs. 36, 43, 52, 60).

(9) The presence of pigmented sensilla on the lateral surface near the base of the distal beak of the inner gonostylus is a synapomorphy of the dimidiata and recta groups. These sensory structures are apparently not present in other tipulines.

A strong synapomorphy of the dimidiata group is

(10) the median region on the posterior edge of the ninth tergite which has expanded to form a subrectangular lobe lying free between the dorsal and apical processes (Figs. 10, 13, 22, 23). In all the other species (except for the turcica group), the homologous region lies between, and at the same level as the apical processes and is fused to these processes at the base.

Two strong synapomorphies of dimidiata and abscondita are:

(11) The similar inner gonostyli, differing in the distal and proximal beaks (Figs. 29, 32) and

(12) the almost identical processes of the 9th tergite (Figs. 10, 13).

(13) The similar inner gonostyli are a synapomorphy of subsericornis (Figs. 41, 57) and setosa.

The recta group is characterized by

(14) the relatively large and long dorsal processes on the 9th tergite (Figs. 11, 19), a presumed synapomorphy, and

(15) a small, raised bump on the mid-lateral surface of the base of the inner gonostylus (Figs. 46, 54). (It should be noted that this feature is not known for mannheimsi and that a similar small bump also occurs in cryptica.)

(16) Savtschenko (1983) describes a strong similarity of the inner gonostylus of recta and mannheimsi. Prionocera byersi is distinguished by a considerably broader distal beak of the inner gonostylus.

(17) The presumed synapomorphy of the ringdahli group is the markedly long hairs on the head and thorax. There is a tendency for long hairs to develop in unrelated northern crane flies and long hairs are found on Prionocera recta, which suggests that this is a plastic character which could have arisen several times in response to a colder climate. Mannheims (1951) associated strongly distended flagellomeres and the loss of the nasus with this group. The flagellomeres are discussed above (4). A nasus is common throughout the Tipulinae and its loss must be a derived feature. This loss may have occurred several times; both pubescens and cryptica have retained a distinct nasus in contrast to their presumed, respective sister species.

(18) A distinctive, roundish sensory patch on the lateral surface of the inner gonostylus is suggested as the synapomorphy which defines a subgroup of the ringdahli group.

(19) This patch is densely hairy and somewhat raised in naskapi and pubescens (Figs. 50, 53) but is

(20) thinner and slightly concave in cryptica and ringdahli (Figs. 47 & 55, respectively).

(21) The synapomorphy which defines the sister group of ominosa and serricornis is the form of the apical processes on the ninth tergite which are sharply curved, their inside edges forming a hard-edged semicircle.

(22) These two species are also distinguished by a very broad dorsal process on the ninth tergite which extends to the lateral edge, eliminating a lateral process. However, this feature is also shared by naskapi, a species which seems to have closer affinities with other species.

(23) A possible synapomorphy of electa, tjederi and woodorum is the strong obliterative streak which contrasts with a dark stigma. Because this character state is also found in turcica and recta, this can only be considered a weak synapomorphy at best. The obliterative streak is only moderately strong in umimicra and insignificant in sordida. These last five species do not form a cohesive group.

Several attempts have been made to establish relationships within the Tipulinae (Tipulidae s.s.) (Theowald, 1957; Frommer, 1963; Savtschenko, 1966; Oosterbroek, 1980). Each of these workers presents a slightly different cluster of generic and subgeneric groups, partly because each studied different taxa. However, except for Savtschenko (1966), there seems to be agreement that several tipuline genera are more closely related to certain subgenera of the very large genus Tipula than they are to each other. This indicates that Tipula is a paraphyletic group.

Species now in the subgenus Tipula (Angarotipula) had been placed in Prionocera because of the similarities of the bare, distended flagellomeres in the adult (Alexander, 1942a) and of the long, fringed lobes on the spiracular disc in the larva (Alexander, 1919). The dissimilarities in the genitalia of both sexes were recognized by Savtschenko (1961) who erected the subgenus Angarotipula. The similarities of the flagellomeres are probably a result of convergence and the similarities in the larval character I believe to be a plesiomorphic feature related to the wet larval habitat. Prionocera larvae are almost indistinguishable from larvae of Tipula (Angarotipula) and are also very similar to those of Holorusia and Megistocera.

Of the tipuline genera which I studied, only Brachypremna and Megistocera together could be identified as a sister group with some confidence. (The synapomorphies which relate them are the torsion in the male terminalia and the corresponding simplification of the aedeagal complex.) Of the other genera, Prionocera, Ctenophora, Dolichocheza, Holorusia, Leptotarsus and Nephrotoma, each is

apparently monophyletic and each seems to be more closely related to species within the huge genus Tipula than to another genus. Despite the work of Savtschenko (1961) and Alexander (1965b), Tipula has not been studied on a world-wide basis and the subgenera of Tipula are not adequately defined so as to allow the establishment of relationships.

Prionocera shares with Tipula (Arctotipula) a rather compact aedeagal complex with a short aedeagus and sclerotized gonocoxal fragments extending to the sperm pump. I tentatively suggest that this may be an indication of a close relationship. Frommer (1963) also placed Prionocera with Tipula (Arctotipula) and included Ctenophora, Tanyptera and Holorusia in this group. However, I think that this analysis was based on a specimen of Tipula (Angarotipula) illustris and not on Prionocera. Oosterbroek (1980) placed Prionocera with Nephrotoma, Dolichopeza, Scamboneura and Tipula (Trichotipula) on the basis of presumed similarities. A refinement of the position of Prionocera within the Tipuline is beyond the scope of this study.

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APPENDIX A

List of specific names applied to Prionocera, their current status and distributions; N = Nearctic, P = Palearctic, O = Oriental. Species recognized and included in this monograph appear in boldface. Oriental species are listed below but are not included in this monograph.

P	<u>abscondita</u> Lackschewitz		<u>lapponica</u> Tjeder = <u>recta</u> Tjeder
	<u>absentiva</u> Mannheims = <u>dimidiata</u>	P	<u>mannheimsi</u> Savtschenko
	(Loew)	N	<u>naskapi</u> n. sp.
	<u>altivolans</u> Alexander -- moved to	N	<u>ominosa</u> (Alexander)
	<u>Tipula</u> (Angarotipula)	N	<u>oregonica</u> Alexander
	<u>anceps</u> Lackschewitz = <u>serricornis</u>		<u>oslari</u> (Dietz) = <u>dimidiata</u>
	(Zetterstedt)		(Loew)
	<u>anderi</u> Tjeder = <u>pubescens</u> Loew		<u>parrii</u> (Kirby) = <u>nomen dubium</u>
	<u>bergrothi</u> (Williston) -- <u>nomen</u>		<u>primoveris</u> Alexander =
	<u>dubium</u>		<u>oregonica</u> Alexander
	<u>broweriana</u> Alexander = <u>unimicra</u>		<u>proxima</u> Lackschewitz =
	(Alexander)	N P	<u>pubescens</u> Loew
N	<u>byersi</u> n. sp.	N P	<u>recta</u> Tjeder
	<u>calvicornis</u> Edwards moved to	N P	<u>ringdahli</u> Tjeder
	<u>Zelandotipula</u>		<u>rostellata</u> (Doane) = <u>dimidata</u>
O	<u>chosenicola</u> Alexander (North		(Loew)
	Korea)		<u>r. churchilliana</u> Alexander =
N	<u>cryptica</u> n. sp.		<u>r. prominens</u> Alexander =
	<u>diana</u> (Meigen) = <u>turcica</u> (Fab.)		<u>salicetorum</u> (Siebke) moved to
N P	<u>dimidiata</u> (Loew)		<u>Tipula</u> (Arctotipula)
N	<u>electa</u> Alexander	O	<u>serenicola</u> Alexander, (North
	<u>flaviceps</u> Enderlein (Sumatra)		Korea)
	<u>fulvicauda</u> Alexander = <u>oregonica</u>	P	<u>serricornis</u> (Zetterstedt)
	Alexander	P	<u>setosa</u> Tjeder
	<u>gracilistyla</u> Alexander = <u>recta</u>	N	<u>sordida</u> (Loew)
	Tjeder	N P O	<u>subserricornis</u> (Zetterstedt)
	<u>hybrida</u> (Dietz) = <u>Tipula</u>	P	<u>subturcica</u> Savtschenko
	(Angarotipula) <u>illustris</u> Doane	N P	<u>tjederi</u> (Mannheims)
O	<u>indica</u> Edwards, probably <u>Tipula</u>	N P	<u>turcica</u> (Fabricius)
	(Angarotipula)	N	<u>unimicra</u> (Alexander)
	<u>lackschewitzii</u> Mannheims = <u>recta</u>	N	<u>woodorum</u> n. sp.
	Tjeder		
	<u>laetipennis</u> Alexander -- moved to		
	<u>Tipula</u> (Angarotipula)		

