THE

TAXONOMY

OF THE

CHRYSOPIDAE

OF

CANADA AND ALASKA

(INSECTA : NEUROPTERA)

by

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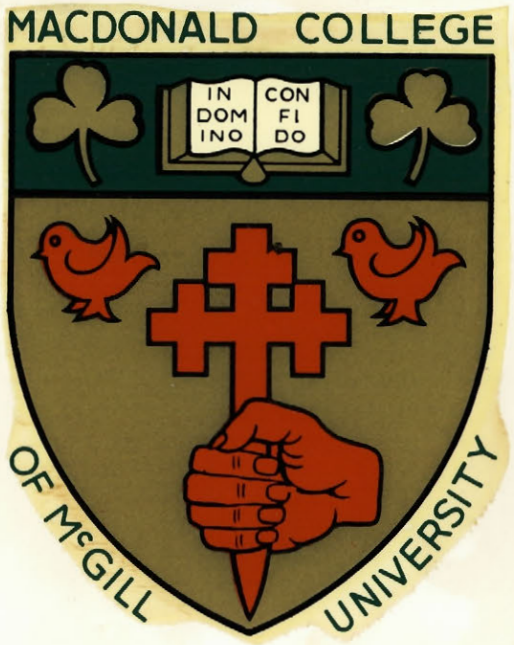

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THE CHRYSOPIDAE OF CANADA

J. A. Garland

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THE TAXONOMY OF THE CHRYSOPIDAE OF CANADA AND ALASKA (INSECTA: NEUROPTERA).

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Abstract

The Chrysopidae of Canada, and of Alaska, are reviewed and revised. The fauna consists of twenty-four species, as follows:

CHRYSOPINAE *Chrysopa chi* Fitch, *C. coloradensis* Banks, *C. excepta* Banks, *C. nigricornis* Burmeister, *C. oculata* Say, *C. pleuralis* Banks, and *C. quadripunctata* Burmeister; *Chrysoperla carnea* (Stephens), *C. harrisii* (Fitch) Comb. nov., and *C. rufilabris* (Burmeister) Comb. nov.; *Chrysopiella brevisetosa* Adams & Garland Sp. nov. [published separately]; *Eremochrysa canadensis* (Banks), *E. fraterna* (Banks), and *E. punctinervis* (McLachlan); *Glenochrysa lineaticornis* (Fitch) Comb. nov.; *Mallada perfectus* (Banks), and *M. slossonae* Sp. nov. [in prep.]; *Meleoma dolicharthra* (Navás), *M. emuncta* (Fitch), *M. schwarzi* (Banks), and *M. signoretti* Fitch; *Nineta gravida* (Banks) Comb. nov.; and *Oviedus placitus* (Banks) Comb. nov.
NOTHOCHRYSINAE *Nothochrysa californica* Banks.

Established changes in nomenclature include:
Chrysopa crotchi Banks Syn. nov. under *C. nigricornis*, *Chrysopa assimilis* Banks Syn. nov. under *C. oculata*, *Chrysopa downesi* Smith Syn. nov. under *Chrysoperla carnea*, and *Chrysoperla comanche* (Banks) Comb. nov.

Figures and geographical distribution, together with any biological notes pertaining to Canada, are included for each of the species in this fauna.

Résumé

Après avoir fait une examination de nouveau, la faune-chrysope canadienne et de l'Alaska comprend dans un inventaire les vingt-quatre espèces suivantes,

CHRYSOPINAE *Chrysopa chi* Fitch, *C. coloradensis* Banks, *C. excepta* Banks, *C. nigricornis* Burmeister, *C. oculata* Say, *C. pleuralis* Banks, et *C. quadripunctata* Burmeister; *Chrysoperla carnea* (Stephens), *C. harrisii* (Fitch) Comb. nov., et *C. rufilabris* (Burmeister) Comb. nov.; *Chrysopiella brevisetosa* Adams & Garland Sp. nov. [publiée séparament]; *Eremochrysa canadensis* (Banks), *E. fraterna* (Banks), et *E. punctinervis* (McLachlan); *Glenochrysa lineaticornis* (Fitch) Comb. nov.; *Mallada perfectus* (Banks), et *M. slossonae* Sp. nov. [en prép.]; *Meleoma dolicharthra* (Navás), *M. emuncta* (Fitch), *M. schwarzi* (Banks), et *M. signoretti* Fitch; *Nineta gravida* (Banks) Comb. nov.; et *Oviedus placitus* (Banks) Comb. nov.
NOTHOCHRYSINAE *Nothochrysa californica* Banks.

En outre, nous avons noté des autres amendements nomenclatorials comprenant *Chrysopa crotchi* Banks Syn. nov. au dessous *C. nigricornis*, *Chrysopa assimilis* Banks Syn. nov. au dessous *C. oculata*, *Chrysopa downesi* Smith Syn. nov. au dessous *Chrysoperla carnea*, et *Chrysoperla comanche* (Banks) Comb. nov.

Pour chaque espèce de cette faune se trouve un dossier, qui inclut des dessins et la répartition géographique avec, quand appartiennent au Canada, quelques remarques sur la biologie.

PREFACE

Our knowledge of Chrysopidae in Canada has undergone many changes since they were first analysed fifty years ago. For instance, the earlier study stimulated collecting, thus adding more species to the faunal list. At the same time, the range of other species was extended. More recently, an increased interest in predatory and other beneficial insects has led to biological study of certain chrysopids in relation to crop pests in Canada. Moreover, changes affecting the nomenclature of species in the Canada-Alaska fauna have made the earlier taxonomy cumbersome, and misleading, especially for the person engaged primarily in biocontrol or pest management.

Similar needs in other parts of the world have been countered, to some extent recently, but Chrysopidae have presented great difficulty generally because of the enormous number of species and the poor state of knowledge of so many of them.

Therefore, this thesis might be useful both in Canada and abroad. For this reason, the historical introductory information in Chapter 1 was augmented by a second chapter dealing specifically with the generic and higher classification of Chrysopidae which occur in Canada, and the quite limited biological notes pertaining to Canada in the main text were extended in a supplementary section at the end.

Finally, although new names were proposed in this thesis, they presently still do not have official status in Zoology until they have been published in accordance with provisions outlined for availability in the International Code of Zoological Nomenclature.

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August 1981

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To prepare the copies of the thesis, Mark J Ltd., Ville St-Michel, Montréal, Sterling Graphics Ltd., Pointe-Claire, Montréal, the Graphics Unit of John Abbott College, Ste-Anne-de-Bellevue, and Mr. R. J. Cornish's Duplicating Services, Macdonald College, were involved. Maps were obtained through the Geography Department, McGill University, being made available by Thomas Allen & Sons, Don Mills, Ontario, and prepared for distribution by Rand McNally & Co., USA.

Besides the necessary correspondence with museums and other institutions, personal contacts included Dr. P. A. Adams, California State University, Fullerton, Dr. W. E. Bickley, University Park, Maryland, Dr. V. J. Monserrat, La Universidad de Madrid, España, and Dr. Catherine A. Tauber, Cornell University. Also acknowledged with other curatorial staff in Materials & Methods, Dr. P. C. Barnard supplemented the available information on specimens in the British Museum.

Collaboration with Mr. B. D. Marshall, Royal Ontario Museum, Toronto, and with Dr. P. A. Adams resulted in two

co-authored publications. In that dealing with a new species from western North America, we acknowledged that,

> " Dr. D. K. McE. Kevan encouraged one of us (JAG) to undertake the study which led to discovery of the Drumheller specimen and preparation of the draft of the species description. "

Subsequently, another manuscript dealing with the new species from eastern and central North America was in preparation, also under co-authorship with Dr. Adams. [1]

Finally, this study was completed with visits to five institutions, hosts being Drs. C. Cloutier and J. N. McNeil, Laval University, Dr. R. D. McMullen, Summerland (B.C.) Research Station, Agriculture Canada, Dr. D. M. Wood and Mr. J. E. H. Martin, Biosystematics Research Institute, Agriculture Canada, Ottawa, Dr. A. G. Robinson and Miss Barbara A. Batulla, Department of Entomology, University of Manitoba, and Miss Mary Hathaway and Dr. F. M. Carpenter, Museum of Comparative Zoology, Harvard University.

Throughout this period, my parents were particularly supportive. Further assistance, of great encouragement and very much an honour, was in the form of a Summer Research Fellowship awarded by the Faculty of Graduate Studies and Research of McGill University, 1980-1981.

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[1] Regarding manuscripts and authorship, Section 7 of the McGill Guidelines for Thesis Preparation applied, as follows:

" The candidate has the option, subject to the approval of the Department, of including as part of the thesis the text of an original paper, or papers, suitable for submission to learned journals for publication. In this case, the thesis must still conform to all other requirements explained in this document, and additional material (e.g. experimental data, details of equipment and experimental design) may need to be provided. In any case, abstract, full introduction and conclusion must be included, and where more than one manuscript appears, connecting texts and common abstract, introduction and conclusions are required. A mere collection ——— is not acceptable; nor can reprints of published papers be accepted. While the inclusion of manuscripts co-authored by the Candidate and others is not prohibited for a test period, the Candidate is warned to make an explicit statement on who contributed to such work and to what extent, and Supervisors and others will have to bear witness to the accuracy of such claims before the Oral Committee. It should also be noted that the task of the External Examiner is much more difficult in such cases. The text of this section 7 should be cited in full in the introduction of any thesis to which it applies."

STATEMENT OF ORIGINALITY [1]

Elements of this thesis which are considered to be contributions to original knowledge include:

1) Figures and the geographical distribution for each of twenty-four species of Chrysopidae known to occur in Canada and Alaska,
2) Two new species of Chrysopidae from North America which range into Canada, one published under co-authorship and the other in preparation at the time of thesis submission,
3) Three NEW SYNONYMIES and six NEW COMBINATIONS in chrysopid nomenclature, and
4) Taxonomic keys to classify the subfamilies, genera, and species of Chrysopidae which occur in Canada and in neighbouring Alaska.

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[1] Regarding originality and historical introduction, Section 6 of the McGill Guidelines for Thesis Preparation applied:

a) The candidate should clearly indicate in the preface, or by a separate statement at the beginning, or end, of the thesis, what elements in the thesis should be considered contributions to original knowledge. This requirement is mandatory for a doctoral thesis and is recommended in other cases. Theses should also contain an appropriate historical statement of previous relevant work or other investigation: "appropriate" does not necessarily mean long or exhaustive.

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INTRODUCTION

This is the first taxonomic revision of the green lacewings of Canada. As a group, green lacewings became different from other Neuroptera during the Mesozoic Era (Adams 1967). Although some species are quite other than green, "green lacewing" is a widely accepted name for this family, the world over.

In Canada, Chrysopidae have a trans-continental distribution. In fact, some species extend to tree-line (Kevan 1979), making information about the fauna of the United Kingdom (Barnard 1978), Iceland (Fristrup 1942), Greenland (Carpenter 1938; Henriksen 1939), Alaska (Bickley & MacLeod 1956), and Siberia (Dorokhova 1979) important to a fuller understanding of green lacewings in Canada.

By considering continental Alaska, if in a more cursory manner, this work aspired to be a revision of Recent Chrysopidae in the northern half of the Nearctic Region. Moreover, as already noted, this was the first attempt to monograph green lacewings in Canada. Previous accounts had been faunal listings which documented the presence of various taxa in

portions of the vast expanse which comprises Canada.

In general, earlier accounts of the Canadian chrysopid fauna depict a slowly accumulating awareness of the family and, together with specimens gathered over the years into many private and public collections in Canadian and foreign institutions, provide the heritage upon which this study was based. Hence, the literature search spans one-and-a-half centuries to the present, and the sources of specimens include not only institutions in Canada and the United States, but also the British Museum (Natural History) in London, England, and the Zoological Museum of the University in Helsinki, Finland.

There was a limit to the time devoted to searching literature or to correspondence regarding additional material. These activities yielded to examination of specimens resulting from collecting, especially in Quebec, Ontario, Manitoba, and significantly in British Columbia (Garland 1979), as well as others obtained on loan.

At the same time, the chrysopids in the Canadian National Collection were available for study in Ottawa. For more detailed examination, short-term loan was arranged. The opportunity to examine specimens which formed the basis for the most comprehensive previous contribution to knowledge of green lacewings in "Canada" (Smith 1932) added an important dimension to this work. In the context of twenty-four species (cf. Kevan 1979), with ten genera in the present arrangement, Smith (1932) had four genera and dealt with twenty of these species. Although he continued to study Chrysopidae in 1936, with travel in Canada (Knutson 1980), Smith never published more about the Canadian chrysopid fauna (cf. Smith 1934, 1938, 1939, 1942).

A more recent treatment (Bickley & MacLeod 1956) for the entire Nearctic Region mentioned Canadian localities for sixteen species and, incidentally, listed one of them from Alaska. For one taxon (Bickley & MacLeod op. cit., as Chrysopa placita Banks), the type locality was erroneously referred to

Canada, confusing Golden, Colorado, with Golden, British Columbia. Colorado is correct (Banks 1908). In this study, C. placita was discussed as Oviedus placitus (Banks) from Ontario and Quebec (two Quebec specimens in the Canadian National Collection had labels stating them to be Chrysopa placita Banks by Dr. P.A. Adams in 1974).

After surveying the literature (Smith 1932; Bickley & MacLeod 1956), a general impression was that the Canadian chrysopid fauna is most diverse in milder zones, such as southern British Columbia and, to use the Ontario subdivisions for naturalists (Snyder 1939), extreme southern Ontario. Moving from these regions, attenuation may be due to climatic and nutritional factors (cf. Scudder 1979). Hence, lists for specific regions in earlier years, admitting the more primitive state of chrysopid taxonomy, should not be expected to embrace nearly so many species as in this coverage.

This accounts for the fewer species in early accounts of the chrysopid fauna. Then, too, the

first descriptions of Nearctic species were in the 1830's (Banks 1903 *re* historical enumeration of species additions). These comments have been preliminary to a more detailed development of Canadian lists of Chrysopidae.

Hence, in the earliest allusion to chrysopids in Canada, Gosse (1840) applied the European name, *Hemerobius perla* L., to the "golden-eyed pearl fly" which he found "frequent among the bushes" on his farm near Compton, Lower Canada. Because his insect emitted a "disgusting odour when handled," true for several species and forming the basis for their popular designation as "stink-flies," this work assumed his observations applied to *Chrysopa oculata* Say. A few years later, Walker (1852), at the British Museum in London, documented the presence in Canada of *C. oculata* and *Chrysopa quadripunctata* Burmeister. His notes represent an unique record for both species from north-central Ontario near Ogoki. They are, in addition, the earliest records for *C. oculata* from Newfoundland,

Nova Scotia, and Québec at Lachine near Montréal.

Walker acknowledged the donors of his material, recording the names of four early collectors, G. Barnston, Dr. J. Barnston, Lieut. Redman, and W.C. St. John (cf. Rennie 1858 re Dr. Barnston; Dawson 1883 re G. Barnston).

Efforts to obtain the specimens which Walker examined were not successful (Barnard in litt. 1980 [1]). Hagen (1861) recorded only one of the species, C. oculata, from Canadian localities. In his discussion of C. quadripunctata, of which there were two specimens, one from Georgia and another from St. Martin's Falls, Albany River, Hudson's Bay (Walker 1852), Hagen (1861) stated that, "The other locality cited by Mr. Walker does not belong to this species." Whether he meant Georgia or St. Martin's Falls is unclear and, as the specimen from St. Martin's Falls was unavailable, this study questioned the authenticity of C. quadripunctata in Walker's account (cf. Map 10 and discussion of C. quadripunctata below).