APPENDIX B

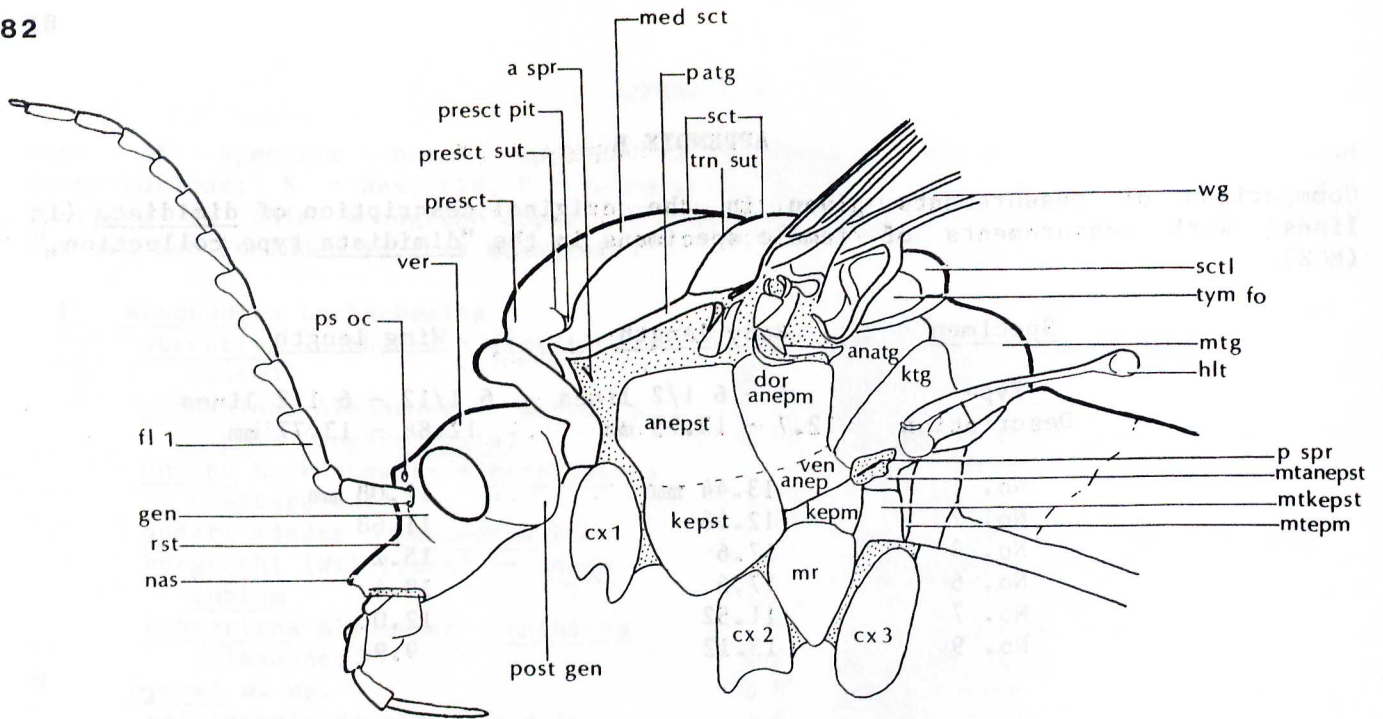
Comparison of measurements given in the original description of dimidiata (in lines) with measurements of female specimens in the "dimidiata type collection," (MCZ).

<u>Specimen</u>	<u>Body length</u>	<u>Wing length</u>
Type Description	6 - 6 1/2 lines 12.7 - 13.75 mm	6 1/12 - 6 1/2 lines 12.88 - 13.77 mm
No. 1	13.44 mm	12.08 mm
No. 2	12.16	11.68
No. 3	17.6	15.2
No. 6	17.6	18.4
No. 7	11.52	12.0
No. 9	13.12	9.92

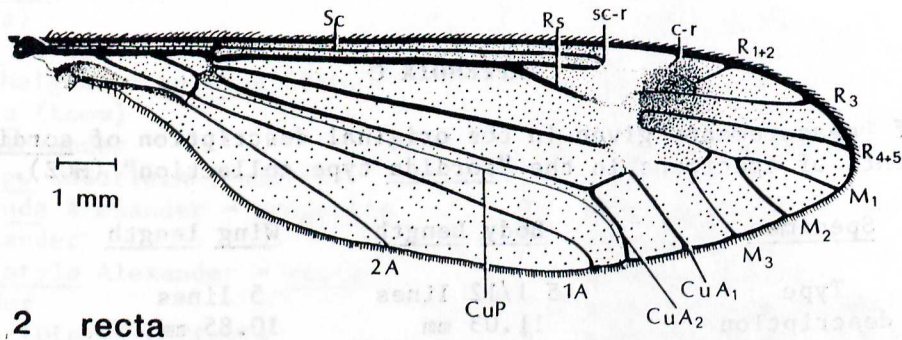
APPENDIX C

Comparison of measurements given in the original description of sordida (in lines) with measurements of specimens in the "sordida type collection" (MCZ).

<u>Specimen</u>	<u>Body Length</u>	<u>Wing length</u>
Type description	5 1/12 lines 11.03 mm	5 lines 10.85 mm
lectotype	11.36 mm	10.72 mm
paralectotype	6.72 mm	8.8 mm



1



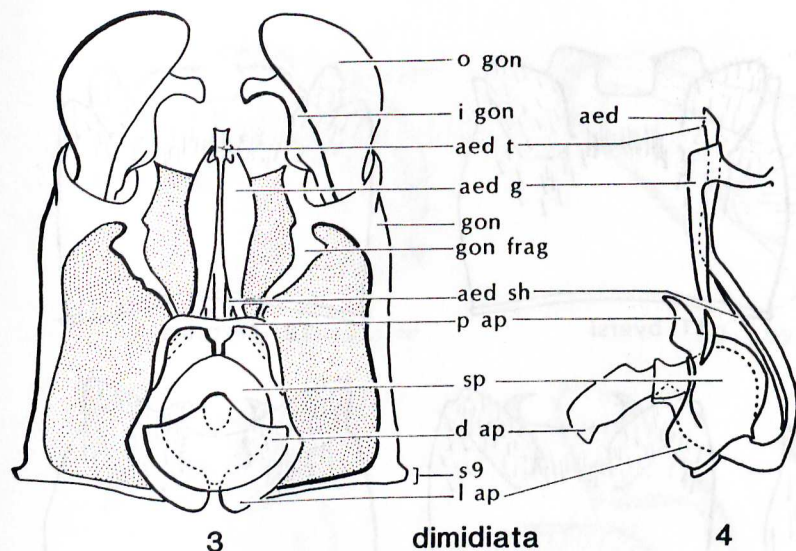
2 recta

Fig. 1. Morphology and terminology of head and thorax of *Prionocera*, lateral view.

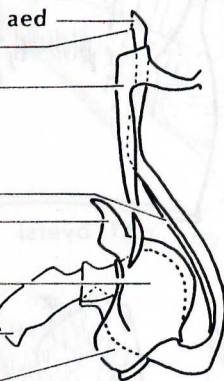
anatg , anatergite	nas , nasus
anepst , anepisternum	patg , paratergite
an s , anapleural suture	pl s , pleural suture
a spr , anterior spiracle	pstgen , postgena
cx 1, 2, 3 , coxae	presct , prescutum
dor anepm , dorsal anepimeron	presct pit , prescutal pit
fl 1 , 1st flagellomere	presct sut , prescutal suture
gen , gena	ps oc , pseudo-ocellus
hlt , halter	p spr , posterior spiracle
kepm , katepimeron	rst , rostrum
kepst , katepisternum	sct , scutum
ktg , katatergite	sctl , scutellum
med sct , median stripe of scutum	trn sut , transvers suture
mr , meron	tym fo , tympanal fossa
mtanepst , metanepisternum	ven anem , ventral anepimeron
mtepm , metepimeron	ver , vertex
mtg , mediotergite	wg , wing
mtkepst , metakatepisternum	

Fig. 2. Wing of *Prionocera recta*.

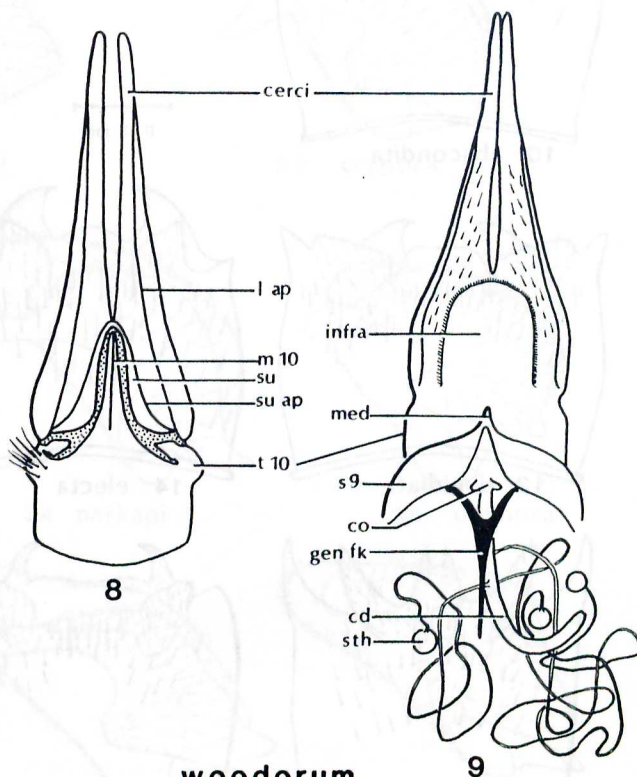
1A, 2A , anal veins	CuP , posterior cubitus	Rs , radial sector
c-r , costal crossvein	M , media	Sc , subcosta
CuA , anterior cubitus	R , radius	sc-r , subcosta-radial cross vein



3

dimidiata

4

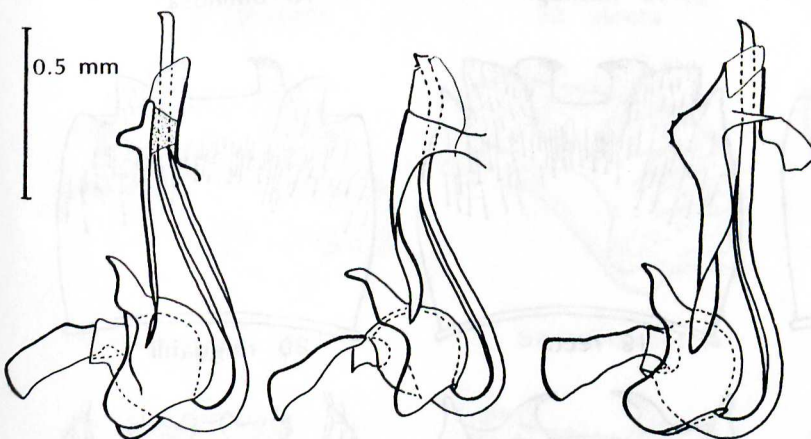


8

9

woodorum

0.5 mm

5 *oregonica*6 *ringdahli*7 *turcica*

Figs. 3-7. Male terminalia. 3. *Prionocera dimidiata*, dorsal view, tergite 9 removed. 4-7. Aedeagal complex, left lateral view.

aed, aedeagus

aed g, aedeagal guide

aed sh, aedeagal sheath

aed t, aedeagal tooth

d ap, dorsal apodeme of sperm pump

l ap, lateral apodeme of sperm pump

gon, gonocoxite

gon frag, gonocals fragment

i gon, inner gonostylus

o gon, outer gonostylus

p ap, posterior apodeme of sperm pump

sp, sperm pump

Figs. 8-9. *Prionocera woodorum*, female terminalia. 8. Dorsal view. 9. Ventral view, hypogynial valvulae, 8th sternite removed.

cerci, cerci

cd, common spermathecal duct

co, aperture of copulatrix

gen fk, genital fork

infra, infraanal plate

l ap, longitudinal apodeme

m 10, median projection of tergite 10

med, median projection of sternite 9

s 9, sternite 9

sth, spermatheca

su, supraanale

su ap, supraanal apodeme

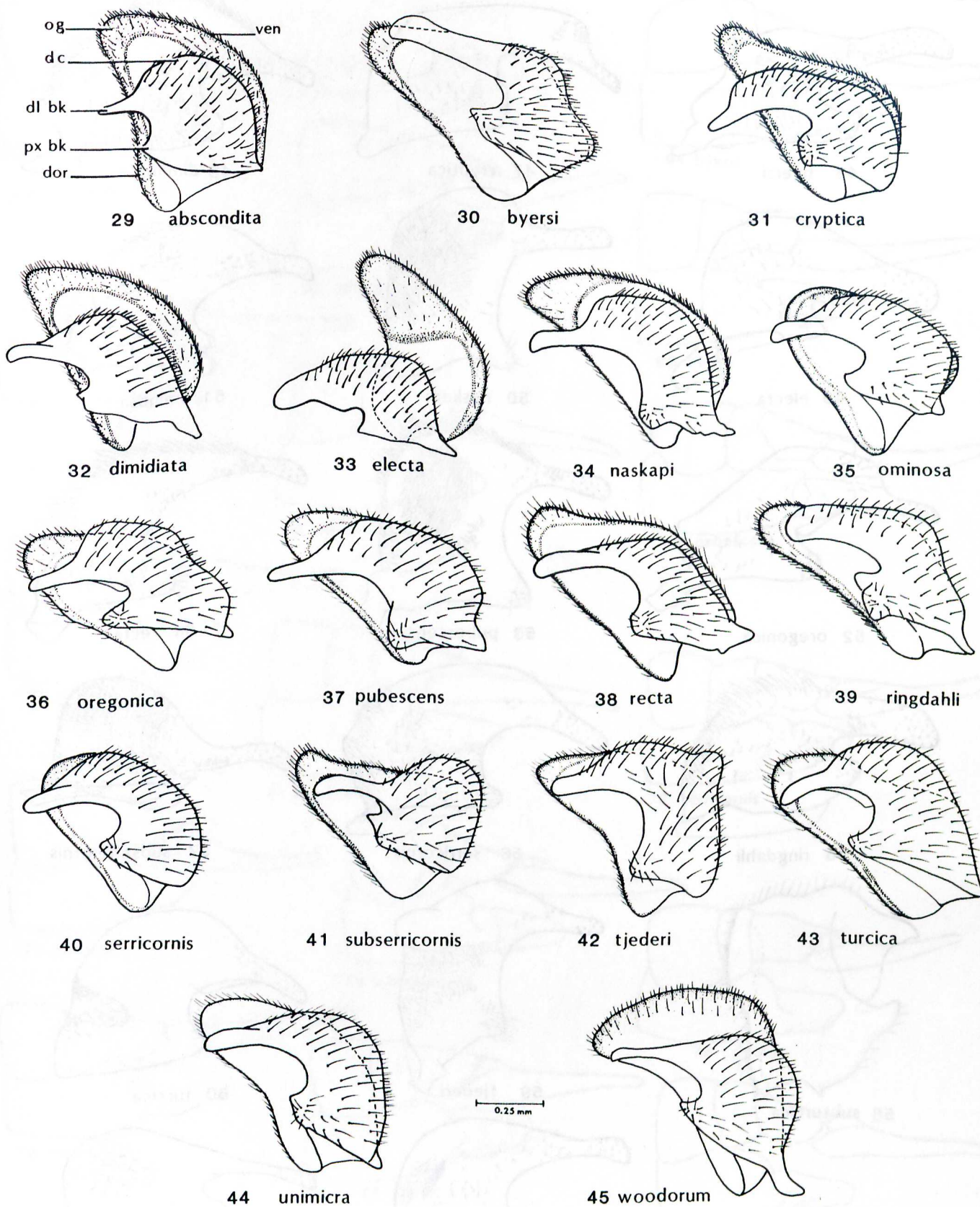
t 10, tergite 10



Figs. 10-28. Male abdominal tergite 9, dorsal view. Scale pertains to all figures.

ap, apical process;
dp, dorsal process

lp, lateral process
ml, median lobe

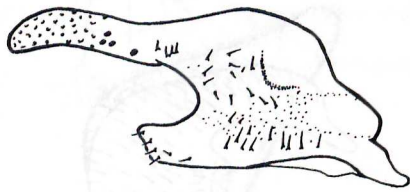


Figs. 29-45. Outer and inner gonostyli, medial view. Scale pertains to all figures.