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1 footnote p.20

By the 1860's, still only one species, C. oculata, had been recorded with certainty from Canada. Throughout this period, identifications were by Dr. H. Hagen at the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts. On one occasion, in respect of material collected in the vicinity of London, Ontario (Saunders 1875), Hagen recognised Chrysopa oculata and one other species, tentatively identified as Chrysopa externa Hagen. In this study, one small female Chrysoperla carnea (Stephens) may have been the insect Hagen saw. Its labels read, "London, Ont., W. Saunders," and "Chrysopa externa." This specimen, at the University of Guelph, undoubtedly was part of the collection of the Entomological Society of Canada though, regrettably, undated. However, on the strength of this specimen, C. externa was consigned here to synonymy under C. carnea.

About the same time, Provancher (1871 a, b; 1877 a, b), who may have been working alone, listed four species. Fortunately, the Provancher Collection was

available at Laval University, and his hand-written labels identify the insects in his published accounts. Besides C. oculata, C. chi Fitch, and C. nigricornis Burmeister, Provancher had two females of Meleoma emuncta (Fitch), both labelled as Chrysopa plorabunda Fitch. Although his concept of C. plorabunda [Chrysoperla carnea] was wrong, Provancher contributed immensely by indicating the presence of additional species in Canada.

A subsequent label-list of insects in the Dominion of Canada (Brodie & White 1883), compiled for the Natural History Society of Toronto, included Provancher's taxa, and those of Saunders. Thus, the list contained five species discussed in this study.

To some extent, Mr. N. Banks ratified previous progress when he revised the Nearctic chrysopid fauna (Banks 1903). At the time, he was at the United States Bureau of Entomology, Department of Agriculture, Washington, D.C. Only in 1916 did he move to the Museum of Comparative Zoology (Carpenter & Darlington

(1954), which may explain why the 1903 study was based on his own collection. If his bibliography be a guide, Banks (op. cit.) was not aware of either Provancher's or Saunders' work.

In terms of the species covered, Banks retained four of the five already noted. He omitted C. carnea. However, his account of C. plorabunda [C. carnea] made that species probable in Canada, too. More important, Banks saw Meleoma slossonae [M. emuncta] from Québec [City] and Sherbrooke, alluding for the first time to Meleoma Fitch in Canada.

To this extent, Banks clarified Provancher's erroneous determination, discussed above, and he concurred with Provancher on the number of species in the Canadian fauna. Nevertheless, the number on the basis of all previous accounts would be five.

Almost thirty years were to elapse before a more comprehensive synopsis of Canadian green lacewings would appear. In the meantime, collectors in widely different parts of the country increased

awareness of the fauna. Banks invariably determined the material. For example, he identified Chrysopa oculata and Chrysoperla carnea [as Chrysopa plorabunda] among early collections from British Columbia, published in the British Columbia List of Insects (Harvey 1906, facsimile reprint in 1926). Later, he helped update that list (Spencer 1942). Other determinations were reported in the Entomological Record of the Annual Report of the Entomological Society of Ontario (Gibson 1910, 1912, 1913, 1914, 1915), and elsewhere (Foster 1942). Besides announcing new distribution records for species already on the Canadian list, Banks reported the presence of Chrysoperla rufilabris (Burmeister), Chrysopa coloradensis Banks, and Eremochrysa canadensis (Banks). The last represented a third genus within the Canadian fauna, though affinities with Eremochrysa Banks were not realised for many years (cf. Banks 1911, 1950).

Altogether, by 1915, the number of species regarded as members of the Canadian chrysopid fauna had

reached ten: Chrysopa oculata, C. chi, C. nigricornis, and C. coloradensis; Chrysoperla carnea, C. harrisii, and C. rufilabris; Meleoma emuncta; and, Eremochrysa canadensis. The tenth was Chrysopa intacta Navás, the unique type of which was from Toronto, Ontario (Navás 1912) and which, until suppressed (cf. Smith 1932; Monserrat in litt. 1980 [1]; Escolà in litt. 1980 [1]), was here provisionally relegated to synonymy under Oviedus placitus (Banks).

To conclude these historical remarks of the Canadian chrysopid fauna prior to the present, the species then known are listed (Smith 1932) without alteration. Then, introductory comments resume with more recent developments.

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[1] footnote p.20

ARRANGEMENT OF THE CHRYSOPIDAE OF CANADA
(according to Smith 1932)

C H R Y S O P I D A E

Nothochrysa McLachlan 1868

Nothochrysa californica Banks 1892

Eremochrysa Banks 1903

Eremochrysa fraterna (Banks 1898)

Eremochrysa punctinervis (McLachlan 1869)

Meleoma Fitch 1856

Meleoma emuncta (Fitch 1856)

Meleoma verticalis Banks 1908

Meleoma signoretti Fitch 1856

Chrysopa Leach 1815

nigricornis section

Chrysopa nigricornis Burmeister 1839
Chrysopa coloradensis Banks 1895
Chrysopa columbiana Banks 1903
Chrysopa excepta Banks 1911

lineaticornis section

Chrysopa lineaticornis Fitch 1856

oculata section

Chrysopa oculata Say var. oculata Say 1839
Chrysopa oculata var. chlorophana Burmeister 1839
Chrysopa oculata var. carei NEW VARIETY
Chrysopa oculata var. xanthocephala Fitch 1856
Chrysopa oculata var. bipunctata Fitch 1856
Chrysopa oculata var. illepida Fitch 1856
Chrysopa oculata var. albicornis Fitch 1856
Chrysopa oculata var. separata Banks 1911
Chrysopa pleuralis Banks 1911
Chrysopa canadensis Banks 1911
Chrysopa chi var. chi Fitch 1856
Chrysopa chi var. upsilon Fitch 1856

plorabunda section

Chrysopa plorabunda Fitch 1856
Chrysopa plorabunda var. californica
Coquillett 1890 NEW COMBINATION
Chrysopa downesi NEW SPECIES
Chrysopa harrisii Fitch 1856
Chrysopa harrisii var. externa Hagen 1861

rufilabris section

Chrysopa quadripunctata Burmeister 1839
Chrysopa gravida Banks 1911
Chrysopa rufilabris Burmeister 1839
Chrysopa majuscula Banks 1906
Chrysopa cockerelli Banks 1903
Chrysopa intacta Navás 1912

unclassified material in the Canadian National Collection

Chrysopa, species near rufilabris Burmeister 1839
Meleoma, species near emuncta (Fitch 1856)

[END OF SMITH's (1932) ARRANGEMENT]

More recently, Bickley and MacLeod (1956) altered Smith's nomenclature. They concluded that varietal names were of little value (cf. Bickley 1952 re evidence for inheritance of varietal characters in C. oculata) because, "--- a variety is not a taxonomic category." All zoologists unreservedly share this view and unanimously exclude any name given to infrasubspecific forms (Stoll et al. 1961, Article 1). In fact, the use prior to 1961 of either of the terms, variety or form, is not to be interpreted as an express statement of either subspecific or infrasubspecific rank in zoological nomenclature (Stoll et al. op. cit., Article 45e(i)). Indeed, since 1961, any new name proposed explicitly as the name of a "variety" or "form" is not available for use under regulations outlined in the International Code of Zoological Nomenclature (Stoll et al. op. cit., Articles 7(9), 45e(ii)), adopted in 1958 at the International Congress of Zoology in London.

These decisions simplified Smith's arrangement. Bickley and MacLeod (1956) correctly

omitted varieties of C. oculata, C. chi, C. harrisii, and C. plorabunda. In the case of carei Smith, despite its being a colour variety, the name was still available. This work confirmed its synonymy under C. oculata.

Besides these changes, Bickley and MacLeod (1956) reported two more species in Canada: Chrysopa sperryae Banks, and Chrysopa crotchi Banks. The latter has Victoria, British Columbia, as its type-locality (Banks 1938 a).

Before leaving this era, C. cockerelli was included on the list of Canadian Chrysopidae on the strength of a single specimen from Victoria, British Columbia (Smith 1932, also recorded by Spencer 1942, and cited as British Columbia by Bickley & MacLeod 1956). Now recognised as M. emuncta, the specimen was in the Canadian National Collection. Besides the original data, it had two subsequent labels. One, undated but written by Dr. R.C. Smith, identified it as his C. cockerelli (Smith 1932). The other label by Dr. C.A. Tauber in 1968 had

the specimen as M. emuncta and, in the Nearctic revision of Meleoma Fitch (Tauber 1969), it was so recorded. Hence, C. cockerelli would drop from the Canadian list. However, Mallada perfectus (Banks) was recognised here from southern British Columbia, and Mallada slossonae (p. 261) from southern Ontario. Consequently, two more species were added to the Canadian list while the name applied to a specimen from British Columbia was synonymised under M. emuncta.

More recently, the type material of C. sperryae was found to consist only of faded or pale individuals of Chrysoperla comanche (Banks) (Adams 1957, as Chrysopa comanche Banks). Although an addition to the Canadian fauna in Bickley and MacLeod's synopsis (1956), its distribution is much more southern (Banks 1945; Adams 1963; Tauber 1974). C. comanche was not found here from British Columbia or, for that matter, Washington State; so, provisionally, C. sperryae (Bickley & MacLeod 1956) was synonymised under C. carnea.

In addition, the type of Chrysopa crotchi

was examined here, and recognised to be C. nigricornis. Likewise, the species Chrysopa assimilis Banks, once reported from British Columbia (Gibson 1914; Smith 1932, discussed under C. oculata var. albicornis), was relegated here to synonymy under Chrysopa oculata (cf. Smith 1932; Bickley & MacLeod 1956; also, determination label on type as C. oculata by Dr. E.G. MacLeod 1963). Further, Chrysopa downesi was recognised here as Chrysoperla carnea (Tauber in litt. 1980 [1], supported by determinations on types in Canadian National Collection as C. carnea by Dr. P.A. Adams). Finally, Chrysopa majuscula previously was synonymised under C. nigricornis, and Chrysopa columbiana under C. lineaticornis [Glenochrysa lineaticornis] (Bram & Bickley 1963).

These nomenclatorial changes did not alter the tally of species in Canada. However, in revision of Nearctic Meleoma (Tauber 1969), Meleoma dolicharthra (Navás) was recognised from British Columbia. Subsequent collecting near Penticton, British Columbia,

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disclosed the presence of Meleoma schwarzi (Banks) (Garland 1979). Consequently, the number of species in Canada would be twenty-three.

More recently, though, Chrysopiella brevisetosa Adams & Garland (1981) was represented by a paratype from Drumheller, Alberta, bringing the tally to twenty-four species (cf. Kevan 1979), in five genera.

This study assigned nine species to five additional genera which, previously, had not been discussed in the Canadian context. Indeed, Oviedus Navás hitherto has been Ethiopian (Tjeder 1966 b). Another, Nineta Navás, was recognised in Chrysopa gravida Banks. This new combination first appeared on a label attached to a specimen of C. gravida in the Smithsonian Institution, Washington, D.C., by Dr. P.A. Adams in 1976.

Therefore, the next section concentrates on the generic and higher classification of Chrysopidae, with special reference to Canada.

FOOTNOTES TO CHAPTER I

Barnard, P.C., British Museum (Natural History)

"C. quadripunctata from St. Marten's Falls: there is no trace "of this specimen. **[in litt. 23.IX.1980]**

Monserrat, V.J., Universidad de Madrid

"--- I have written to the two official centers where the "Navás's specimens may be deposited: Museo de Zoologia de "Barcelona, and Estituto Español de Entomologia of Madrid. "Nextly they writte you with news on Chrysopa intacta N., "1912. **[in litt. 29.IV.1980]**

"--- esta mañana he estado personalmente revisando la "colección de Neurópteros del Instituto Español de "Entomologia y al menos en esta institución no he conseguido "encontrar el ejemplar de Chrysopa intacta Nav. que Vd. busca. "Debo informarle que la colección de este autor ha estado "abandonada durante muchos años en Zaragoza y sólo parte de "ella pudo salvarse y se encuentra en el Museo de Barcelona "donde Vd. ya ha consultado. **[in litt. 16.IX.1980]**

Escolà, O., Museo de Zoologia de Barcelona

"We have just revised the Navás' collection for obliging yours "and other petitions and Chrysopa intacta Navás 1912 is not "there. --- I have not this type. **[in litt. 19.V.1980]**

Tauber, C.A., Cornell University

"I have examined many specimens **[C. downesi, C. carnea]** and "have not found significant differences. Moreover, the two "species readily interbreed, so any differences can't be "too great. **[in litt. 18.IV.1980]**

GENERIC AND HIGHER CLASSIFICATION OF CHRYSOPIDAE IN CANADA

STABILITY OF THE FAMILY-GROUP NAME

As a division of his Stegoptera, Edward Newman (1853) proposed the name Chrysopidae for Linnean Neuroptera having setaceous antennae and emarginate labrum, but lacking ocelli. Perhaps intentionally, he amended the spelling of Schneider's (1851) taxon Chrysopina. Ever since, Chrysopidae referred to green lacewings.

However, homonomy with a dipterous taxon (Tjeder 1966 a, b) led the International Commission on Zoological Nomenclature to place Chrysopidae as a correction of Chrysopina Schneider 1851, with type-genus Chrysopa Leach 1815, on the Official List of Family-Group Names in Zoology, with Name Number 426 (Melville & China 1968). In so doing, Chrysopina Schneider 1851 was declared an incorrect original spelling for Chrysopinae and placed on the Official Index of Rejected and Invalid Family-Group Names in Zoology, with Name Number 433 (Melville & China op. cit.).

A concomitant decision was to rule Chrysopinae Lutz 1909, with type-genus Chrysops Meigen 1803, an incorrect original spelling for Chrysopsinae. Accordingly, Chrysopinae Lutz 1909 was placed on the Official Index of Rejected and Invalid Family-Group Names in Zoology, with Name Number 434 (Melville & China op. cit.).

Thus, Opinion 851 of the International Commission on Zoological Nomenclature, which bears the date 14 February 1968, is fundamental to the higher classification of the green lacewings, ensuring the stability of the family-group name.

CHARACTERISATION OF CHRYSOPIDAE IN CANADA

Chrysopidae, as Hemerobioidea, share traits with other lacewing groups. For instance, there are crossveins in the costal region of the wings but, in Chrysopidae, they are unbranched. Also, there is a pterostigma near the apex of each wing and, when present, the wing-coupling apparatus is frenulate. Keeping these facts in mind, one of the subfamilies of green lacewings in Canada exhibited a jugal lobe in the fore wing and an opposing frenulum of setae on the

hind wing. Other Chrysopidae did not display the frenulate condition or, at least, the jugal lobe was much reduced.

In common with other Hemerobioidea, most Chrysopidae have veins Sc and R_1 (Fig. 101c; cf. Adams 1967; Wotton 1979) connected by crossveins in the pterostigmata. Apical fusion of these longitudinal veins, depicted in the ascalaphid recently confirmed in Canada (Garland & Marshall 1980), is characteristic of the Mesozoic Mesochrysopinae Handlirsch (Adams 1967), and is found in present-day Apochrysinae (Handlirsch), which do not occur in Canada (Tjeder 1966 b). All Canadian chrysopids had pterostigmatic crossveins.

In addition, many crossveins occur between R_1 and Rs in the chrysopid fore wing, as in other Hemerobioidea (Riek 1970). A particularly chrysopid character is that Rs arises from only one stem. Other hemerobioids have two or more stems of Rs coming off the fused R_1-Rs stem (Riek op. cit.).

Another character of Chrysopidae is the marginal fringe of simple setae on the wings (Riek 1970). Other Hemerobioidea have trichosors.

Also, Chrysopidae lack nygmata (Riek 1970; Londt 1974, as corneous spots) and, as a matter of interest, no Hemerobioidea (sensu Riek 1970) have these.

Parenthetically, Dilaridae do have nygmata (Riek 1970) and, considering their male reproductive structures (Adams 1970), they have affinity most with Osmyloidea or Mantispoidea (Gurney 1947; Adams 1970). Perhaps pleuritocavae, present in Osmyloidea (sensu Adams in Tjeder 1979), are homologous with the dilarid digitiform process (Adams 1970), though this still does not resolve the phylogenetic dilemma posed by this group.