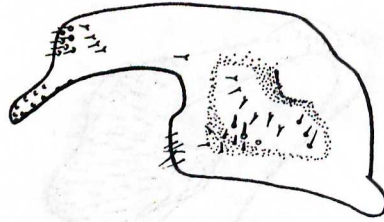
dc, dorsal crest
dl bk, distal beak

dor, dorsal edge
og, outer gonostylus

px bk, proximal beak
ven, ventral edge



46 byersi



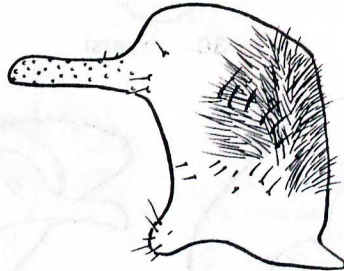
47 cryptica



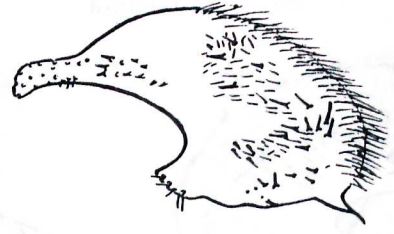
48 dimidiata



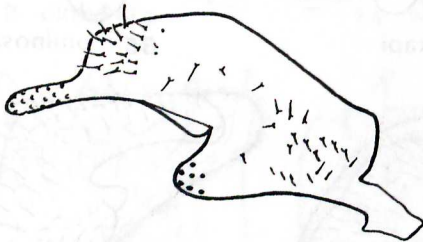
49 electa



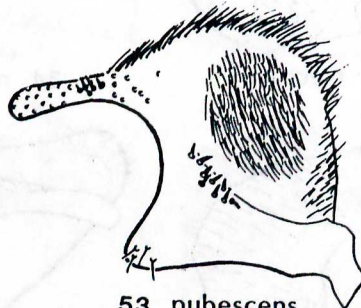
50 naskapi



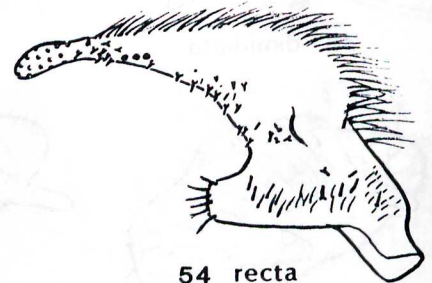
51 ominosa



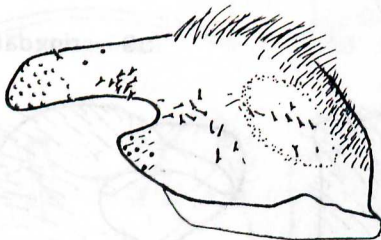
52 oregonica



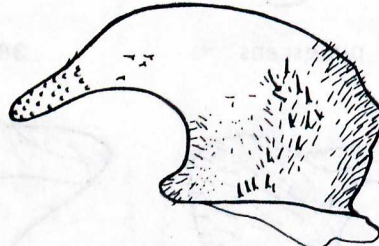
53 pubescens



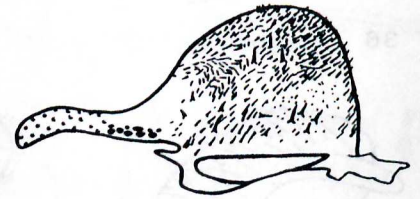
54 recta



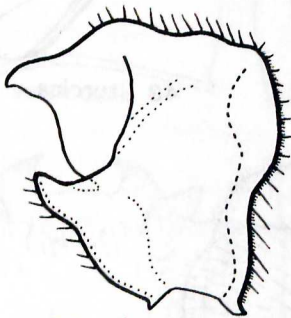
55 ringdahli



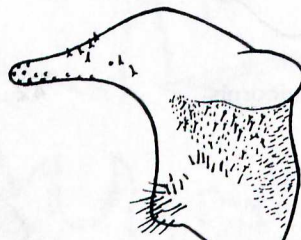
56 serricornis



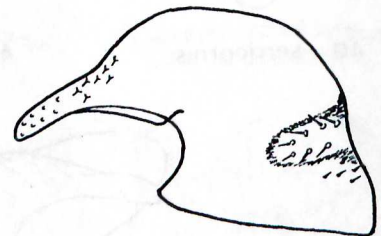
57 subsericornis



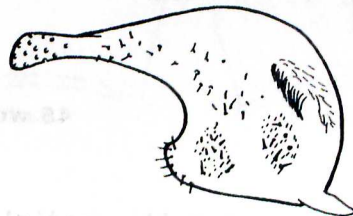
58 subturcica



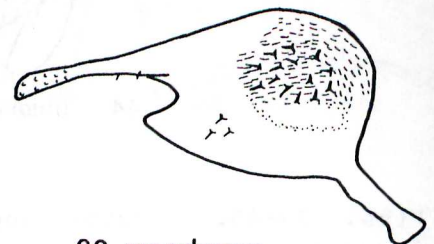
59 tjederii



60 turcica



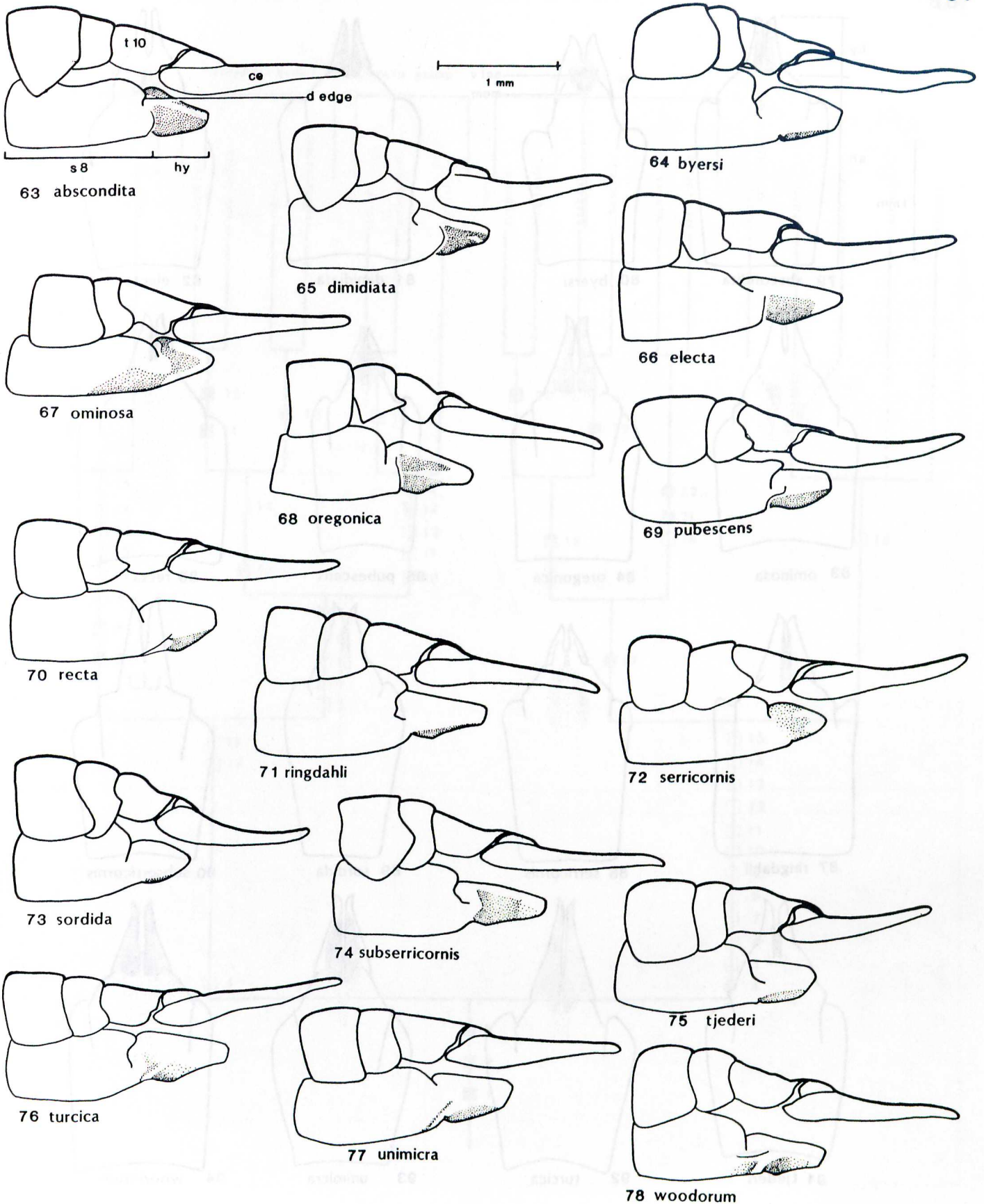
61 unimicra



62 woodorum

0.25 mm

Figs. 46-62. Inner gonostyli, lateral view. Scale pertains to all figures.



Figs. 63-78. Female terminalia, left lateral view. Scale pertains to all figures.

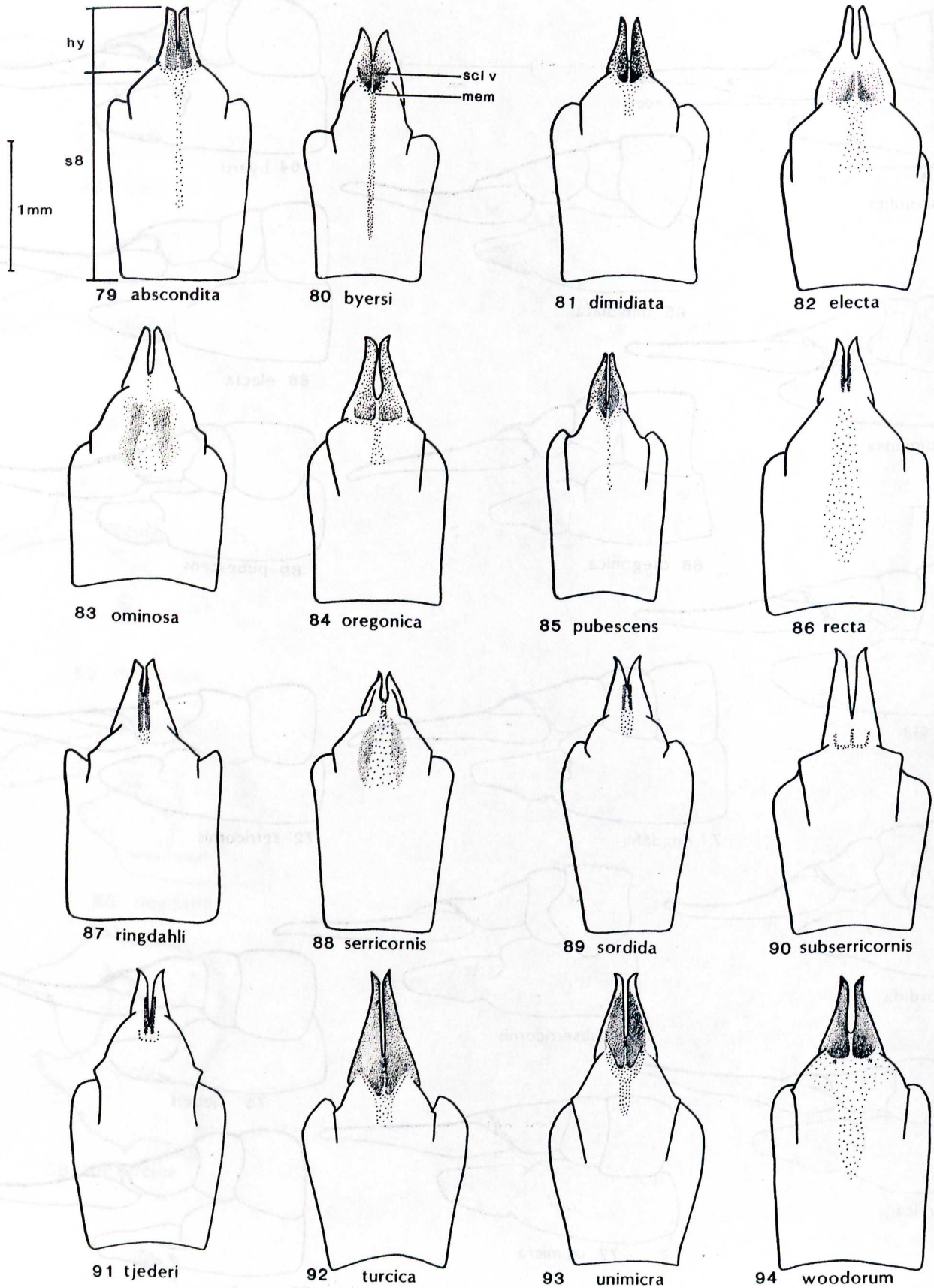
ce, cercus

d edge, dorsolateral edge of sternite 8

hy, hypogynial valvulae

s 8, sternite 8

t 10, tergite 10



Figs. 79-94. Female sternite 8 and hypogynial valvulae, ventral view. Scale pertains to all figures.

hy, hypogynial valvulae
mem, membranous area

s 8, sternite 8
scl v, sclerotized ventral edge of valvulae

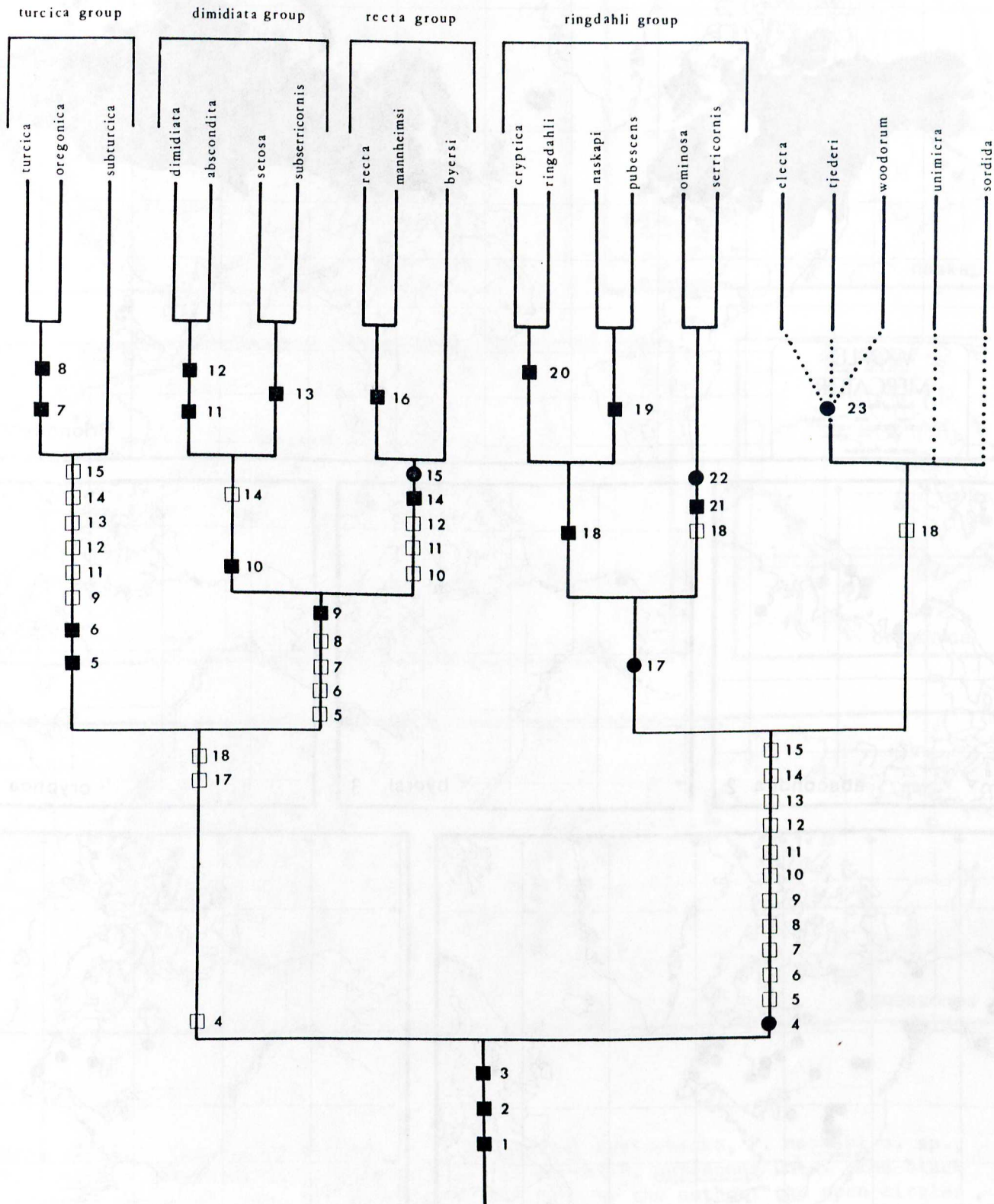
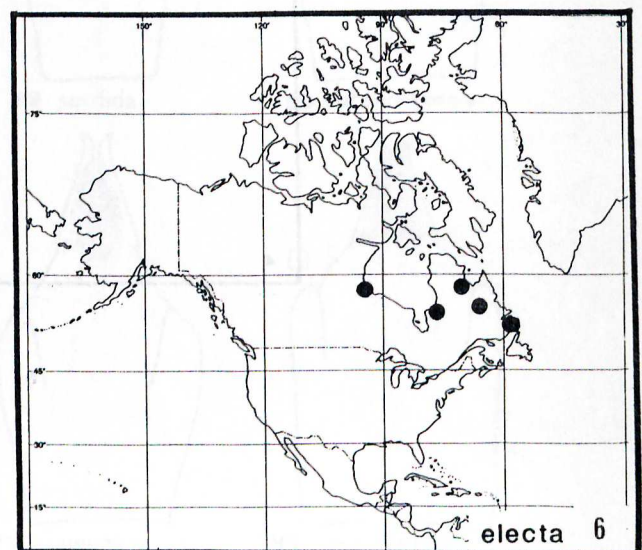
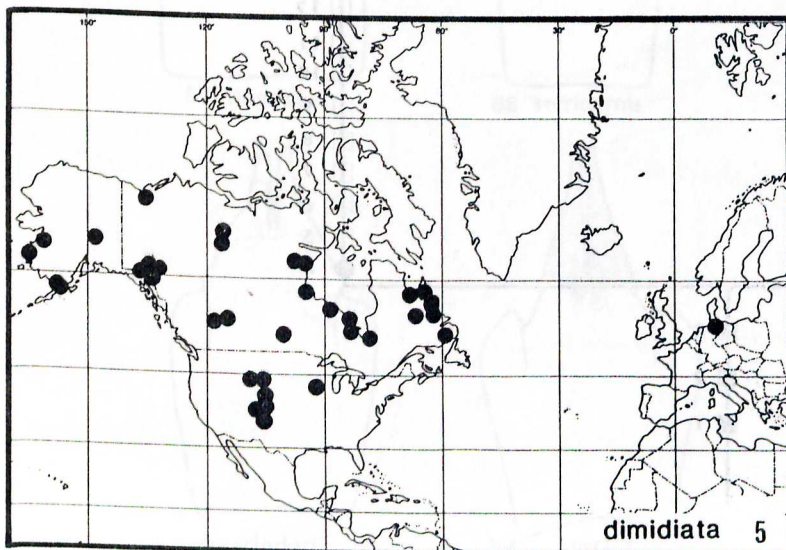
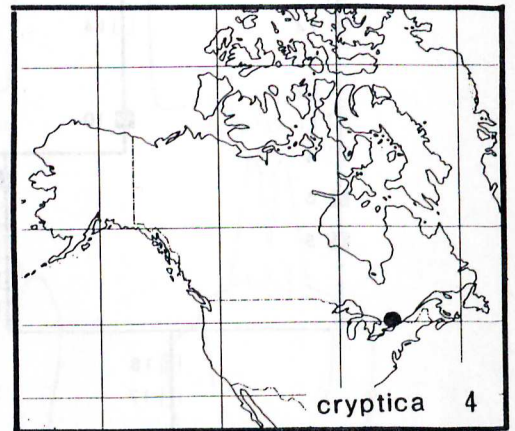
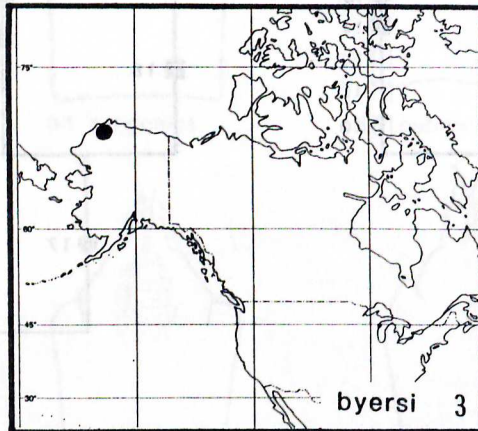
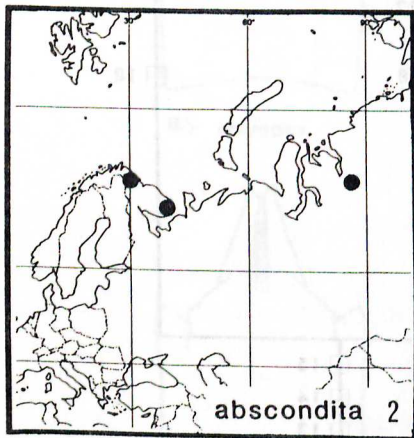
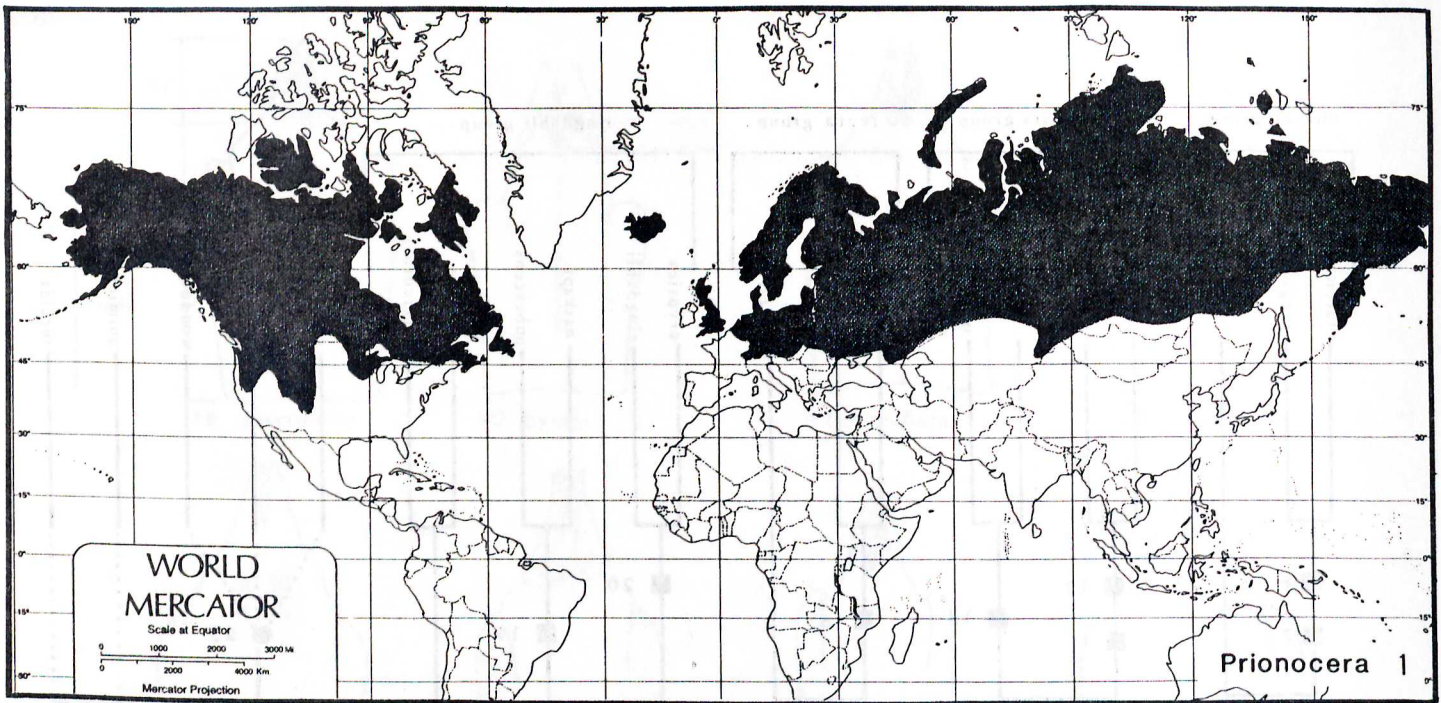
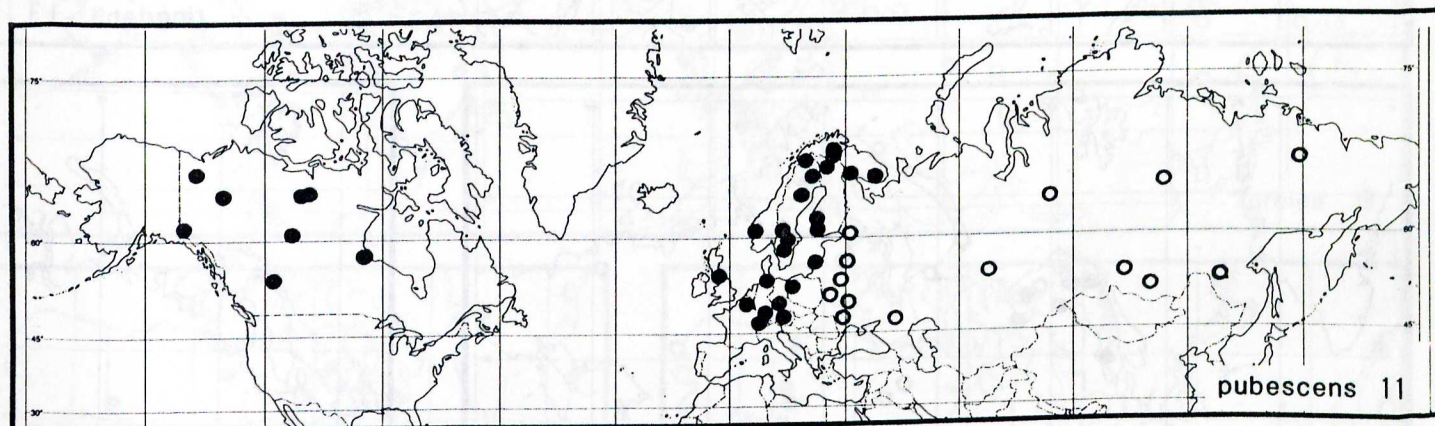
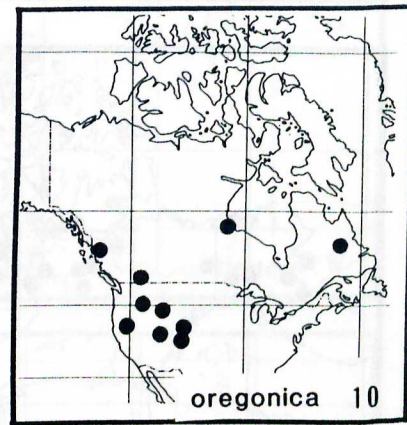
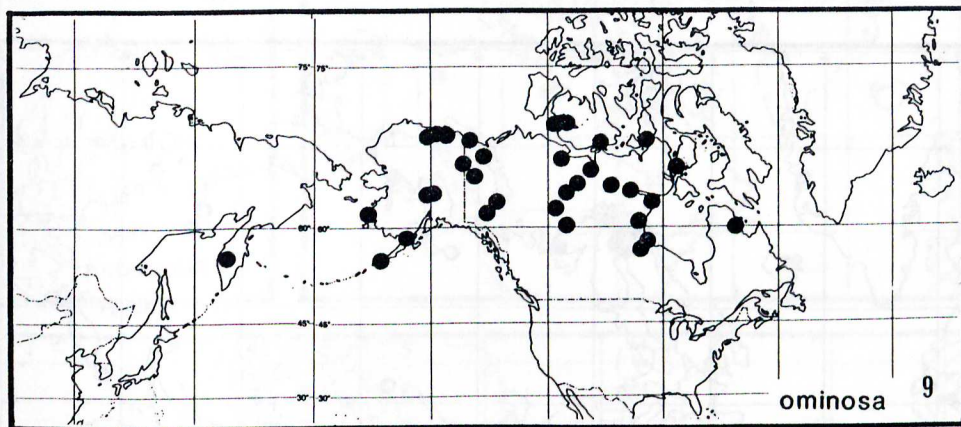
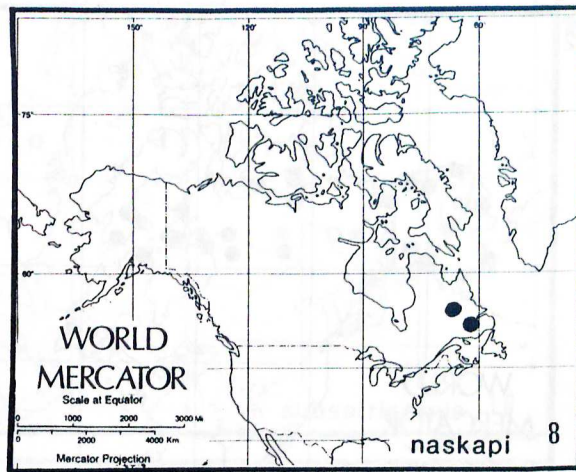
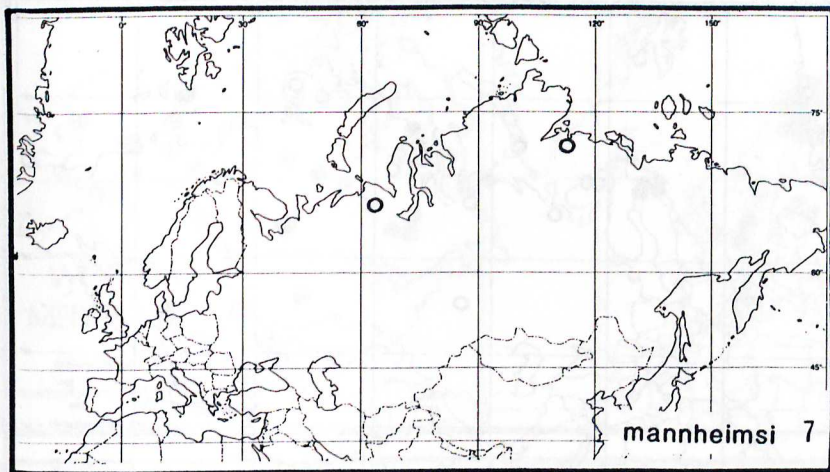