The present basis for higher classification of the Neuroptera, exclusive of Coniopterygoidea which have hamulate wing-coupling and lack pterostigmata, is wing venation and certain larval characteristics (Riek 1970). Hence, another distinction

is that third-instar larvae of Chrysopidae and other Hemerobioidea have curved jaws (Riek op. cit.), resembling Myrmeleontoidea and differing from Mantispoidea and Osmyloidea. For comparison, larvae of one dilarid have straight jaws (Gurney 1947).

Again, even immature Dilaridae present conflicting characteristics. The straight larval jaws, together with an empodium, liken them to Mantispoidea or Osmyloidea (Withycombe 1925; Gurney 1947). Yet, their pattern of ecdysis most closely resembles that in many Chrysopidae (MacLeod & Spiegler 1961), making their classification difficult.

Leaving the enigma of Dilaridae, the more immediate need was to distinguish Chrysopidae in Canada from other Hemerobioidea.

In this context, one species of Dilaridae was reported from Michigan (Steyskal 1944) and, more recently, southern Ontario (Kevan 1979, as a note added in proof). Consequently, according to the most recent

arrangement (Kevan op. cit.), Hemerobioidea in Canada comprise Sympherobiidae, Hemerobiidae, Dilaridae, and Chrysopidae.

To distinguish Chrysopidae from these families, the most recent revision of Nearctic Hemerobiidae (Carpenter 1940), a review of Asiatic Sympherobius Banks (Kozanchikov 1956), a comparative morphological study of the head and cervix of larval Neuroptera (MacLeod 1964), and descriptions of new taxa (Monserrat 1976 a, b) treat the genus Sympherobius as a component of the Hemerobiidae. The sympherobiid-hemerobiid assemblage differs from Chrysopidae by possession of forked costal crossveins in the fore wing; and, also in the fore wing, by the presence of two or more branches of Rs arising from the apparently fused R_1-Rs (Brues et al. 1954). Conveniently, in addition to characters already noted, Dilaridae resemble the sympherobiid-hemerobiid group in the number of branches of Rs arising from the fused R_1-Rs stem (Carpenter 1940; Adams 1970).

In immatures, the empodium sets Chrysopidae apart from the sympherobiid-hemerobiid assemblage (Withycombe 1925; Townsend 1935).

In summary, chrysopid larvae have curved jaws and empodia in all three instars. The adult has simple costal crossveins, and only one branch of the radial sector arises from R_1-Rs. These, and pterostigmata, separated Chrysopidae from all other Neuroptera in Canada during the course of this study.

SUBFAMILIAL CATEGORIES OF CHRYSOPIDAE IN CANADA

Two quite different groups of Chrysopidae occurred in Canada, being the Nothochrysinae Navás 1910 (spelling corrected by Adams 1967), and Chrysopinae Schneider 1851. In the past, these subfamilies were differentiated by means of wing venation (Banks 1903; Smith 1932; Bickley & MacLeod 1956). The procedure is based on the configuration of the posterior media of the fore wing in terms of the shape of contiguous cells. Occasional aberrant specimens were

resolved by recourse to colour differences and the degree of branching of veinlets extending to the margin of the fore wing (cf. Banks 1903; Smith 1932; Bickley & MacLeod 1956). Beyond the Nearctic Region, these distinctions of Nothochrysinae and Chrysopinae fail (Tjeder 1966 b re true Nothochrysa-species and transfer of others to Italochrysa Principi). Fortunately, more fundamental differences separate these subfamilies.

For instance, a jugal lobe at the base of the fore wing and a frenulum, consisting of an haired extension on the opposing region of the hind wing, declare Nothochrysinae a primitive group (Tjeder 1966 b, as Dictyochrysinae Esben-Petersen).

These structures persist in reduced form. Specifically, Chrysopinae have a jugal vein, but there is no jugal lobe at all (Adams 1967). Hence, the wing-coupling apparatus is a taxonomic character for subfamilial classification (cf. Tjeder 1966 b; Adams 1967).

Another character, having evident

phylogenetic and ecological significance, is the tympanum on the ventral surface of the radius at the base of the fore wing.

For instance, Chrysopinae have a conspicuous swelling enclosing alary chordotonal organs in a deep ventral groove (Tjeder 1966 b), distinct from the region of campaniform sensillae at the base of the radius (Séméria 1980 a), and not likely to be confused with the spindle-shaped field of scolopale receptors between Sc and R (Fröhlich 1973), or with the field of modified microtrichia in the anal region of the fore wing (Riek 1967).

The tympanal organ is an ultrasonic receptor (Miller 1971). In response, the fore wing muscle twitches, suggesting that the tympanal organ provides for reflex contraction of the fore wing flexor muscle, or that it functions as a flight pattern regulator (Miller 1971; Olesen & Miller 1979). This explains why free-flying lacewings fold their wings and "nose dive" in response to the cries of hunting bats (Miller & Olesen 1979).

The tympanal swelling conceals a proximal and distal component of chordotonal organs, each composed of three separate cells (Miller 1970). In addition, a distal attachment cell unites with the membrane and an adjacent scolopale cell envelopes the dendrite of a bipolar neuron (Miller op. cit.).

Though a ventral groove is present in Nothochrysinae, the tympanal organ is rudimentary (Séméria 1979, as Dictyochrysinae). The radius does not obscure the course of the media. In contrast, Chrysopinae have a swelling which distorts the media, obscuring it when viewed from above (Adams 1967).

The tympanal organ must have had phylogenetically adaptive significance. Evidently, habitat or behaviour differ between Chrysopinae and other Chrysopidae, constituting the biological basis which makes the tympanal organ a meaningful taxonomic character. As with the wing-coupling apparatus, the tympanal organ has been used to characterise Chrysopidae at the subfamilial level (Tjeder 1966 b; Adams 1967;

Séméria 1979, 1980c).

The two subfamilies of Chrysopidae in the Canadian fauna were differentiated in the following manner:

KEY TO SUBFAMILIES OF CHRYSOPIDAE IN CANADA [1]

1a Jugal lobe of FW large; frenulum on HW; no tympanum in FW; body dark, two gradate series in HW; marginal veinlets of FW simple; venation dark **Nothochrysinae**

1b Jugal lobe and frenulum reduced or absent; tympanum in FW; body green, brown in groups with only one gradate series in HW; most marginal veinlets of FW forked; venation green or brown, only gradates or ends of crossveins dark **Chrysopinae**

[1] FW: fore wing; HW: hind wing

CONSIDERATION OF CANADIAN CHRYSOPID GENERA

To the subfamilies of Chrysopidae in Canada, this study assigned ten genera, adopting an arrangement as follows (see remarks on p. 51):

Chrysopinae	*Meleoma* Fitch 1856
	Eremochrysa Banks 1903
	Chrysopiella Banks 1911
	Chrysopa Leach 1815
	Chrysoperla Steinmann 1964
	Nineta Navás 1912
	Glenochrysa Esben-Petersen 1920
	Oviedus Navás 1913
	Mallada Navás 1925
Nothochrysinae	*Nothochrysa* McLachlan 1868

Recent nothochrysine genera are found in Canada, the United States except Alaska and Hawaii, and México (Adams 1967, as *Nothochrysa* and *Pimachrysa* Adams), in the United Kingdom (Barnard 1978, as *Nothochrysa*), in continental Europe (Adams 1967, as *Hypochrysa* Hagen), including France (Séméria 1979, as *Notochrysa* [*sic*] and *Hypochrysa*) and Moldavia (Dorokhova 1979, as *Hypochrysa*), and in Transcaucasia (Dorokhova

op. cit., as Hypochrysa). Also, other genera occur in South Africa (Tjeder 1966 b), and Australia (Kimmins 1952; Tjeder 1966 b). Of interest, Nothochrysa has a widely disjunct distribution in the Holarctic Region, whereas structural characters between its extant representatives might form the basis for further subdivision (Adams 1967).

Specifically, N. californica is coastal in British Columbia and the United States (Adams 1967). Other Nothochrysa species, in the United Kingdom, do not occur through the north Atlantic in Iceland (Fristrup 1942), or Greenland (Henriksen 1939). They have not been discovered, either, from Atlantic Canada. Similarly, Hypochrysa is absent from Siberia (cf. Adams 1967; Dorokhova 1979), so is doubtful in continental Alaska or the Aleutian Islands.

Hence, the foregoing subfamilial characterisation diagnoses Nothochrysa from other chrysopid genera in Canada, and identifies N. californica. In spite of this convenience, the generic classification which follows includes Nothochrysa, using the shape of the pretarsal claws as a supplementary character.

Although Nothochrysa varies with respect to pretarsal claws (Adams 1967), Nearctic Nothochrysinae have simple pretarsal claws without a basal enlargement (Adams op. cit.). In N. californica, the claws were broad proximally with a smoothly concave ventral edge (Fig. 74 a). The term "entire" describes their shape.

In contrast, pretarsal claws of Canadian chrysopine genera were shallowly or deeply excised. For instance, Eremochrysa had a shallow excision, making the claw appear entire. However, the proximal edge of the claw was convex, not concave as in Nothochrysa (Fig. 74 a, b). A similar shallow excision was apparent in Chrysopiella, as an obtuse angle (Fig. 74 c).

The other chrysopine genera in the Canadian fauna had an excision in the ventral aspect of the claw forming an acute angle (Fig. 74 d-1), making the base of the claw appear swollen. Only Nineta gravida (Banks) (Fig. 74 1) did not have such a deep excision.

Unfortunately, the ecological significance of the cleft is unclear. Nevertheless, it was a reliable

taxonomic character, easily seen under magnification by rotating the specimen in order to get the best view of the legs. This work incorporated the shape of the pretarsal claws in generic classification.

Wing venation provided other taxonomic characters for classifying genera of Chrysopidae. Specifically, the crossveins in the outer half of the wings form gradate series of crossveins (Schneider in Bickley & MacLeod 1956). In the Canadian species, an inner gradate series terminated on the radius or pseudomedia. An outer gradate series was aligned more with the pseudocubitus.

In the world arena, examples are known with three (Kimmins 1952, as Triplochrysa n. gen.; Adams 1978, as Triadochrysa n. subg.), none, or where there is only one series (Tjeder 1966 b).

Reduction or multiplication in the number of gradate series may be more recent, since mesochrysopine fossils from the Jurassic Period of the Mesozoic Era have two regular series (Adams 1967).

Although the ancestral condition, if monophyletic, might never be known adequately, reduction provided an objective taxonomic distinction between genera here.

For instance, Eremochrysa was defined with one gradate series in the hind wing (Banks 1903). By this distinction, the genus appears in the fauna of Central America (Banks 1945), and the Antilles (Alayo 1968). Similarly, Chrysopiella has only the outer series in either wing (Banks 1911). The range of this genus is still being defined (cf. Adams in litt. 1979 [1], 1980 [1], re South America), and its discovery in Canada was announced recently (Adams & Garland 1981). Consequently, the presence of these two genera in the Canadian fauna permitted use of the number of gradate series of crossveins as a diagnostic generic trait. In contrast, Nothochrysa, and the remaining seven chrysopine genera, consistently had two series of gradate crossveins in both wings in their Canadian representatives.

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[1] footnote p.61

Searching for other generic characters, one distinction of Nothochrysa californica was that the ninth abdominal tergum was less extensive dorsally. The ectoprocts were separated by a membranous furrow. This condition occurs only in nothochrysine genera (Tjeder 1966 b, as Dictyochrysinae). In other Nothochrysinae, Apochrysinae, and Chrysopinae, the ninth tergum is fused with ectoprocts on the entire dorsum (Tjeder op. cit., as tergite 9 + ectoprocts).

In chrysopine genera, a dorsal furrow separated the ectoprocts in Glenochrysa and Oviedus, extending caudad to the proctiger. Indeed, the furrow was obvious and not to be mistaken for a shallow dorsal crease noticed in other genera.

The relationship between tergum 9, the ectoprocts, and remnants of the true 11th and 12th segments (Matsuda 1976), resolved into ectoprocts isolated from tergum 9 by a membranous band of tissue, or tergum and ectoprocts fused.

The relationship between tergum 9 and the ectoprocts objectively described both sexes. It was

most useful for females, supplementing characters based on terminalia.

TERMINALIA IN GENERIC CLASSIFICATION

Chrysopid terminalia provide good taxonomic characters for generic classification. When combined with pretarsal, wing, and ectoproct characters already discussed, as well as mandibles, the terminalia facilitated classification of the genera in the Canadian fauna.

In the extensive Nearctic fauna, Bickley and MacLeod (1956) expressed a need to clarify generic relationships, and there has been progress with Meleoma (Adams 1969; Tauber 1969), Mallada (Adams 1975, 1978), and other genera (Adams 1975, 1977, 1979; Tauber 1975).

Meleoma was the first Nearctic genus to be redefined in terms of its genitalia (Adams 1962, 1969), an approach subsequently applied to South Africa (Tjeder 1966 b), and Europe (Hölzel 1970). Unfortunately, the same characters define genera (Adams 1962; Tauber 1969; re Meleoma), and also subgenera (Tjeder 1966 b re

Glenochrysa, Chrysoperla, Mallada as Anisochrysa Nakahara, and Chrysopa sensu stricto, as well as others).

Until there is a better understanding of evolutionary trends and additional characters are found, a period of nomenclatorial instability is to be expected (Adams 1975). Meanwhile, by placing emphasis on fusion of the eighth and ninth abdominal sterna in the male, subgeneric taxa have been elevated to generic rank and further split into subgenera (cf. Tjeder 1966 b; Hölzel 1970), not necessarily reflecting phylogeny in the family.

In like manner, two chrysopine genera are accorded separate tribal status, resulting in three tribes (Hölzel 1970). The procedure was not, unfortunately, carried to a logical conclusion, resulting in two monogeneric tribes and one tribe for all other genera. The latter tribe, Chrysopini, represents a repository, though there is nothing particular to recommend it, so it was omitted here.

More recently, by placing emphasis on larval behaviour and morphology, as well as on the overwintering state, while still considering male

terminalia, a subgenus is accorded generic rank (Sēmēria 1977 a re Chrysoperla). In this particular case, the arguments were compelling, and adopted (Henry 1979).

The trend to create new genus-group taxa continues, other traits being emphasised. For instance, the number of gradate series of crossveins defines a new subgenus (Adams 1978 re Triadochrysa n. subg. of Mallada).

However, emphasis on reproductive structures and abdominal sterna, despite ignoring one sex, implies that venation should be reserved for categories at a different level in the classification. Only more profound knowledge of the chronological order of appearance of a number of traits will improve the foundation for genus-group classification. In the meantime, current arrangements are expedient.

Fortunately, Mesozoic and Tertiary drift of the continental zoogeographic realms is better understood (cf. Dietz & Holden in Wilson 1976; Bambach et

al. 1980; West 1981 re Alaska). Still, clues to better classify Chrysopidae are concealed in the geological record which, though only fragmentarily, demonstrates unequivocally the presence of Neuroptera-Planipennia in Lower Permian deposits of the Paleozoic Era (Carpenter 1976).

MALE STRUCTURES IN GENERIC CLASSIFICATION

Continuing with the male, it is premature (Hölzel 1970) to say, "dass alle Formen mit einfachen Strukturen der männlichen Genitalregion (das betrifft die Mehrzahl der Chrysopiden überhaupt) aus Formen mit kompliziert zusammengesetzten Strukturen abzuleiten sind."

Nothochrysinae have fossil forms which differ but little from Recent species (Hölzel op. cit., as Dictyochrysinae) and, in all probability, this subfamily displays the primitive condition for Chrysopidae, meaning that complexity in Meleoma is secondary (Adams 1969).

Another view is that reduction resulted in Chrysopinae with much simplified male genitalia

(Hölzel 1970). The two viewpoints are really only speculative, though, in the absence of fossil evidence.

Considering male structures, only the gonarcus [1] is in all genera (Tjeder 1966 b; Hölzel 1970). It has been interpreted as a modified tenth "sternite" (Killington 1936, 1937; Carpenter 1940), or as the fused coxopodites of the ninth abdominal segment (Acker 1960, also in Hölzel 1970). Regardless, the gonarcus is in all Neuroptera-Planipennia (Acker 1960; Hölzel 1970), providing a landmark when examining male terminalia but failing as a taxonomic character for generic classification.