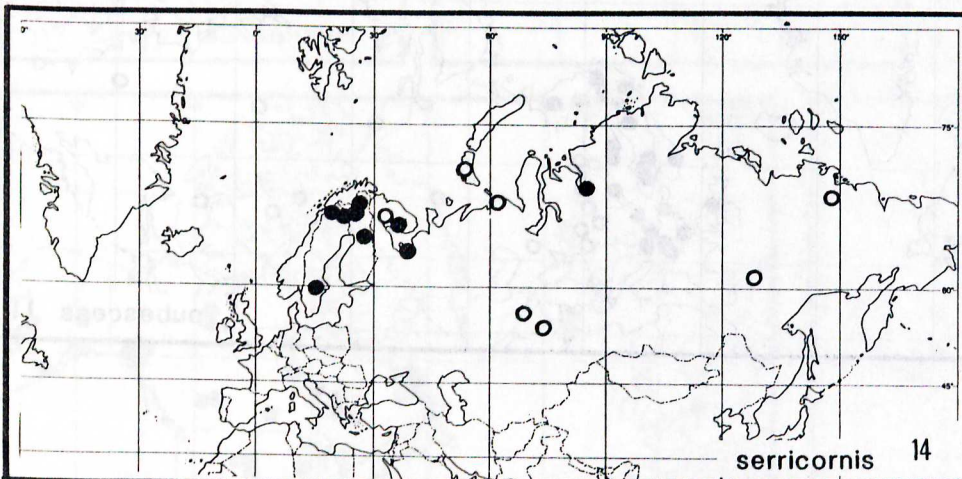
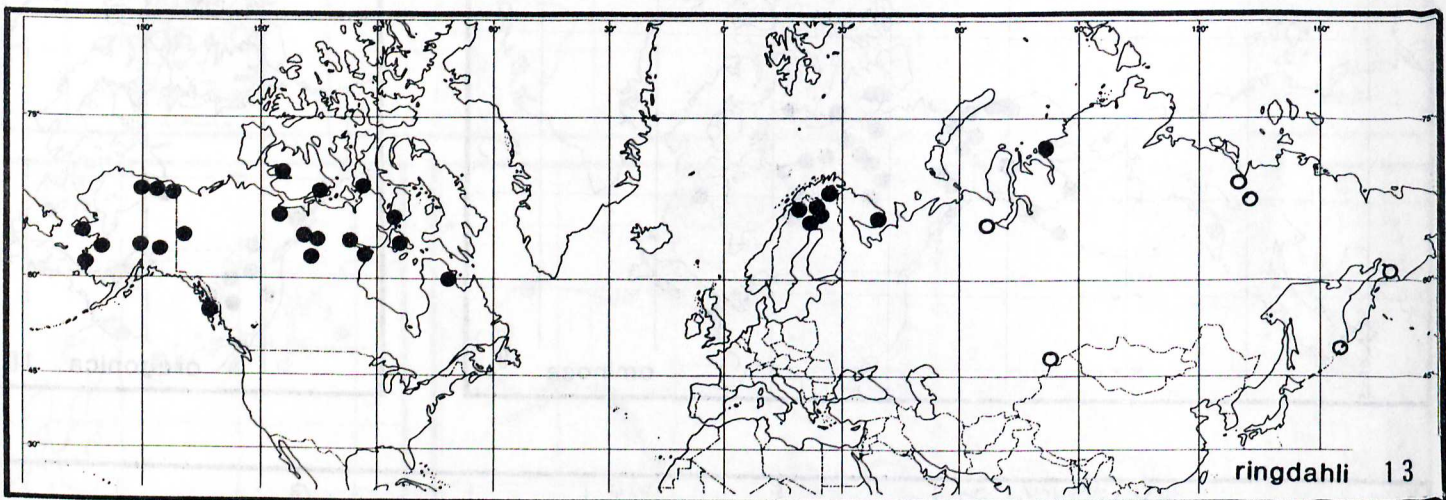
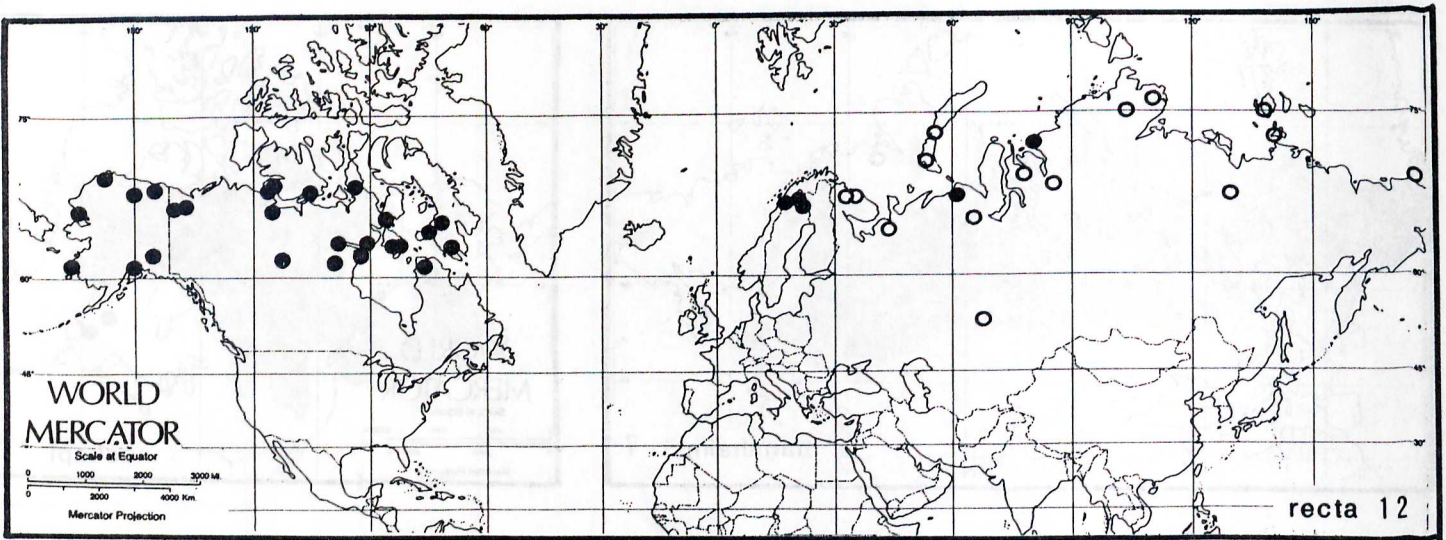
Fig. 95. Cladogram of the Genus *Prionocera*.
 ■ strong synapomorphy; ● weak synapomorphy; □ plesiomorphy.