The tignum [1], a transverse arch above the gonarcus (Tjeder 1966 b), may be derived from the coxopodites of the tenth abdominal "sternite" (Hölzel 1970). In Meleoma (Adams 1962; Tauber 1969), and chrysopids with carnea-like terminalia (Bram & Bickley 1963), this is called the transverse arch. Actually, that term is older in the literature (Principi in Hwang & Bickley 1961, also in Matsuda 1976), but it causes confusion with the gonarcus which is subrectal, too.

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[1] Diagram 1a, p.59

This study adopted "tignum." In addition, some species had a median caudad acumen (Tjeder op. cit.), projecting just below the anus. As a taxonomic character, the acumen may be useful when diagnosing species, but the tignum was important in generic classification in this analysis.

The gonosaccus [1] is the hind body wall (Tjeder 1966 b). It is an eversible endophallus with the gonopore (Matsuda 1976). Here, it was simple as a caudal sac, or bilobed laterocaudal bulges. Toward its distal end, there often is a field of gonosetae [1] (Tjeder 1966 b), or canaliculate bristles (Philippe 1972), inserted into large, sometimes long sockets. The enlarged sockets and setae may be secretory, acting as scent-glands (Killington 1936; Hwang & Bickley 1961), or producing a pheromone (Philippe 1972). Gonosetae are absent in Oviedus (Tjeder 1966 b). However, they are present in other genera, and differ sufficiently to be useful in generic classification. They were used here.

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[1] Diagram 1a, p.59

In addition to gonosetae, some chrysopids have spinellae on the ventral aspect of the gonosaccus. Spinellae are small tooth-like structures (Tjeder 1966 b), arranged around a central orifice (Adams 1963). The structure is thought to give off a scent (Adams op. cit.). Spinellae occur in Chrysoperla, making them useful to differentiate males of that genus in Canada, but failing as a taxonomic character for the genus as a whole.

However, proximodorsally on the gonosaccus, there is a set of sclerotised elements, most elaborate in Meleoma. One structure, the true mediuncus (Adams 1969), corresponds to the pseudopenis (Tjeder in Hwang & Bickley 1961; Adams 1962; Bram & Bickley 1963; Tjeder 1966 b; Tauber 1969; Philippe 1972; Séméria 1977 a), the mediuncus (Tjeder in Adams 1969; Adams 1967, 1969, 1975, 1977, 1978, 1979; nec Tauber 1969; Adams & Garland 1981), the arcessus (Tjeder 1966 b; Hölzel 1970; Séméria 1977 a), the aedeagus (Killington 1936; Kimmins 1952), and the fused styli on the ninth coxopodites (Acker 1960). In general, it

varies in position relative to the gonarcus. For instance, when hinged to the gonarcus, it has been called a mediuncus [1] in Nothochrysa (Adams 1967), Mallada (Principi 1977, as Chrysopa (Anisochrysa); Adams 1978 as Triadochrysa n. subg.), and Chrysopiella (Adams & Garland 1981). In the latter, it is indistinguishably fused with the gonarcal arch, as also in Eremochrysa (Acker 1960). In Chrysoperla (Tjeder 1966 b; Sēmēria 1977 a), it is known as an arcessus [1]. Conversely, when in the dorsal wall of the gonosaccus, it has been referred to as a pseudopenis [1] (Hwang & Bickley 1961; Bram & Bickley 1963, partim; Tjeder 1966 b). Thus, the terms mediuncus, arcessus, and pseudopenis or aedeagus, refer to different conditions of the same morphological structure (Adams 1969).

This structure may represent the fused styli of the ninth coxopodites (Acker 1960), with the gonarcus as a coxopodal arch.

In addition, Meleoma has a mediuncus-like lobe attached to the posterior margin of the gonarcus

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[1] Diagram 1a, p.59

(Adams 1969), while having the tubular pseudopenis, or true mediuncus, in the dorsal membrane of the gonosaccus. The extra structure is bilobed basally, and may have originated by fusion of the dorsal rami of the entoprocessus [1] (Adams 1969; Tauber 1969, as mediuncus).

These structures, and position of the true mediuncus with respect to the gonarcus, were important taxonomic characters in generic classification here.

However, they do not function as an intromittent organ (Hwang & Bickley 1961; Philippe 1972). Instead, the ductus ejaculatorius opens on the gonosaccus (Tjeder 1966 b) through a barely perceptible ventromedian orifice, the gonopore (Hwang & Bickley 1961). In preparing male terminalia, membranes associated with the internal genitalia extruded through the gonopore, accompanied by a small v-shaped sclerite, the hypandrium internum [1], with a keel-like comes connected to it (Tjeder 1966 b). Normally, the hypandrium internum

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[1] Diagram 1a, p.59

and comes are internal and support the ductus ejaculatorius (Tjeder op. cit.), or provide a site for insertion of retractor muscles associated with the gonosaccus.

A final structure, the gonapsis [1], is associated with the hypovalva. It consists of a central piece and, often, lateral wings (Tjeder 1966 b). The wings vary in shape and, in Meleoma, have denticulate gonocristae (Tauber 1969).

Chrysopa lacks the gonapsis, but has lateral fields of denticulate setae on the hypovalva (Hwang & Bickley 1961; Philippe 1972). A gonapsis is absent in Nothochrysinae (Adams 1967), and in many Chrysopinae (Tjeder 1966 b). It has been called the hypandrium (Killington 1937), median pointed process (Kimmins 1952), processus (Tjeder in Bram & Bickley 1963), as well as gonapsis (Tjeder in Hwang & Bickley 1961; Adams 1962, et seq.; Hölzel 1970; Principi 1977; Séméria 1977 a). Its presence, shape, and dimensions, provided additional characters for generic classification in this analysis of the Canadian fauna.

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[1] Diagram 1a, p.59

FEMALE STRUCTURES IN GENERIC CLASSIFICATION

The female has useful structures, too, though not as many as in the male, including the subgenitale, spermatheca, and praegenitale.

The subgenitale [1] is the female sternum VIII. A sclerotised apical lobe clasps the bases of the gonapophyses laterales (the 9th coxopodites of Matsuda 1976). In some genera, the apical lobe protrudes proximo-ventrally as a transverse callus.

Generally, a cavity is associated with the transverse callus, location of which was useful in generic classification in this study.

The proximal region of the subgenitale is stalked, or broad and partly sclerotised.

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[1] Diagram 1b, p.60

On the basis of the Canadian fauna, the subgenitale provided consistent traits for classification, though their phylogenetic significance was unclear. For example, the proximal part of the subgenitale sometimes has numerous microtrichia (Tjeder 1966 b). Regular-sized macrotrichia were not found. Further, the subgenitale was stalked in Eremochrysa and Chrysopiella, without microtrichia.

The spermatheca [1] is highly sclerotised and darkly tanned (Tjeder 1966 b; Philippe 1972; Matsuda 1976). The bulb, or body, is a coiled spherical chamber, continuous dorsally with the bursa copulatrix. In essence, the entire spermatheca is a tube (Hwang & Bickley 1961), bearing many small cilia-like canaliculi at the proximal end of the duct.

Tjeder (1966 b) and Philippe (1972) traced the ciliated part of the duct. It is continuous with the common oviduct, making it a probable route for sperm transfer. The ciliated canaliculi correspond to the

[1] Diagram 1b, p.60

cuticle-lined ductules of spermathecae in general (Huebner 1980), which are attached to pores in the luminal cuticle and have a cuticular end-apparatus associated with a gland cell.

The spherically coiled bulb of the spermatheca has a conical or irregular ventral impression. The conformation was useful in this generic classification, though the basis for differences is not understood. The ventral invagination, in the case of Nineta (Tjeder 1966 b), is irregular. Other chrysopinae have a conical invagination. Nothochrysa did not have a well-defined impression at all (Fig. 131 b).

Similarly, the dorsal aspect of the bulb is produced as a pair of vela. These were sclerotised and varied in shape, supplementing other aspects of the spermatheca in generic classification here.

Finally, the hind margin of sternum VII is emarginate in two African genera, one being Oviedus, and a praegenitale is situated in the emargination (Tjeder 1966 b). One of the species in this study displayed the

same condition, though the emargination was not as extensive as in the African cases. Its praegenitale, with other traits, caused it to be assigned to Oviedus.

The praegenitale is an unusual structure visibile in the membrane between sternum VII and the subgenitale. It was another, much needed, female character in this generic analysis.

This completes the background necessary to use the generic key which follows, and to understand the tables of male and female structures. Explanatory diagrams of the terminalia conclude this section on the generic and higher classification of Chrysopidae in Canada.

The arrangement adopted (cf. p.41) throughout this thesis took into account both genitalic complexity and zoogeographic distribution, being an original arrangement intended only to provide consistency in the presentation of results from this study and not intended as a comment on phylogeny simply because the subfamilies and genera treated here have many more representatives than occur in the northern half of the Nearctic Region, Canada and Alaska.

KEY TO THE GENERA OF CHRYSOPIDAE OF CANADA

1 a	Pretarsal claws entire, or with shallow obtuse ventral excision	2
1 b	Pretarsal claws with deep acute ventral excision	5
2 a	Jugum and frenulum present; no tympanum; ectoprocts separated from tergum 9 and from each other by membrane	Nothochrysa
2 b	Jugum and frenulum reduced, or absent; tympanum in FW; ectoprocts fused with tergum 9	3
3 a	HW: one series of gradate crossveins	4
3 b	HW: two series of gradate crossveins	5
4 a	FW: two series of gradate crossveins	Eremochrysa

4 b	FW: one series of gradate crossveins	*Chrysopiella*
5 a	Male	6 (Table 1)
5 b	Female	12 (Table 2)
6 a	Sternum IX protruding beyond rest of abdomen, tuft of long setae caudally	*Nineta*
6 b	Sternum IX not protruding, no tuft of setae	7
7 a	Gonosaccus rudimentary; gonosetae sparse, very short, and straight	*Mallada*
7 b	Gonosaccus tongue-like or bilobed	8
8 a	Gonosetae absent	*Oviedus*
8 b	Gonosetae either long and recurved, short and straight, or short and slightly curved	9
9 a	Gonapsis long and narrow	*Glenochrysa*

9 b	Gonapsis absent or, if present, short with lateral processes	10
10 a	Gonosetae large, recurved, with elongate sockets	Chrysopa
10 b	Gonosetae short, straight or weakly curved, sockets small	11
11 a	Gonapsis acuminate caudally, rounded lateral wings with gonocristae	Meleoma
11 b	Gonapsis and gonocristae absent	Chrysoperla
12 a	Dorsal furrow between ectoprocts prominent, narrow anteriorly	13
12 b	Dorsal furrow between ectoprocts reduced to weak anterior crease, or absent	14

13 a	Praegenitale present	*Oviedus*
13 b	Praegenitale absent	*Glenochrysa*
14 a	Subgenitale sclerotised proximally	*Chrysopa*
14 b	Subgenitale membranous proximally	15
15 a	Transverse callus prominent, ectal cavity with orifice directed caudad	*Meleoma*
15 b	Transverse callus prominent or reduced, no ectal cavity	16
16 a	Mandibles weakly sclerotised proximally, subequal tooth symmetric on inner edges; bulb with irregular ventral impression	*Nineta*
16 b	Mandibles strongly sclerotised, tooth asymmetric on left side; bulb with conical ventral impression	17

17 a	Transverse callus reduced or, if prominent, small proximo-ental cavity; vela erect, slightly arched; inner gradates of fore wing terminate on pseudomedius	Chrysoperla
17 b	Transverse callus prominent, proximo-ental cavity; vela erect or extending to edge of bulb; inner gradates of fore wing terminate on radial sector branch	Mallada

These distinctions between vela of Chrysoperla and Mallada in this analysis of the Canadian fauna probably disappear when considering congeneric species from the whole of the Nearctic Region.

Table 1.

Canadian chrysopid genera characterised by male reproductive structures. [a]

Genus	Tignum	Arcessus	Pseudopenis	Gonosetae	Gonapsis
Chrysopa	0	0	1	1	0
Chrysoperla	1	1	0	1	0
Chrysopiella	0	1	0	1	1
Eremochrysa	0	1	0	1	1
Glenochrysa	0	1	0	1	1
Mallada	1	1	0	0/1	1
Meleoma	1	1	1	1	1
Nineta	0	1	0	1	0
Nothochrysa	0	1	0	1	0
Oviedus	0	1	0	0	1

[a] 0: absent; 1: present

Table 2.

Canadian chrysopid genera characterised by female reproductive structures. [a], [b]

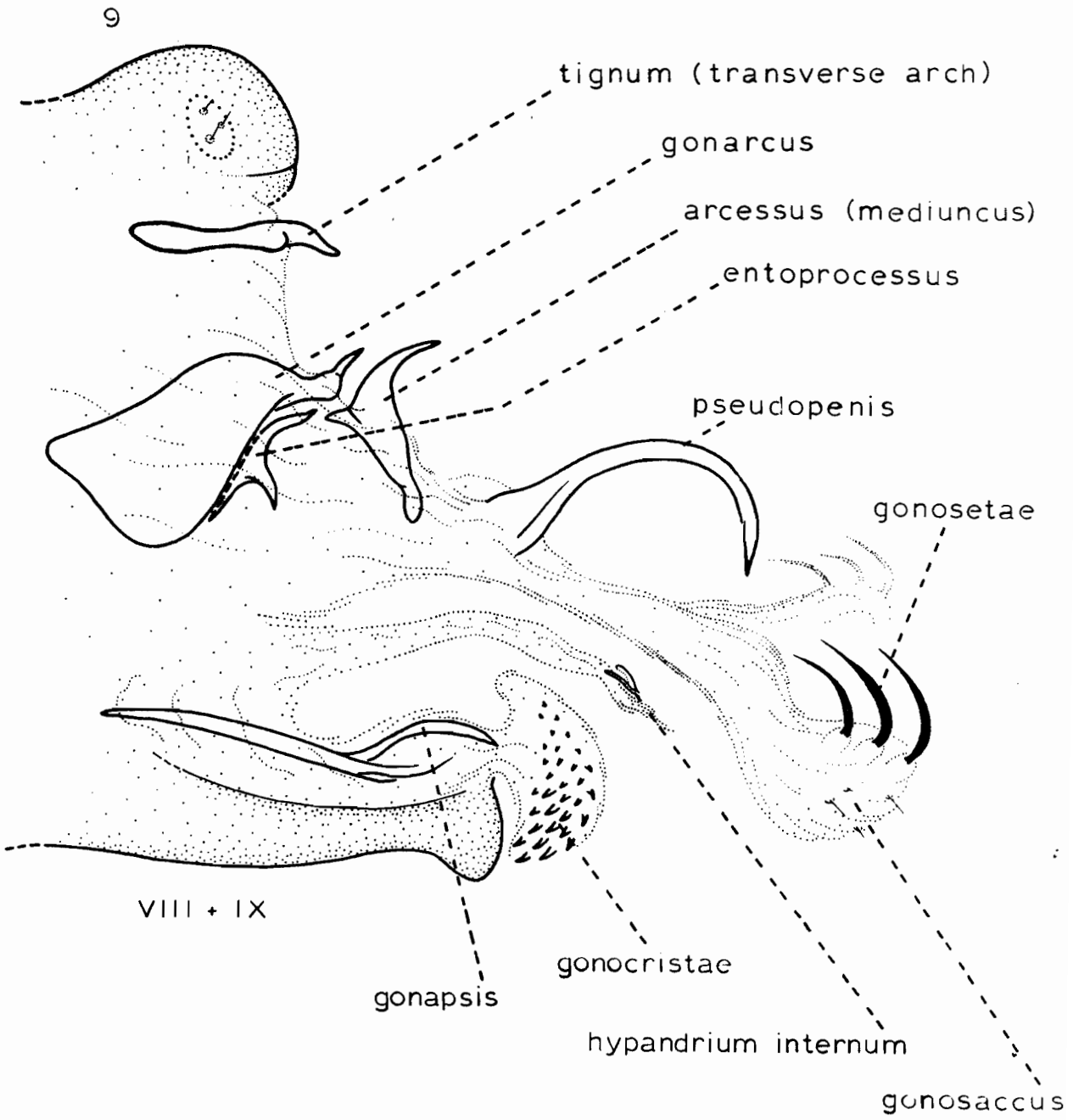
Genus	A	B	C	D	E	F	G
Chrysopa	1	0	0	1	1	0	1
Chrysoperla	1	0	0	1	0	1	0
Chrysopiella	1	0	1	0	0	0	0
Eremochrysa	1	0	1	0	1	0	0
Glenochrysa	1	0	0	1	0	0	1
Mallada	1	0	0	1	0	0	0
Meleoma	1	0	0	1	1	0	0
Nineta	1	0	0	1	0	1	0
Nothochrysa	0	0	0	1	0	0	0
Oviedus	1	1	0	0	0	0	0

[a] 0: absent; 1: present

[b] A: vela; B: praegenitale; C: stalked subgenitale; D: transverse callus; E: ectal cavity; F: ental cavity; G: proximal sclerotised subgenitale.

Diagram 1. Configuration of reproductive structures in hypothetical chrysopid.

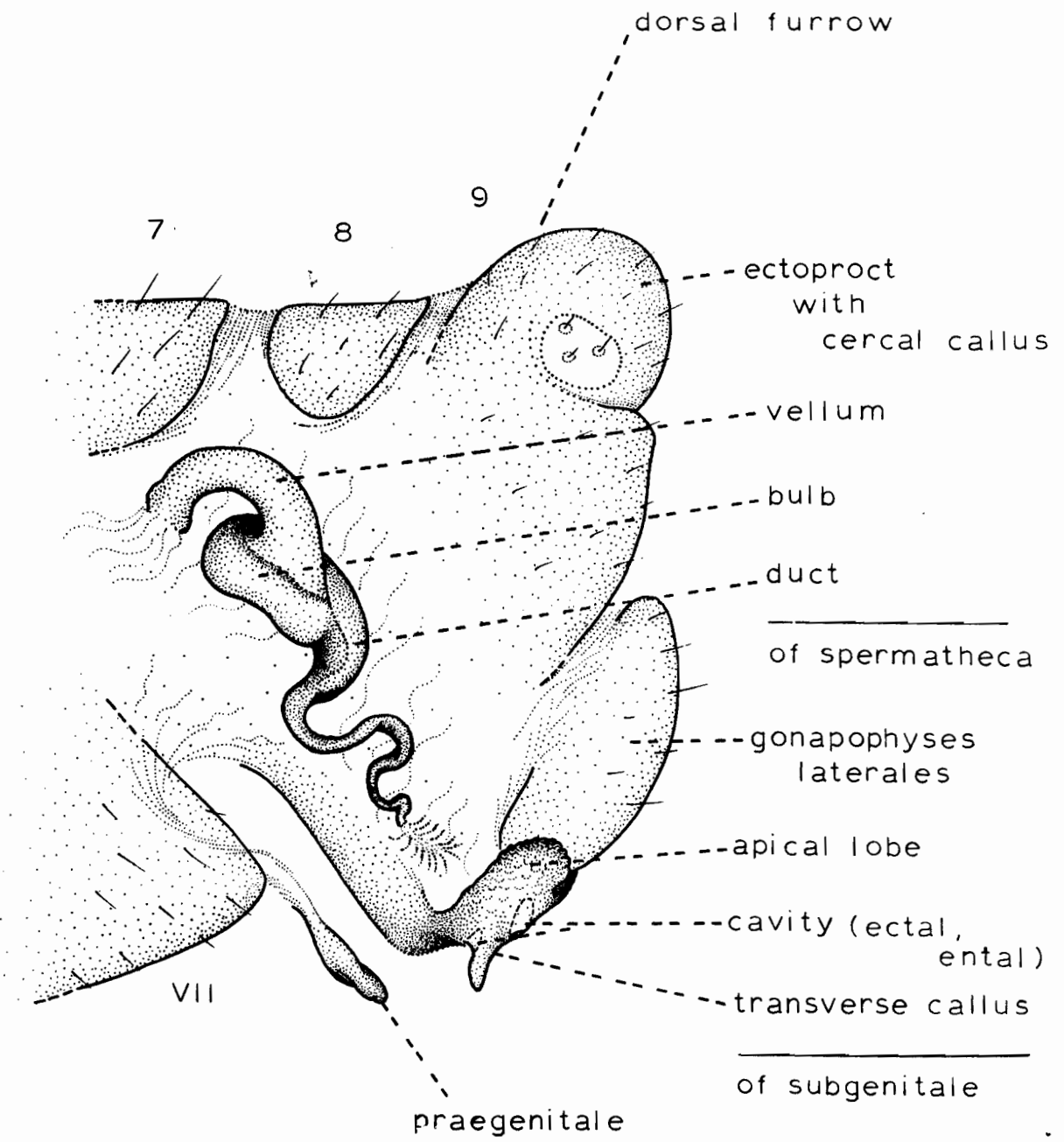
a. male


9
tignum (transverse arch)
gonarcus
arcessus (mediuncus)
entoprocessus
pseudopenis
gonosetae
VIII + IX
gonapsis
gonocristae
hypandrium internum
gonosaccus

a

Diagram 1. (continued)

b. female


dorsal furrow
9
7
8
ectoproct
with
cercal callus
vellum
bulb
duct
of spermatheca
gonapophyses
laterales
apical lobe
cavity (ectal,
ental)
transverse callus
of subgenitale
VII
praegenitale

b

FOOTNOTES TO CHAPTER 2

Adams, P.A., California State University

"I regard Chrysopiella as a derivative of Suarius, "most likely. South American members of the genus "have no tignum, a typical gonarcus with articulated "mediuncus, and usually a bilaterally symmetrical "gonapsis. It is common to see the mediuncus "inflated and bearing microtrichia in the South "American Suarius (but not Yumachrysa, which has had "an oriental origin, and is quite different).

[in litt. 30.X.1979]

"**[re Chrysopiella]** The true gonapsis is the "asymmetrical hook-like structure. There is no "tignum in this genus; the structure you interpreted "as the tignum is simply a flange on the gonarcus. "The mediuncus is the whole large microtrichiated "structure which is articulated to the gonarcus. "Similar inflated mediunci are quite common on "South American species of Suarius.

[in litt. 16.VI.1980]

MATERIALS AND METHODS

SOURCE OF CHRYSOPIDAE FROM CANADIAN LOCALITIES

In addition to private field-work, this study obtained Canadian Chrysopidae deposited over the years into various museums and other institutions. Of sources approached, most institutions were listed in Collections of Canadian Insects and Certain Related Groups 1978, the Entomological Society of Canada supplement to Bulletin 10(1). For this purpose, one letter was used.

To reiterate, completeness of coverage was restricted by availability of specimens through loan, or visitation, all arranged by correspondence. Additional specimens may have existed elsewhere, possibly including rare or occasional species.

In the list which follows, a logo before the co-operating institution identified it in succeeding

sections. Curators who initiated loans have been named, being acknowledged in this way. Institutions which did not have specimens from Canada or Alaska, were omitted.

Finally, the data-base for specimens examined was retained.

APM Ontario Ministry of Natural Resources, Algonquin Provincial Park (Museum), Whitney, Ontario; Mr. R.G. Tozer.

BCPM British Columbia Provincial Museum, Victoria; Mr. R.A. Cannings.

BMNH British Museum (Natural History), London, England; Department of Entomology; Dr. P.C. Barnard.

CARS Agriculture Canada Research Station, Charlottetown, Prince Edward Island; Dr. L.S. Thompson.

CAS California Academy of Sciences, San Francisco, California; Department of Entomology; Dr. P.H. Arnaud, Jr.

CNC Canadian National Collection, Ottawa, Ontario; Biosystematics Research Institute; [visit].

CRFL Environment Canada, Centre de Recherches forestières des Laurentides, Ste-Foy, Québec; M. J.-P. Laplante.

CSQ Gouvernement du Québec, Ministère de l'Energie et des Ressources, Service d'Entomologie et de Pathologie, Complexe scientifique du Québec, Ste-Foy, Québec; M. G. Bonneau.

CU Cornell University, Ithaca, New York; Department of Entomology; Dr. L.L. Pechuman.

GLFRC Environment Canada, Canadian Forestry Service, Great Lakes Forest Research Center, Sault Ste. Marie, Ontario; Dr. P.D. Syme.

IHTN Tree Nursery, PFRA, Canada Regional Economic Expansion, Indian Head, Saskatchewan; Mr. G.B. Neill.

JEC Washington State University, Pullman, Washington; James Entomological Collection, Department of Entomology; Dr. R.S. Zack.

KARS Agriculture Canada Research Station, Kentville Nova Scotia; Dr. A.W. MacPhee.

KSU Kansas State University, Manhattan, Kansas; Department of Entomology; Dr. H.D. Blocker.

LCCU Concordia University, Loyola Campus, Montréal, Québec, Department of Biology; Dr. P.J. Albert.

LEM Lyman Entomological Museum and Research Laboratory, Macdonald College of McGill University; Ste-Anne-de-Bellevue, Québec; [on site].

MCMU McMaster University, Hamilton, Ontario; Department of Biology; Dr. D.M. Davies.

MCZ Harvard University, Museum of Comparative Zoology, Cambridge, Massachusetts; Department of Entomology; Miss S.M. Foster, Miss M. Hathaway, Mr. N.D. Stone.

MFRC Environment Canada, Canadian Forestry Service, Maritimes Forest Research Center, Fredericton, New Brunswick; Mr. F.A. Titus.

MMMN Manitoba Museum of Man and Nature, Winnipeg, Manitoba; Dr. W.B. McKillop.

MU Memorial University of Newfoundland, St. John's, Newfoundland; Department of Biology; Dr. D. Larson.

NDFRC Environment Canada, Canadian Forestry Service, Newfoundland Forest Research Center, St. John's, Newfoundland; Mr. K.E. Pardy.

NFRC Environment Canada, Canadian Forestry Service, Northern Forest Research Center, Edmonton, Alberta; Dr. H.R. Wong.

NSM Nova Scotia Museum, Halifax, Nova Scotia; Mr. B. Wright.

PFRC Environment Canada, Canadian Forestry Service, Pacific Forest Research Center, Victoria, British Columbia; Miss E. Pass.

PIDAA Alberta Agriculture, Plant Industry Division, Plant Industry Laboratory, Edmonton, Alberta; Mr. M.Y. Steiner.

RARS Agriculture Canada Research Station, Regina, Saskatchewan; Dr. M.G. Maw.

ROM Royal Ontario Museum, Toronto, Ontario; Dr. G.B. Wiggins; Mr. B.D. Marshall.

SARS Agriculture Canada Research Station, Saskatoon, Saskatchewan; Dr. L. Burgess.

SDARS Agriculture Canada Research Station, Summerland, British Columbia; [visit] .

SEM University of British Columbia, Vancouver, British Columbia; Spencer Entomological Museum, Department of Zoology; Dr. G.G.E. Scudder, Mr. R.A. Cannings, Mr. S.G. Cannings.

SJARS Agriculture Canada Research Station, St. John's, Newfoundland; Dr. R.F. Morris.

SJRS Agriculture Canada Research Station, Saint-Jean, Québec; Dr. R.O. Paradis.

SMNH Saskatchewan Museum of Natural History, Regina, Saskatchewan; Mr. R.R. Hooper.

UAE University of Alberta, Edmonton, Alberta; Strickland Museum, Department of Entomology; Mr. D. Shpeley[1].

UdeM Université de Montréal, Montréal, Québec; Département des Sciences biologiques, Collection entomologique; Mme. M. Coulloudon.

UG University of Guelph, Guelph, Ontario; Department of Environmental Biology; Dr. D.H. Pengelly.

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[1] An apology is here offered to Mr. D. Shpeley for the misspelling of his name (Can. Ent. 113: 4).

UL — Université Laval, Ste-Foy, Québec; Département de Biologie, Provancher Collection; [visit].

UMAA — University of Michigan, Ann Arbor, Michigan; Museum of Zoology, Division of Insects; Mr. G. Breitenbach.

UMW — University of Manitoba, Winnipeg, Manitoba; Department of Entomology; Dr. T.D. Galloway.

UQC — Université du Québec à Chicoutimi, Chicoutimi, Québec; Département des Sciences pures; Dr. A. Francoeur.

USNM — National Museum of Natural History, Smithsonian Institution, Washington, D.C.; Dr. O.S. Flint, Jr.

USS — University of Saskatchewan, Saskatoon, Saskatchewan; Department of Biology; Dr. D.M. Lehmkuhl.

UWO — University of Western Ontario, London, Ontario; Department of Zoology; Dr. W.W. Judd.

WLNP Canada Indian and Northern Affairs, Waterton Lakes National Park, Waterton Park, Alberta; Mr. S. Lunn.

WLUM Wilfred Laurier University (Museum), Waterloo, Ontario; Dr. W.Y. Watson.

ZMUH Zoological Museum of the University, Division of Entomology; Helsinki, Finland; Dr. A. Jansson.

PREPARING SPECIMENS FOR DRAWING AND SHIPPING

Drawings included views of terminalia, head and other body regions, and wings. In all cases, only the adult was involved, using dried specimens on pins. The operations to prepare figures resolved into preparation, drawing, and storage.

For preparation, specimens were treated with potassium hydroxide (KOH), technical grade. Instead of volumetric solutions of KOH, trial and error led to satisfactory digestion of tissues. Hence, using hot

plate and pyrex dish with water, chips of KOH were added and heat applied. The piece of specimen was dropped into the solution. Heat was applied. Then, the tissue was checked under a binocular microscope to see if further heating was necessary. In this way, structures were prepared without over-digesting, retaining their integrity and tanned appearance.

As a final step, the tissue was rinsed with methanol-water. The concentration of the rinse was near 50%, sufficiently low to prevent hardening during manipulation. A syringe with a 30-gauge needle was used to flush the tissues (Tauber 1969). The force of the fluid often everted genitalia. After rinsing, parts were teased with a pin to bring important structures into view.

This completed the process of preparation. However, where the whole head was being figured, the pinned specimen was positioned under a stereomicroscope at a suitable angle. Wings were placed between two microscope slides. However, in those cases requiring KOH

digestion, the next step was to transfer the structure to a droplet of glycerol-70% methanol on a microscope slide.

To draw the head and thorax, the whole specimen was on its pin in a block of styrofoam at the desired angle, using a Wild stereomicroscope with camera lucida. Balancing the light was critical. Dimensions were obtained with a micrometer (0.1 and 0.01 mm) slide positioned at the same level as the specimen. An image of the scale was reflected in the same way as that of the specimen.

All other drawings were done with a microprojector. The microscope slide was positioned on the stage and, in a darkened room, the projected image could be traced. For dimensions, the slide with the micrometer scale replaced that containing the structure. The microprojector gave the general proportions of structures, but was not very good for fine detail.

Further detail was obtained with a microscope. Inking was done on matte mylar drafting film placed over the sketch, using rapidograph waterproof drawing ink and a pen with replaceable nibs. The finished drawings were pasted onto bristol board with rubber

cement. For best results, the cement was applied to both the bristol board and mylar decal, and allowed to dry before positioning the decal. Excess cement peeled away by rubbing with the fingers. This summarises drawing activities, apart from the hours involved and the strain associated with inking a drawing.

After being drawn, the specimen was transferred to a microvial containing a drop of glycerol-70% methanol. For stainless steel pins, a small glass microvial with a cork stopper sufficed. However, certain pins reacted with glycerol-impregnated cork, corroding and staining labels. To avoid this, a vinyl vial with non-reactive rubber stopper was used (Arthropod Specialties Co., Sacramento, California). The microvial was attached to the specimen's pin. Wings were put on a small square of mylar, using clear nail polish as glue.