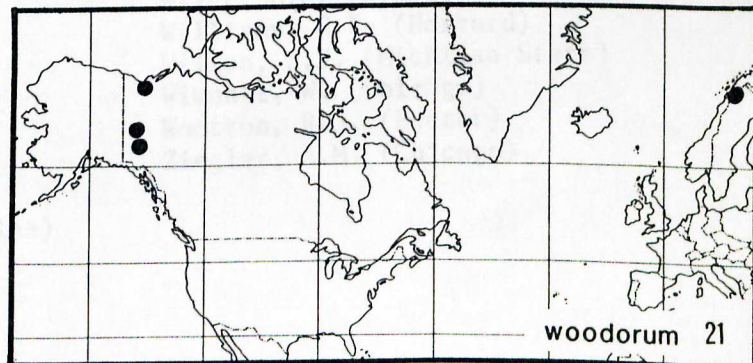
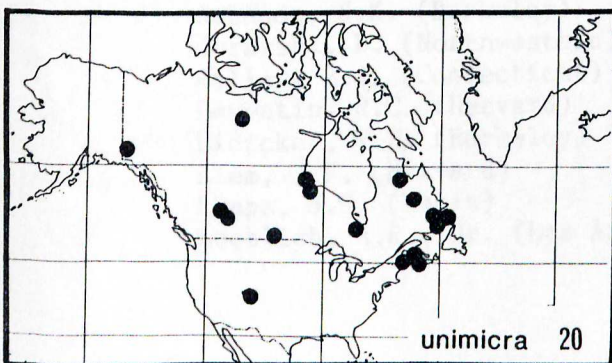
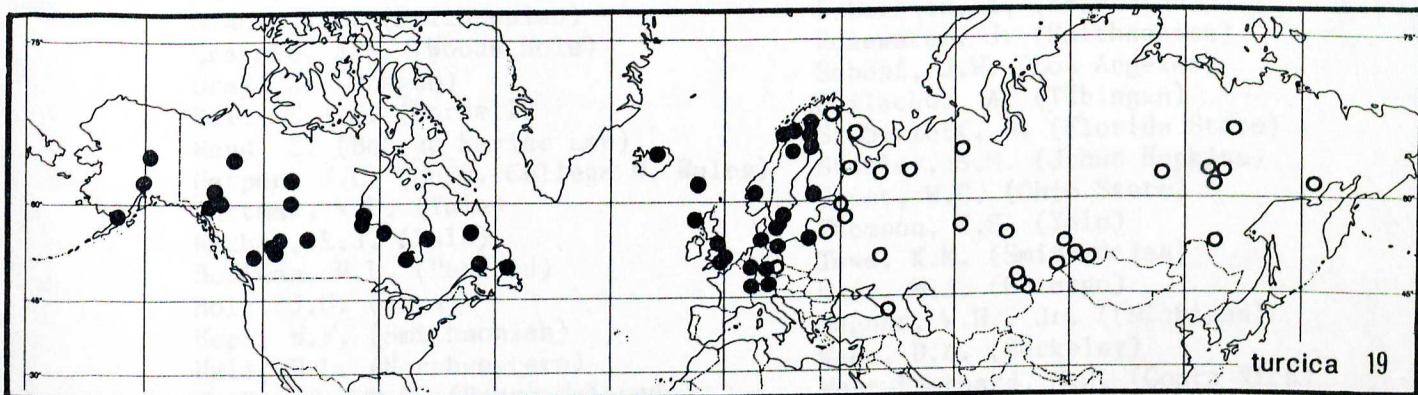
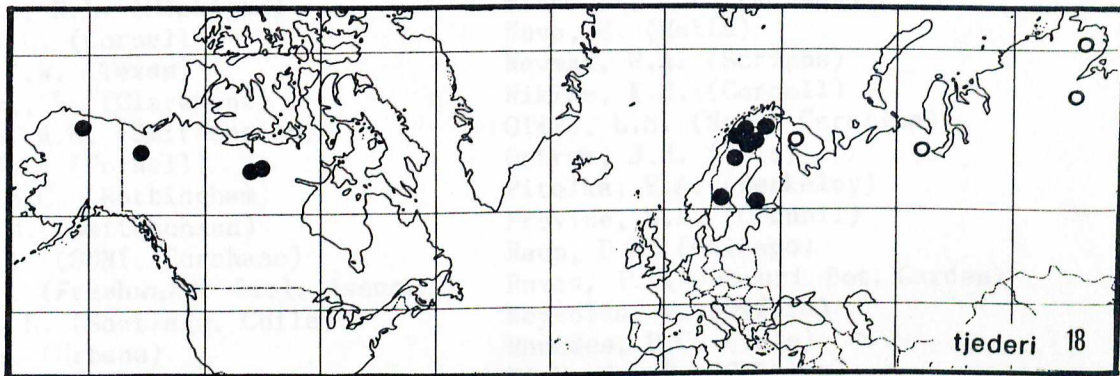
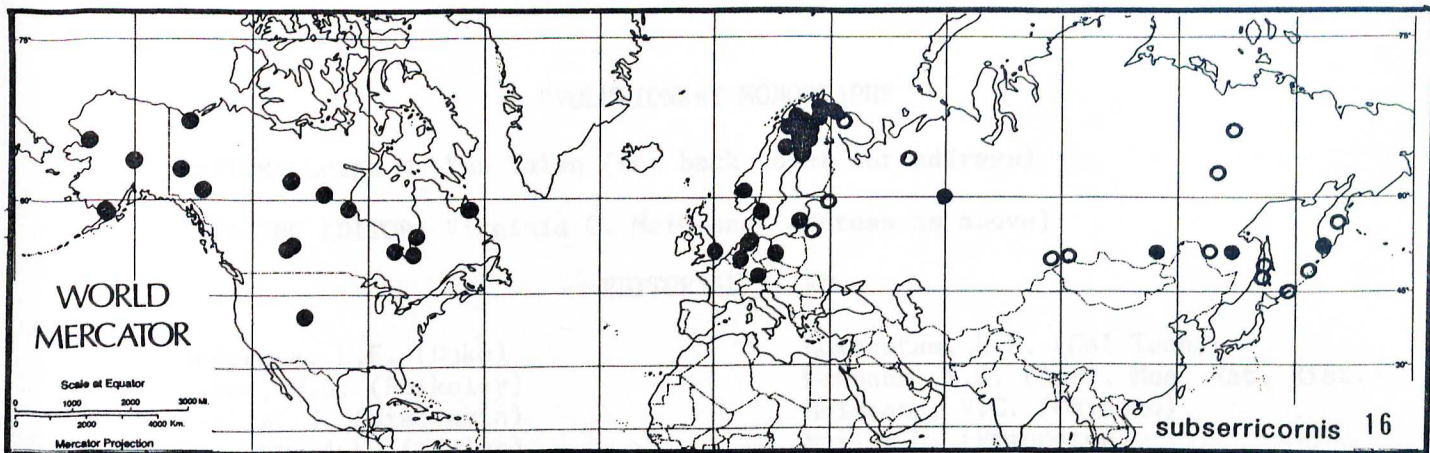
Map 1. Range of the genus *Prionocera* (including records from Savtschenko, 1983).
 Maps 2-6. Collection records of *P. abscondita* Lackschewitz, *P. byersi* n. sp.,
P. cryptica n. sp., *P. dimidiata* (Loew), and *P. electa* Alexander.