Another aspect of storage involved shipping. To ship microvials, three additional pins prevented rotation and ensured that they remain plugged (Dietz 1979).

Without going into greater detail, these comments describe preparatory, drawing, and storage activities, being routine taxonomic methods. Once stored, specimens were returned to their respective institutions.

Although not specifically mentioned in the foregoing, all specimens examined in this study from localities in Canada and Alaska were labelled so that they would be easy for future workers to locate accurately in whichever institution to which they were returned, making it possible for future workers or curators to know with certainty that they have found the specimens actually studied and discussed in this thesis. To the pin of each specimen, or its vial in the case of material stored in fluid, a hand-written label was added, indicating the scientific name of the insect together with the name of its author, the sex of the specimen when it could be ascertained, my own name as determiner, and the year of examination, 1980 or 1981. Further details for all material examined from Canada and Alaska constituted the data-base of this thesis, and that was retained (cf. p. 294).

SUBFAMILY C H R Y S O P I N A E

GENUS MELEOMA FITCH 1856

Meleoma Fitch 1856. First Report Insects New York: 81-82.

INTRODUCTION

The original definition of Meleoma specified antennae widely separate at the base (Fitch 1856). However, by delimiting this genus and others on the basis of male terminalia (Adams 1962, 1969; Tjeder 1966b; Tauber 1969), Meleoma embraces species with antennae having typical insertion. Nevertheless, sexual dimorphism of the frons and antennae is still part of the generic definition, being found in Meleoma signoretti Fitch 1856, type-species by monotypy. In the expanded definition other traits exist, such as a stridulatory structure (Adams 1962) found only in a few species (Tauber 1969), one of which occurs in Canada (Garland 1979).

In his treatment of Meleoma in Canada, Smith (1932) discussed M. emuncta (Fitch), M. signoretti Fitch, and M. verticalis Banks. The last was later synonymised under M. emuncta (Tauber 1969), leaving only two of the earlier taxa on the Canadian list. However, at the same time (Tauber op. cit.), M. dolicharthra (Navás) was added and, more recently, M. schwarzi (Banks) (Garland 1979). Therefore, this study considered four species of Meleoma. Present evidence indicated that M. dolicharthra and M. schwarzi occur only west of the Rocky Mountains in Canada.

KEY TO SPECIES OF MELEOMA IN CANADA

1 a Antennal scapes approximate basally, not longer than broad, lateral margins convex; frons with black transverse band encircling antennae; second and third abdominal sterna with striae laterally; ental aspect of hind femora with row of setal pegs

schwarzi

1 b	Scapes separated by at least one-half their width, longer than broad, lateral margins almost straight; frons unmarked; abdominal sterna and metathoracic femora unmodified	2
2 a	MALE: Interantennal horn present, a second protuberance in frontal cavity; cavities of frons continuous mesally, margin rim-like. FEMALE: Interantennal ridges present, shallow median depression; frontogenal sutures reddish-brown	dolicharthra
2 b	MALE: Interantennal horn present, no second protuberance; frons with shallow emarginate cavity, or deep median cavity flanked by rounded eminences. FEMALE: Interantennal ridges convex anteriorly, no median depression; frontogenal sutures unmarked	3

3 a	Genae and clypeus brownish-black laterally; maxillary palpi black on ectal aspect; gradate crossveins green	emuncta
3 b	Genae and clypeus unmarked; maxillary palpi amber-brown; gradate crossveins in fore wing brown	signoretti

MELEOMA SCHWARZI (BANKS 1903) ADAMS 1962
(Figs. 1, 2, 11, 12, 13; Map 1)

Chrysopa schwarzi Banks 1903. Trans. Am. ent. Soc. 29: 146.
Meleoma schwarzi; Adams 1962. Pan-Pacif. Ent. 38: 178.

TYPE-LOCALITY

Las Vegas Hot Springs, New Mexico, U.S.A.

CANADIAN REFERENCES

Meleoma schwarzi; Garland 1979: 745-746.

DESCRIPTION

HEAD (Fig. 2): scape unmarked, smoothly convex lateral margins, scattered dark setae; pedicel unmarked, dark setae distally; flagellum longer than fore wing; maxillary palpi terminal three divisions dark, basal two paler; labial palpi terminal division darker

than others; mandibles (Fig. 12 a) tooth on both sides, symmetrical; labrum dark laterally; clypeus with dark transverse band, extending laterally to the anterior tentorial pits; frons anterolateral angles pale, dark band encircling antennae; genae dark longitudinal band from eye to base of mandible, continuous with mark on clypeus; vertex dorsolateral bands, less intense than mark on frons, continuous with frontal markings, widest posteriorly.

THORAX: dark dorsolateral bands, weakly continuous, intense in region of axillary cords on alinotum and on pronotum; pleura pale, setae dark, sparse; legs pale, dark setae; hind femora ental row of setal pegs; fore wing longitudinal veins and most crossveins dark (Garland 1979), gradate crossveins dark at setal insertions.

ABDOMEN: dark setae; striae of microtrichia laterally on sterna II and III, in both sexes. Male terminalia (Fig. 1 a): tignum narrow, median acumen; entoprocessus distinct, secondary mediuncus deflected at apex, hood-like; true mediuncus up-curved, acute at apex; gonosaccus straight setae dorsally; gonapsis small, tapering to a caudal point, minute

gonocristae laterally. Female terminalia: subgenitale (Fig. 11 a) ectal ventromedian cavity, and proximoental pit on the transverse callus; spermatheca (Fig. 13 a) long erect vela.

DISCUSSION OF VARIATION

Adults of M. schwarzi vary in markings on the clypeus and around the antennal socket, and in the colour of the pleuron (Tauber 1969). Three males from Penticton, British Columbia, had lateral clypeal marks extending along the frontoclypeal suture, forming a continuous band (Fig. 2 a, c). These specimens also had black encircling the antennal sockets (Fig. 2). In other respects, they resembled more southern specimens (Tauber op. cit.; also a female from Colorado (NSM)).

DISTRIBUTION IN CANADA

Although the range may eventually be extended throughout the south Okanagan and adjacent valleys, M. schwarzi was seen only from one locality (Map 1).

BRITISH COLUMBIA Penticton (Garland 1979; LEM).

EXAMINED FROM CANADA

Three males (Garland 1979).

MELEOMA DOLICHARTHRA (NAVAS 1914) KIMMINS 1940
(Figs. 1, 3, 4, 11, 12, 13; Map 2)

Chrysopa dolicharthra Navás 1914. Ann. Soc. sci. Bruxelles, Mem. 38: 96.
Meleoma dolicharthra; Kimmins 1940. Ann. Mag. nat. Hist. (11) 5: 448-449.

TYPE-LOCALITY

Capetillo, Guatemala

CANADIAN REFERENCES

Meleoma cavifrons; Toschi 1965: 402.

Meleoma dolichartha [sic]; Tauber 1969: 35-37, 72.

Meleoma dolicharthra; Garland 1979: 745.

Meleoma emuncta; Smith 1932: 583 (partim).

DESCRIPTION

HEAD (Figs. 3, 4): scape elongate, bowed outwardly, widely separate at base; pedicel unmarked; flagellum pale, shorter than fore wing; maxillary palpi outer three divisions dark, ultimate division pale apically; labial palpi ultimate division amber-brown, darkest on ectal aspect; mandibles (Fig. 12 b) with an asymmetric tooth on left side; labrum unmarked; clypeus pale medially, dark laterally to anterior tentorial pits; male frons unmarked, modified as a transverse cavity below antennae to frontogenal sutures, a median prong within cavity and a two-pronged interantennal process; female frons shallow median interantennal depression; genae broadly marked, longitudinal dark band extending from eye to mandibles, reaching clypeal markings; vertex unmarked.

THORAX: dorsolateral bands and inconspicuous amber-coloured setae on pronotum, also on alinotum; pleura unmarked, with pale setae; legs unmarked with amber-brown setae; fore wing with pale longitudinal veins and pale gradate crossveins, but with gradates darkened at insertions of setae, remainder of venation amber-brown, setae short and brownish; hind wing similar to fore wing.

ABDOMEN: setae amber-coloured. Male terminalia (Fig. 1 b): tignum reduced, a narrow wishbone-like pair of ribs extending laterally from subrectal sclerite; entoprocessus distinct; secondary mediuncus hood-like, up-turned at apex; true mediuncus up-turned and spatulate, tapering to a point apically; gonosaccus short straight setae dorsally; gonapsis blunt caudally, lateral sclerites bearing minute gonocristae. Female terminalia: subgenitale (Fig. 11 b) ectal ventromedian pouch on transverse callus; spermatheca (Fig. 12 b) small; vela erect.

DISCUSSION OF VARIATION

Adults of M. dolicharthra from western Canada resemble the type of M. cavifrons Banks (Adams in Toschi 1965), now considered a synonym under M. dolicharthra (Tauber 1969). Apparently, the species varies throughout its extensive range, clinal forms existing (Tauber 1969). On the basis of specimens from Penticton and Kaslo, British Columbia, the female in the Canadian part of the species' range has reddish-brown frontogenal sutures, making it different from other populations.

DISTRIBUTION IN CANADA

In addition to southern Vancouver Island, and probably the Gulf Islands generally, M. dolicharthra seemed to occupy the major valley systems in southern British Columbia. To date, however, this species has been seen only from British Columbia, as follows (Map 2):

BRITISH COLUMBIA Galiano Island (SEM). Kaslo (USNM). Langley (SEM). Pavilion Lake (Tauber 1969; CNC). Penticton (LEM). Radium Hot Springs (Tauber 1969; CNC). Seton Lake, Lillooet (Smith 1932, as M. emuncta; Tauber 1969; CNC). Sugar Lake (Tauber 1969; CNC). The University of British Columbia Forest, near Haney (Tauber 1969; CNC). Victoria (Tauber 1969; CNC).

EXAMINED FROM CANADA

Four males, eleven females.

MELEOMA SIGNORETTI FITCH 1856
(Figs. 1, 5, 6, 11, 12, 13, 74; Map 3)

Meleoma signoretti Fitch 1856. First Report Insects New York: 82.

TYPE-LOCALITY

Mount Antonio, Rupert, Vermont, U.S.A.

CANADIAN REFERENCES

Meleoma emuncta; Tauber 1969: 24 (partim).

Meleoma signoretti; Putman 1932: 121; Smith 1932: 584 (partim); Ross & Putman 1934: 37; Putman 1937: 29-37; Spencer 1942: 26 (partim); Bickley & MacLeod 1956: 185; Tauber 1969: 32-35, 71; Throne 1971: 67; Garland 1979: 745.

DESCRIPTION

HEAD (Figs. 5, 6): scape elongate, round apically; pedicel unmarked; flagellum amber-brown proximally, darker in some specimens, amber setae; maxillary palpi unmarked; labial palpi unmarked; mandibles (Fig. 12 c) symmetrical tooth each side; labrum unmarked; male clypeus unmarked, swollen posteriorly at anterior tentorial pits to form dorsolateral eminence bearing tuft of curved setae directed posteriad; female clypeus unmarked, modified into transverse swelling between anterior tentorial pits, orifices of anterior tentorial pits rounded and enlarged; male frons excavated behind anterior tentorial pits and mesad forming continuous transverse cavity anterior to the antennae, interantennal forward-projecting horn with tuft of long setae at apex, additional setae on ental aspect; female frons indented dorsolaterally behind the transverse clypeal swelling, interantennal region swollen slightly, shallow subantennal depressions; genae unmarked; vertex unmarked and unmodified.

THORAX: longitudinal dorsolateral bands on pronotum, weaker on alinotum as dorsolateral spot; setaepale; pleura unmarked, setae pale; fore wing amber-coloured setae, costal and radial crossveins wholly or partly brownish, gradates amber-brown to dark brown, remainder of venation amber-coloured; hind wing brown atends of costal and radial crossveins, remainder of venation amber-coloured; legs unmarked, setae amber; claws excised (Fig. 74 d).

ABDOMEN: setae whitish to amber-coloured. Male terminalia (Fig. 1 c): sterna VIII and IX weakly separated by suture zone; tignum reduced, no acumen; entoprocessus distinct; secondary mediuncus hood-like, abruptly pointed at apex; true mediuncus spatulate, up-curved, pointed apically; gonosaccus straight gono-setae dorsally; gonapsis rounded caudally, lateral gonocristae. Female terminalia: subgenitale (Fig. 11 c) ectal ventro-median pouch, transverse callus reduced; spermatheca (Fig. 13 c) erect vela.

DISCUSSION OF VARIATION

M. signoretti varied in the colour of the flagellum and gradate crossveins in the fore wing. Freshly caught specimens displayed the brown well, but ancient specimens were often faded and without antennae. The brown tint of the gradate crossveins in the fore wing was visualised by altering the position of the specimen while decreasing direct light under the binocular microscope. No noticeable variation was found at opposite ends of the east-west distribution.

DISTRIBUTION IN CANADA

Previous records indicated M. signoretti in British Columbia, Ontario, and Québec (Bickley & MacLeod 1956), later expanded to Nova Scotia (Tauber 1969; Throne 1971), and Manitoba (Tauber 1969). Here, an Alberta record was based on a specimen in the Canadian National Collection.

The presence of M. signoretti in the Manitoba escarpment and, indeed, in the vicinity of Winnipeg, increased the likelihood of its being in northern Minnesota, where it had been recorded from the extreme southwest (Parfin 1952). Other records from the Great Plains were wanting (cf. Tauber 1969), making the present distribution disjunct.

One citation from Oliver, British Columbia (Smith 1932; also cited by Spencer 1942) requires correction. The specimen, in the Canadian National Collection, was identified here as Chrysopa nigricornis. Thus, M. signoretti did not occur in the southern Okanagan Valley, although it has been found near Lumby. Considering other previous records, only the Baddeck, Cape Breton Island (Tauber 1969) specimen was impossible to verify. The present distribution of M. signoretti, therefore, was (Map 3)[1] :

BRITISH COLUMBIA Quesnel (SEM). Trinity Valley [near Lumby] (SEM). The University of British Columbia Forest, near Haney (Tauber 1969; CNC). Vancouver (SEM).

ALBERTA Rocky Mountain House District (CNC).

MANITOBA Brandon (Tauber 1969; CNC). Ninette (Tauber 1969; CNC). Stockton (Tauber 1969; CNC). Winnipeg (CU; LEM).

ONTARIO Algonquin Prov Pk, and Head Lake (APM; ROM). Ausable River, Pinery Prov Pk (ROM). Bala (Tauber 1969; CNC). Belleville (LEM; UG). Big Rideau Lake (UG). Cawaja Beach, Tiny Tp, Simcoe Co (ROM). Chaffeys Locks (ROM). Fraserburg, Muskoka District (ROM). Guelph (UG). Halls Lake [near Haliburton] (UG). Hornings Mills (ROM). Kendal(ROM). Marmora (UG). Meaford (UG). Merivale [near Ottawa] (Tauber 1969; CNC). Monteith (Tauber 1969; CNC). One Sided Lake [Claxton Lake, Rainy River District] (ROM). Ottawa (CNC). Port Credit (ROM). St Davids (Putman 1932, 1937; Smith 1932; UG). Silver Lake, Maberly (LEM). Sudbury (ROM). Toronto (ROM).

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[1] see p. 411 for late additions [QUEBEC]

QUEBEC Belisle Beach, Luskville (CNC). Berthierville (CRFL). Black Lake, Gatineau Prov Pk (LEM). Frelighsburg (UL). Gracefield (Tauber 1969; CNC). Kingsmere, Gatineau Prov Pk (Tauber 1969, as M. emuncta; CNC). Kirks Ferry [near Chelsea] (Tauber 1969, as M. emuncta partim; CNC). Knowlton (Smith 1932; Tauber 1969; CNC). Lac-Mondor, Ste-Flore (Tauber 1969; CNC). Lanoraie (LEM). La Trappe [Oka-sur-la-Lac] (UdeM). Laval (LEM). Montfort (Tauber 1969; CU). Mont-St-Hilaire (LEM). Parc du Mont-Tremblant (UdeM). Ste-Anne-de-Bellevue (LEM). Ste-Clotilde (SJRS). Sherbrooke (Tauber 1969; CRFL; CU). Tadoussac (LEM).

NOVA SCOTIA Acadia Forest Station [near Debert] (CNC). Baddeck (Tauber 1969). Chester (NSM). Kentville (CNC).

BIOLOGICAL NOTES IN CANADA

M. signoretti was a factor in natural control of the Oriental fruit moth, Grapholitha molesta (Busck), in the Niagara Peninsula during the 1930's (Ross & Putman 1934). The lacewing was trapped in molasses baits (Putman 1932). Both eggs and larvae were collected from peach tree foliage and, in insectary studies, development was studied in relation to temperature (Putman 1937). At the same time, the larval instars were described (cf. Putman 1937; Tauber 1969).

EXAMINED FROM CANADA

Thirty-five males, sixty-eight females; total of 103 specimens.

MELEOMA EMUNCTA (FITCH 1856) BANKS 1924
(Figs. 1, 7, 8, 9, 10, 11, 12, 13; Map 4)

Chrysopa emuncta Fitch 1856. First Report Insects New York: 88.
Meleoma emuncta; Banks 1924. Bull. Mus. comp. Zool. 69: 432.

TYPE-LOCALITY

New York State, U.S.A.

CANADIAN REFERENCES

Chrysopa cockerelli; Smith 1932: 597; Spencer 1942: 27; Bickley & MacLeod 1956: 195 (partim); [?] Brown & Clark 1956: 682.

Chrysopa plorabunda; Provancher 1869: 140; 1871 a: 142; 1871 b: 269; 1877 a: 121; 1877 b: 203, 205; Brodie & White 1883.

Meleoma emuncta; Putman 1932: 121, 123; Smith 1932: 583, 599; Putman 1937: 36-37; Spencer 1942: 26; Garlick 1955: 326, 329; Bickley & MacLeod 1956: 185; Tjeder 1960: 148; Grobler 1962: 40; Tauber 1969: 22-27, 69; Throne 1971: 68; Garland 1979: 745.

Meleoma slossonae; Banks 1903: 157-162, pl. II; Fyles 1903: 29.

Meleoma verticalis; Banks 1908: 259-260; Gibson 1910: 127; Smith 1932: 583-584; Spencer 1942: 27; Bickley & MacLeod 1956: 185-186.

DESCRIPTION

HEAD OF MALE (Figs. 7, 9): scape elongate, irregular laterally, black on ental aspect near apex; pedicel brown transverse streak on ental aspect, not in all specimens; flagellum proximal flagellomere elongate and swollen, hair-like setae; maxillary palpi terminal

three divisions dark, paler at joints; labial palpi black on ectal aspect of terminal division; mandibles (Fig. 12 d) asymmetric tooth on left side; labrum pale, unmarked; clypeus dark laterally, markings extend to base of mandible, median tuft of setae; frons transverse narrow cavity, two-pronged interantennal protuberance, median tuft of setae on interantennal horn , setae at apex of lateral prongs; genae longitudinal black band from eye to base of mandible, continuous with clypeal markings, not reaching anterior tentorial pits; vertex unmarked.

HEAD OF FEMALE (Figs. 8, 10): scape straight sided, cylindrical, tapered at apex; basal flagellomere not elongate, swollen, or with long setae as in male; clypeus smoothly convex, marked laterally; frons shallow subantennal depressions, raised interantennal ridge.

THORAX: dorsolateral bands on pronotum and alinotum, corresponding dark marks on cervix; setae whitish; pleura unmarked, setae pale; fore wing costal and radial crossveins dark at ends, gradates and remainder of venation pale or amber, setae amber; hind wing similar, legs unmarked, setae amber-brown.

ABDOMEN: setae whitish. Male terminalia (Fig. 1 d, e): tignum broad, median acumen; entoprocessus distinct; secondary mediuncus hood-like, tapering to point caudally; true mediuncus spatulate, up-curved, taper to point at apex; gonosaccus gonosetae dorsally; gonapsis rounded caudally, lateral gonocristae. Female terminalia: subgenitale (Fig. 11 d) ventromedian pouch, raised transverse callus; spermatheca (Fig. 13 d) erect vela.

DISCUSSION OF VARIATION

M. emuncta has three phenotypic aggregates across the continent (Tauber 1969), two ranging into Canada. In British Columbia on the coast and in the

interior, males had hair-like setae on the basal flagellomere (Fig. 9), a reduced condition more typical of eastern specimens (Fig. 7).

The median region of the interantennal horn was less developed in western specimens, forming the basis for Meleoma comata Banks (1950), now synonymised under M. emuncta (Tauber 1969). In conclusion there are, in Canada, an eastern phenotype and a western one. The eastern phenotype extends to western Manitoba (Tauber op. cit.).

Local population differences existed in the clypeal and genal markings. Also, the mark on the male pedicel was variable. The density of hair-like setae in eastern specimens did not conform to any rule. Western specimens, however, consistently had long dense setae. Some males had a brown streak on the basal flagellomere, in addition to the mark on the pedicel.

DISTRIBUTION IN CANADA

Previous accounts indicated M. emuncta from Newfoundland to British Columbia in seven of the intervening Provinces (Bickley & MacLeod 1956; Tjeder 1960; Tauber 1969; Throne 1971). In addition, there was a record from Saskatoon, Saskatchewan (Smith 1932, as Meleoma species near emuncta). Unfortunately, that specimen was no longer in the Canadian National Collection.

Chrysopa cockerelli from Victoria, British Columbia (Smith 1932, also cited by Spencer 1942, and by Bickley & MacLeod 1956 as British Columbia), was a female M. emuncta. The specimen was available in the Canadian National Collection and had the label attached by Smith, showing his determination and authorship.

One further correction also involved Chrysopa cockerelli. In Smith's (1932) key, it can be confused with females of M. emuncta. A record of C. cockerelli from eastern Canada (Brown & Clark 1956), though voucher specimens were not available, probably represents just such a misidentification.

Finally, a correction affects the many early citations by Provancher (1869 et seq.). The Provancher Collection at Laval University included two females of M. emuncta. Both had Provancher's own hand-written labels, attesting that they were his Chrysopa plorabunda described (1877 a, b) as, "Vert tendre avec une strie dorsale jaune. Tête jaune, avec une ligne noire au-dessous de l'oeil. Palpes noires annelés de blanc. Antennes blanchâtres, jaunâtres à l'extrémité, le second article sans tache. Pattes verdâtres, tarses jaunâtres. Ailes hyalines, arrondies à l'extrémité, surtout les antérieures. - PC. [peu commun]." Provancher noticed that the pedicel was unmarked. However, separation of the antennae at the base escaped him, and the large size of the two specimens was overlooked, M. emuncta being considerably larger than C. plorabunda [Chrsoperla carnea] (Fitch 1856).

Though specific localities for M. emuncta were numerous in Canada, the ones already recorded were substantiated, except St. Marys, British Columbia, and

the uncertain record from Saskatchewan (Smith 1932). Also, there were no specimens from Grimsby, St. Davids, or Vineland, Ontario (Putman 1932), from Kazabazua (Smith 1932) or Montmorency (Fyles 1903), Québec, nor from Economy, Nova Scotia (Tjeder 1960), Corner Brook or Glenwood, Newfoundland (Tjeder op. cit.). Regardless, these localities, except Saskatoon, were within the accepted range of M. emuncta and, in most cases, there were specimens from nearby. The Canadian distribution follows (Map 4)[1] :

BRITISH COLUMBIA Ainsworth (Tauber 1969; USNM). Chilliwack (Tauber 1969; CNC). Cowichan Lake (Spencer 1942; SEM). Departure Bay [Nanaimo] (Smith 1932, also cited as Nanaimo by Spencer 1942; Tauber 1969; CNC; SEM). Galiano Island (SEM). Kaslo (Tauber 1969; USNM). Kootenay Lake (ROM). Langford (Tauber 1969; CNC). Lillooet (Smith 1932, also cited by Spencer 1942; Tauber 1969; CNC). Nanaimo (ROM; UWO). Penticton (Gibson 1910; LEM). Quesnel (SEM). Revelstoke (Tauber 1969; USNM). St Marys [near Kimberley, according to Mr. D.F. Pearson, BC Representative of the Canadian Permanent Committee on Geographical Names in litt. 26.VII.1979] (Smith 1932,

[1] see p. 411 for late additions [QUEBEC]

also cited by Spencer 1942). Terrace, including Lakelse Lake Bog, and Skeena River (Tauber 1969; CNC; ROM). Vancouver (Tauber 1969; CNC; SEM). Vancouver Island (Banks 1908; Tauber 1969; MCZ). Victoria (Smith 1932, as Chrysopa cockerelli; Tauber 1969; CNC).

SASKATCHEWAN [?] Saskatoon (Smith 1932, as Meleoma species near emuncta).

MANITOBA Cedar Lake [near The Pas] (Tauber 1969; MCZ).

ONTARIO Algonquin Prov Pk (APM). Bancroft (ROM). Bass Creek, Lake Nipissing (ROM). Bigwin Island [Lake of Bays] (UWO). Biscotasing (Tauber 1969; CNC). Chaffeys Locks (ROM). Echo Lake, Baysville (ROM). Fraserburg (ROM). Grimsby (Putman 1932). Hamilton (ROM). Hornings Mills (ROM). Iron Bridge (CNC). Joe Lake, Algonquin Prov Pk (Smith 1932, also cited by Spencer 1942; Tauber 1969; CNC). Kap-kig-iwan Prov Pk, Englehart (ROM). Kirkwood Tp [Thessalon area] (Grobler 1962; Tauber 1969, nec British Columbia; CNC). Niagara [Niagara-on-the-Lake] (Putman 1932; UG). Port Credit (ROM). Rossport Prov Pk, Rossport (ROM). Rostrevor [near Port Carling] (Smith 1932; Tauber 1969; CNC). St Davids (Putman 1932). Sault Ste Marie (UG). Smoky Falls, Mattagami River [near Kapuskasing]

(Tauber 1969; CNC; ROM). Sudbury (ROM). Timmins (GLFRC). Vineland (Garlick 1955).

QUEBEC Aylmer, including Queen's Park (Smith 1932; Tauber 1969; CNC). Belisle Beach, Luskville (CNC). Berthierville (CRFL). Brandypot (UL). Canton Rouyn, Rouyn-Noranda (CSQ). Charlevoix Co (LEM). Covey Hill (Smith 1932; Tauber 1969; CNC). Duchesnay, Portneuf (CSQ). Frelighsburg (UL). Hemmingford (Smith 1932; Tauber 1969; CNC). Kazabazua (Smith 1932). Kirks Ferry [near Chelsea] (Tauber 1969, partim; CNC). Knowlton (Smith 1932; Tauber 1969; CNC). Lac Métis [Seigneurie Lac Mitis, Matapedia & Rimouski] (CSQ). Lac-Mondor, Ste-Flore (Tauber 1969, as Knowlton partim; CNC). Lac Serpent, Notre-Dame-du-Laus (LEM). Laniel (Tauber 1969; CNC). Laval (LEM). Le Relais, Laurentides Prov Pk (Tauber 1969; CNC). Lorraine (UdeM). Migantic [Magenta, Rouville] (CSQ). Montfort (Tauber 1969; CU). Montmorency (Fyles 1903). Montréal (UdeM). Parc du Mont Tremblant (UdeM). Québec (Provancher 1871 b, as Chrysopa plorabunda; Banks 1903, also cited by Smith 1932; UL;

USNM). St-Augustin, Portneuf (CRFL). St-Hippolyte, Terrebonne (UdeM). St-Théodore-de-Chertsey (LEM). Ste-Angèle-de-Merici, Rimouski (UdeM). Ste-Foy (CRFL). Shawbridge (LEM). Sherbrooke (Banks 1903, also cited by Smith 1932; CRFL). Tadoussac (LEM).

NEW BRUNSWICK Boom Road, Northumberland (MFRC). Campbellton (NDFRC). Fredericton (Tauber 1969; CNC; ROM). McGraw Brook [near Blissfield](NDFRC). Petitcodiac (Tauber 1969; USNM). Red Bank (Tauber 1969; CNC). St John (UG). St Quentin (NDFRC). Sussex (NDFRC).

PRINCE EDWARD ISLAND [an unspecified locality] (LEM).

NOVA SCOTIA Armdale (NSM). Baddeck (Tauber 1969; MCZ). Chester (NSM). Debert (NDFRC; NSM). Economy (Tjeder 1960). Kentville (Tauber 1969; CNC). Lake Ainslie, Cape Breton Island (NSM). Lawrencetown, Annapolis Co (NDFRC). MacNabs Island, Halifax Co (Tauber 1969; CNC). Malagash Mines (MFRC). North Sydney (NSM). Pictou (ROM). Purcell's Cove (NSM). Truro (NSM). West Dover, Halifax Co (NSM). Wolfville (Tauber 1969; CNC; MCZ).

NEWFOUNDLAND Corner Brook (Tjeder 1960). Eastport (Tauber 1969; USNM). Exploits River [near Bishop's Falls] (USNM). Glenwood (Tjeder 1960). Pynn's Brook [near Corner Brook] (SJARS). Romaine Brook [near Stephenville] (Tauber 1969; USNM). St. George's (Tauber 1969; SJARS; USNM). St John's (NFRC; SJARS). Salton Brook, Terra Nova Nat'l Pk (MU). Shoal Harbour [near Clarenville] (SJARS).

BIOLOGICAL NOTES IN CANADA

Like M. signoretti, adults of M. emuncta have been taken at bait (Garlick 1955), as well as at light. Similarly, field studies showed that larvae of M. emuncta were an important predator on eggs of the woolly pine-needle aphid, Schizolachnus pini-radiatae (Davidson), in pine plantations in Kirkwood Township, Ontario (Grobler 1962). Again, in eastern Canada, M. emuncta was a probable predator of the balsam woolly aphid, Adelges piceae (Ratz.), on infested balsam fir, though feeding was not actually observed (Brown & Clark 1956, as Chrysopa cockerelli).

Immatures of M. emuncta were studied and described from the Niagara Peninsula (Putman 1937). The third instar larva had a frontal spot, distinguishing it from M. signoretti . Unfortunately, this spot is not constant in M. emuncta (Toschi 1965, as Meleoma comata). Moreover, the third instar M. dolicharthra has a similar spot, decreasing its value in diagnostic determination.

EXAMINED FROM CANADA

Seventy males, two hundred and ninteen females, one indeterminate; total of 290 specimens.

GENUS EREMOCHRYSA BANKS 1903

Eremochrysa Banks 1903. Trans. Am. ent. Soc. 29: 158.

INTRODUCTION

As mentioned previously, the genus Eremochrysa was designated (Banks 1903) by possession of only the outer series of gradate crossveins in the hind wing (Fig. 14 b, d), there being two series in the fore wing (Fig. 14 a, c). Also, the pretarsal claws were simple (Figs. 15, 74). Surprisingly, the genus had not yet been redefined in terms of the male genitalia, and female terminalia were only recently described (Adams & Garland 1981). For this reason, this study provided considerably greater figurative detail for the Canadian representatives which, incidentally, included the type-species, Chrysopa punctinervis McLachlan.

Taking into account all species in North America (Banks 1950), the genus is best developed in the southwest. However, a new species was recently described from the Greater Antilles (Alayo 1968), as pointed out earlier and the situation in Central and South America remains essentially unknown (Banks 1945). Canada had three species:

E. canadensis (Banks), from southern Ontario, and E. fraterna (Banks) and E. punctinervis (McLachlan) from southern British Columbia. This study considered these, adding further distribution data but not changing nomenclature.