Maps 7-11. Collection records of *P. mannhemisi* Savtschenko, *P. naskapi* n. sp., *P. ominosa* (Alexander), *P. oregonica* Alexander and *P. pubescens* Loew. The black circles represent one or more specimens seen by the author; the open circles refer to records in Savtschenko, 1983.



Maps 12-15. Collection records of *P. recta* Tjeder, *P. ringdahli* Tjeder, *P. serricornis* (Zetterstedt) and *P. setosa* Tjeder. Black circles represent one or more specimens seen by the author; open circles refer to records from Savtschenko, 1983.



Maps 16-21. Collection records of *P. subserricornis* (Zetterstedt), *P. tjederi* Mannheims, *P. turcica* (Fabricius), *P. unimicra* (Alexander) and *P. woodorum* n. sp. Black circles represent one or more specimens seen by the author; open circles refer to records in Savtschenko, 1983.

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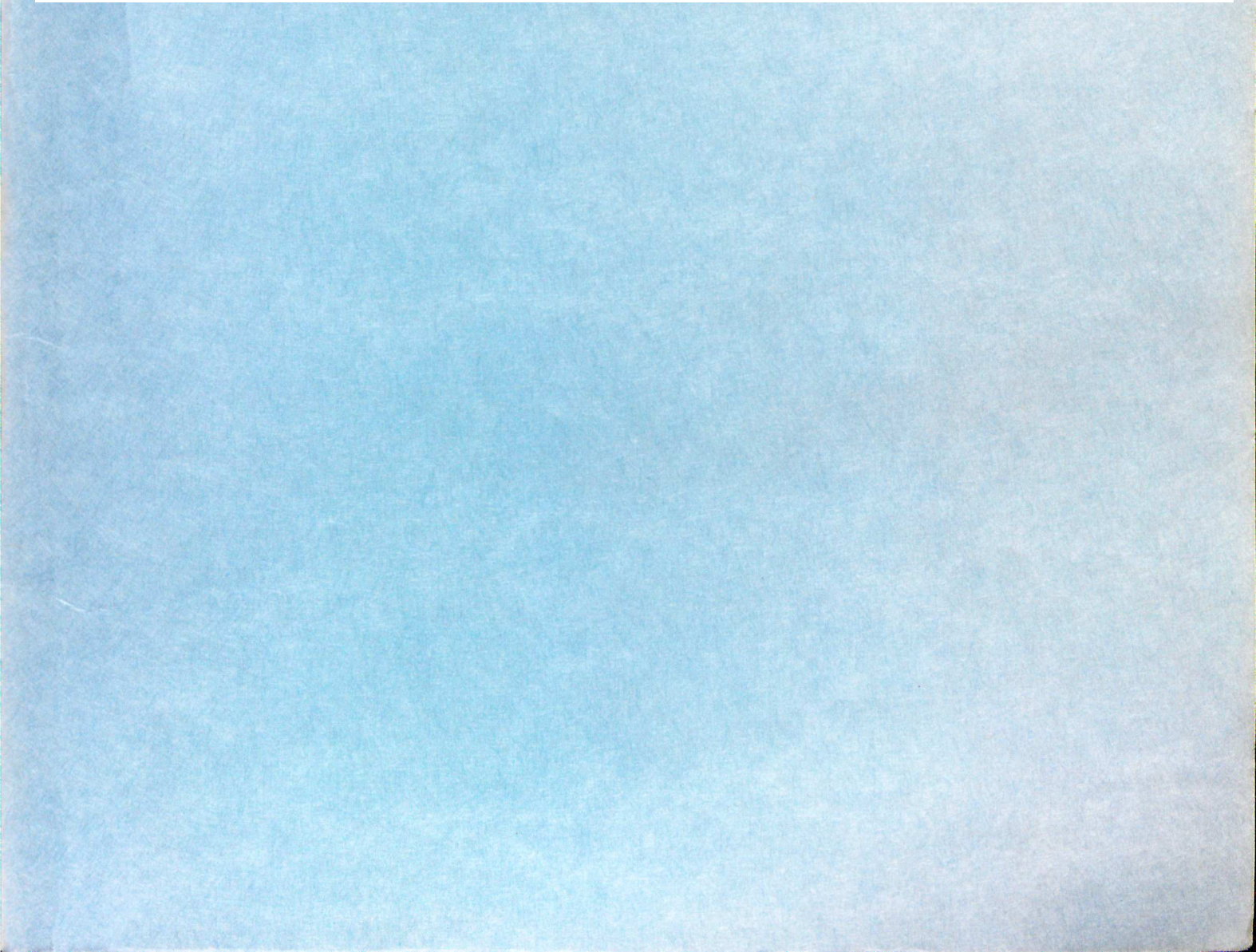
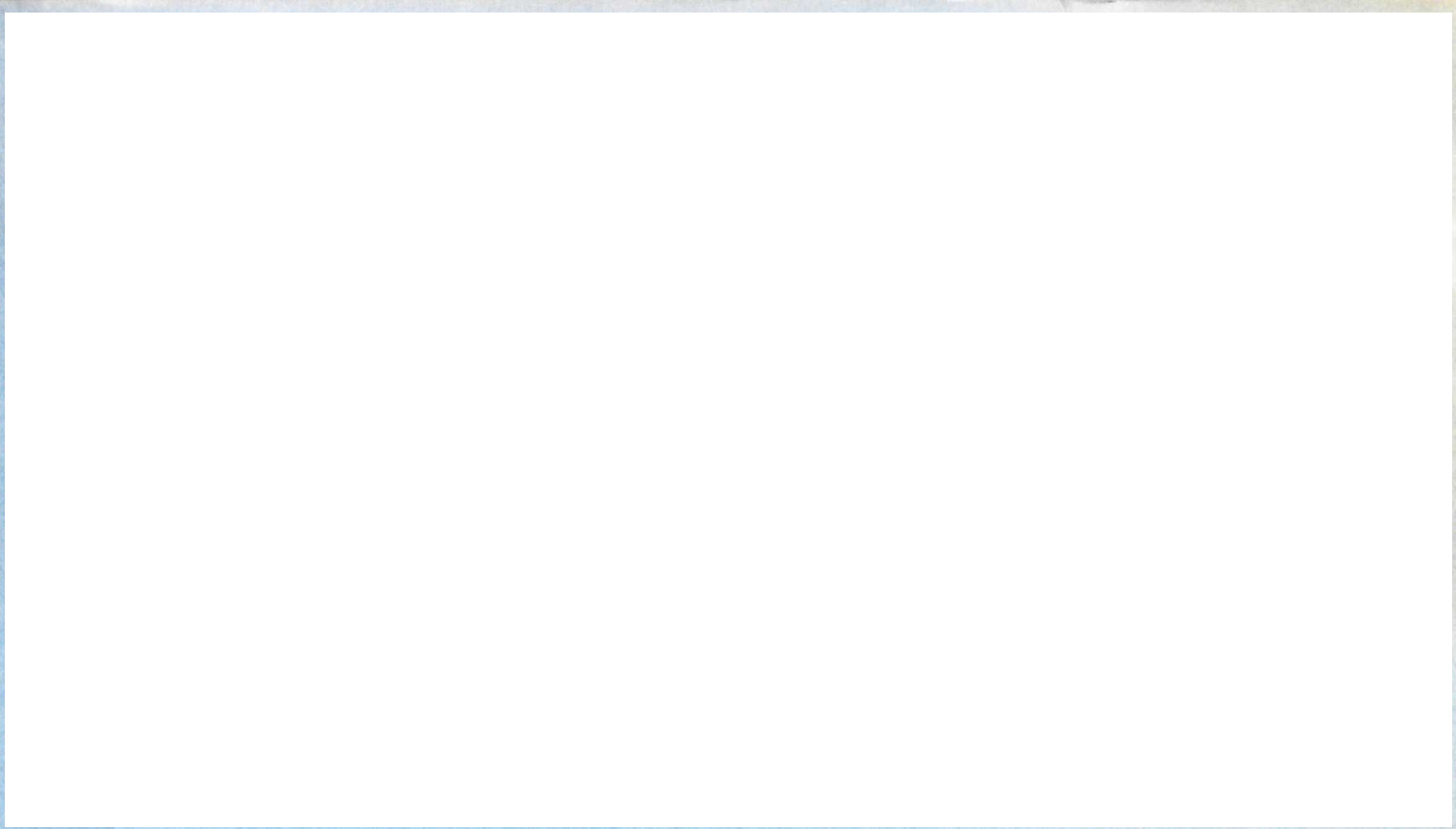
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