KEY TO SPECIES OF EREMOCHRYSA IN CANADA

1 a	Scape brown over entire ectal aspect; clypeus and frons with long dense setae	canadensis
1 b	Scape with longitudinal brown stripe on lateral aspect; setae on clypeus and frons sparse and short	2
2 a	Wings with longitudinal veins pale, brown only where setae originate	punctinervis
2 b	Wings with longitudinal veins uniformly brown-coloured	fraterna

EREMOCHRYSA CANADENSIS (BANKS 1911) BANKS 1950
(Figs. 15, 16, 17, 18, 19, 20, 21, 22, 35, 74; Map 5)

Chrysopa canadensis Banks 1911. Trans. Am. ent. Soc. 37: 339-340.
Eremochrysa canadensis; Banks 1950. Psyche, Cambridge 57: 64, 66.

TYPE-LOCALITY

Go Home Bay, Lake Huron, Ontario, Canada.

CANADIAN REFERENCES

Chrysopa canadensis; Banks 1911: 339-340; Gibson 1912: 110; Smith 1932: 591.

Eremochrysa canadensis; Banks 1950: 64-66; Bickley & MacLeod 1956: 200; Throne 1971: 76.

DESCRIPTION

HEAD (Figs. 16, 17): scape broadly marked on ectal aspect with brown; pedicel brownish-black ring; flagellum brown, setae dark; maxillary palpi distal three divisions black, paler apically, dark brown on ectal aspect of basal two divisions; labial palpi black on distal two divisions; mandibles (Fig. 35 a, b) asymmetric tooth on left side, similar to E. yosemite Banks (Fig. 35 c); labrum unmarked; clypeus dark posterolaterally, long dense setae amber-brown; frons interantennal mark broadest anterior to antennae; genae broad dark longitudinal band from eye to base of mandible, continuous with clypeal mark; vertex median expansion of interantennal mark, not extending to margin of eyes, setae dark.

THORAX: pronotum dark on anterolateral angles, whitish setae; dark markings reduced on alinotum; pleura whitish setae, irregular dark blotches; fore wing costal crossveins totally darkened, other veins margined; hind wing dark at ends of crossveins, some radial crossveins margined; legs brown, darker setae.

ABDOMEN: brown setae. Male (Figs. 18, 19, 20): one population of setae; sterna VIII and IX weakly defined zone lacking setae; caudal process of sternum IX with setae normal, directed caudad; mediuncus hinged to gonarcus, tapering caudally; gonosaccus small gonosetae; gonapsis asymmetric, seven tynes. Female (Figs. 21, 22): subgenitale stalked, shallow ectal cavity on apical lobe, no transverse callus, spermatheca erect vela, duct wart-like eruptions on surface.

DISCUSSION OF VARIATION

Differences between E. yosemite and E. canadensis seemed to be a matter of degree, so much so that the unique specimen from Penticton, British Columbia, was assigned to E. canadensis. For comparison, eastern E. canadensis, of which there were very few specimens available [females: type (MCZ), one each from Knowlton, Québec (CNC), and Lexington, Massachusetts (USNM); one male from Weirs Beach, New Hampshire (LEM)], had markings blacker and facial setae less robust. The only male of eastern E. canadensis was damaged, making

comparison of the gonapsis difficult (Figs. 20 a and b). On the other hand, the Penticton specimen had browner markings on the palpi, and elsewhere, and the clypeal setae were denser and uniformly stouter than in eastern specimens. Also, the lateral margins of the pronotum in the Penticton specimen were pale, making it resemble E. yosemite.

Other workers hinted that E. canadensis might be a northern expression of E. hageni Banks, which occurs in the southeast (Bickley & MacLeod 1956). If this were the case, E. hageni would be the senior synonym. Resolution of this was beyond the scope of this study. Instead, there was a similarity between E. canadensis and E. yosemite, the latter being southwestern as the name suggests. The Penticton specimen was intermediate in many respects. These three taxa might be further investigated when more specimens become available.

DISTRIBUTION IN CANADA

All references to E. canadensis reiterated the type-locality in Ontario, without adding further distribution data. Specimens in the Canadian National Collection added Québec to the Canadian range. At the same time, a wing formed the basis for a further record in Ontario. Finally, the unique specimen from British Columbia encouraged the hope that E. canadensis will be found more widely distributed than at present. Specific localities were (Map 5):

BRITISH COLUMBIA Penticton (LEM).

ONTARIO Go Home Bay, Lake Huron (Banks 1911, 1950, also cited by Gibson 1912, by Smith 1932, by Bickley & MacLeod 1956, and by Throne 1971). Magnetawan, Parry Sound District (UMAA).

QUEBEC Knowlton (CNC).

EXAMINED FROM CANADA

One male, two females, one fore wing.

EREMOCHRYSA FRATERNA (BANKS 1897) BANKS 1903
(Figs. 14, 23, 24, 25, 26, 27, 28, 35; Map 6)

Chrysopa fraterna Banks 1897. Proc. ent. Soc. Wash. 4: 174-175.
Eremochrysa fraterna; Banks 1903. Trans. Am. ent. Soc. 29: 159.

TYPE-LOCALITY

Fort Collins, Colorado, U.S.A.

CANADIAN REFERENCES

Eremochrysa fraterna; Smith 1932: 582; Spencer 1942: 26.

DESCRIPTION

HEAD (Figs. 23, 27): scape longitudinal dark bands medially and laterally; pedicel dark ring, incomplete laterally; flagellum pale, darker at extremity; maxillary palpi all divisions dark, paler at joints; labial palpi all divisions dark; mandibles (Fig. 35 d) asymmetric tooth on left side; labrum dark proximally; clypeus dark laterally, median spot, many small scattered setae; frons slightly swollen, dark

shading below antennal sockets, dark interantennal mark widest just below antennae; genae longitudinal dark streak from eye to base of mandible, continuous with clypeal markings; vertex longitudinal streaks, continuous with interantennal mark medially, widest posteriorly, lateral dark marks border posterior margins of eyes.

THORAX: pronotum dark marginal markings, dark pattern dorsally, numerous short black setae, scattered longer white setae laterally; alinotum dorsolateral marks continuous from pronotum, short black setae; pleura mottled, whitish setae; fore wing some crossveins faintly margined, venation dark brown, setae amber-brown; hind wing similar; legs pale, setae amber-brown, metathoracic femora dark apical mark.

ABDOMEN of MALE (Figs. 24, 25, 26): two populations of setae; sternum IX with large recurved setae on caudal process; mediuncus deflected at apex; gonosaccus four large tuberculate setae, smaller setae

caudally; gonapsis asymmetric, terminating as a single point; FEMALE single population of setae; terminalia (Fig. 28) stalked subgenitale, shallow cavity ectally on apical lobe, no transverse callus; spermatheca short erect vela, spiculate projections on surface of duct.

DISCUSSION OF VARIATION

In E. fraterna, the male genitalia were variable with respect to tuberculate setae on the gonosaccus. One specimen had only three (Fig. 25 a). Another had several small supernumerary setae (Fig. 26 d). Hence, these setae were not consistent for specific diagnosis. However, one distinctive character of E. fraterna is the distal mark on the metathoracic femur (Banks 1898). This study confirmed its presence, but it was variable, being best developed in females. Turning to the head, marks on the vertex and below the antennal sockets were transient after treatment with KOH. A weak ectal scape spot in some females was similarly affected. These marks on the vertex, frons, and scape, varied between specimens and, because of

this, some specimens of E. fraterna closely resembled E. punctinervis, especially males. In fact, the distinction between these species is based on spotting on the longitudinal veins (Banks 1903). The spotting, associated with the bases of setae on the wing veins, was variable. No doubt this was affected by climatic factors. Regardless, this study found certain specimens very difficult to determine at the specific level without proceeding to genitalic analysis.

Fortunately, E. fraterna males were distinct from E. punctinervis males, the mediuncus being deflected in the former but tapering smoothly to a point in the latter. The number of tuberculate setae did not provide supporting evidence, and the gonapsis appeared the same in both species. Females differed in the superficial concretions on the spermathecal duct, though the reason for this was unclear and may not be significant in a larger sample.

E. fraterna and E. punctinervis should be studied more closely, from the point of biology as well

as taxonomy, to satisfy the possibility that they might be only one species, in which case the deflected mediuncus would be viewed as an abnormality of wide occurrence. In the meantime, the specimens here were one or the other species. Males were verified by examining the shape of the mediuncus. In females, the distinction was less objective, using surface characteristics of the spermathecal duct. However, the interantennal mark in E. fraterna was uniform, not divided medially.

DISTRIBUTION IN CANADA

Smith (1932) recorded E. fraterna in Canada. The specimens in the Canadian National Collection, from Seton Lake, near Lillooet in British Columbia, were available. In addition, there were other specimens from the south Okanagan. Specific localities included (Map 6):

BRITISH COLUMBIA McIntyre Creek, Oliver (CNC). Oliver (CNC). Penticton (LEM). Seton Lake, Lillooet (Smith 1932, also cited by Spencer 1942; CNC). Vaseux Lake, near Oliver (CNC).

EXAMINED FROM CANADA

Five males, seven females.

EREMOCHRYSA PUNCTINERVIS (McLACHLAN 1869) BANKS 1903
(Figs. 15, 29, 30, 31, 32, 33, 34, 35; Map 7)

Chrysopa punctinervis McLachlan 1869. Entomologist's mon. Mag. 6: 24.
Eremochrysa punctinervis; Banks 1903. Trans. Am. ent. Soc. 29: 159.

TYPE-LOCALITY

Bosque County, Texas, U.S.A.

CANADIAN REFERENCES

Eremochrysa punctinervis; Smith 1932: 583; Spencer 1942: 26.

DESCRIPTION

HEAD (Figs. 29, 33): scape longitudinal stripes, one lateral, one medial, a less complete one on ectal aspect; pedicel dark ring, less distinct laterally; flagellum pale, darker toward extremity; maxillary palpi distal three divisions dark, paler at joints and apex, basal two divisions brown on ectal aspect; labial palpi distal two divisions dark, paler at joints and apex, basal division brownish; mandibles (Fig. 35 e) asymmetric tooth on left side; labrum dark proximally; clypeus dark laterally, median spot, slightly swollen, many scattered setae; frons superficial brownish markings below antennal sockets, interantennal mark divided in both sexes, especially females; genae narrow longitudinal band from eye to base of mandible, continuous with lateral clypeal marks; vertex dorsolateral streaks continuous with interantennal markings, marks bordering posterior margin of eyes.

THORAX: pronotum small black setae, longer whitish setae laterally; alinotum dorsolateral bands continuous with pattern on pronotum, setae dark; pleura mottled, setae whitish; fore wing veins dark at insertions of setae; hind wing similar; legs pale, dark mark broadest on metathoracic femora, setae amber-brown.

ABDOMEN in MALE (Figs. 30 a, 31, 32): two populations of setae, sternum IX stout recurved setae on caudal process; sterna VIII and IX separated by non-setate zone; gonosaccus four long tuberculate setae dorsally; mediuncus tapering to a point; gonapsis asymmetric, terminating as a point. FEMALE (Figs. 30 b, 34): single population of setae; subgenitale stalked, shallow cavity on ectal aspect of apical lobe, no transverse callus; spermatheca duct spiculate surface, vela erect.

DISCUSSION OF VARIATION

The interantennal mark in E. punctinervis was separated medially in specimens from Texas, California, and Wyoming, as well as from British Columbia. Females displayed the lines better than males. This character separated E. punctinervis from E. fraterna though it, together with spotting of the wing veins and the metathoracic femoral spot, may vary due to climatic conditions.

Spotting of the wing veins was variable, being mainly on the radial sectors and at the bases of longitudinal veins. It was subjective, and some specimens from British Columbia had dark venation but a limited degree of spotting, too.

Consequently, this study resorted to the male mediuncus. In E. punctinervis the mediuncus was straight at its apex, not deflected. A number of

specimens, including some from Wyoming and California (Fig. 32 c, d), demonstrated that the mediuncus varied in breadth, but the apex was smoothly tapered.

Having established this relationship, the interantennal marks were re-examined and supported the way the specimens had been segregated. In spite of these remarks, variability was great and suggested that E. fraterna and E. punctinervis may be phenotypes of a single taxonomic entity. This study could not resolve this problem and, consequently, the present nomenclature was retained.

DISTRIBUTION IN CANADA

E. punctinervis was reported from the south Okanagan (Smith 1932). Here, further records extended the range northwards. Specific localities were (Map 7):

BRITISH COLUMBIA Oliver (Smith 1932, also cited by Spencer 1942; CNC). Penticton (LEM). Seton Lake, Lillooet (CNC). South Okanagan [unspecified] (CNC).

EXAMINED FROM CANADA

Three males, thirty-one females.

GENUS CHRYSOPIELLA BANKS 1911

Chrysopiella Banks 1911. Trans. Am. ent. Soc. 37: 344.

INTRODUCTION

This genus is distinguished from other Nearctic chrysopids (Banks 1911) by the absence of the inner series of gradate crossveins in both wings (Fig. 36). It, too, had simple pretarsal claws (Figs. 37, 74). Indeed, there is structural similarity with Eremochrysa (Adams & Garland 1981).

The type-species of Chrysopiella, Chrysopa sabulosa Banks, did not extend into Canada, although a specimen was seen from southern Montana courtesy of Miss S. Rose, Montana State University. Instead, three hitherto described species occur more southerly in the western United States and México (Bickley & MacLeod 1956), and other, as yet undescribed, species include South America [Adams in litt. 12.VIII.1980, "Chrysopiella in South America has a symmetrical

gonapsis, but the external genitalia are asymmetrical in some species. The genus is not confined to North America."].

Despite the need for revision of this genus, one new species was described separately in conjunction with this study (Adams & Garland 1981). Among other named paratypes, an unique specimen from Drumheller, Alberta, provided the first record of Chrysopiella from Canada.

CHRYSOPIELLA BREVISETOSA ADAMS & GARLAND 1981
(Figs. 36, 37, 38, 39, 40, 41, 74; Map 8)

Chrysopiella brevisetosa Adams & Garland 1981. Can. Ent. 113: 1-4.

TYPE-LOCALITY

Uintah County, Utah, U.S.A.

CANADIAN REFERENCES

Chrysopiella brevisetosa Adams & Garland 1981: 1-4.

DESCRIPTION

HEAD (Fig. 38): scape lateral black stripe, middorsal brown spot confluent with medial reddish area; pedicel black-ringed; flagellum pale, setae dark; maxillary palpi divisions blackish, stipes dark laterally; labial palpi divisions black; mandibles (Fig. 41) well-developed tooth, symmetrical; labrum median notch on anterior margin, wide and elongate, unmarked, scattered setae; clypeus dark laterally; frons dark lunule below antennal sockets, median interantennal streak; genae black longitudinal band from near margin of eye to base of mandible, continuous to anterior tentorial pits; vertex faint dorsolateral streaks, black rim above antennal sockets.

THORAX: bright green, faint brown markings over and at ends of pronotal furrow, triangular dark marks posterolaterally on scuta. MALE: pronotum two populations of setae consisting of a dense covering of short, vaned microsetae mixed with sparse normal setae; similar mixed setal patches on nota and pleura of

pterothorax; fore wing erect black setae, venation pale green, dark at bases of setae, inner gradate series absent; pterostigma yellow-green; hind wing similar; legs pale, black setae, claws simple (Figs. 37, 74); FEMALE: similar to male, but setae normal.

ABDOMEN: green, females with tiny reddish marks at setal bases; setae black, normal in female, two populations in male with short vaned microsetae on sterna and terga and gradual transition to normal setae on ectoprocts and sternum IX (Fig. 39 a). Male terminalia: weak suture separating sterna VIII and IX (Fig. 39 a); conical setose processes from apex of sternum IX (Fig. 39 b), bearing stout setae directed laterad; gonarcus expanded, medially notched (Fig. 39 c); mediuncus inflated proximally, broadly attached to gonarcus, surface microtrichiate, produced caudad as slender beak; gonosaccus straight tuberculate gonosetae; gonapsis (Fig. 39 b) asymmetrical hook on right side, narrow base, tapering to point; two weak sclerites posterior to gonapsis, duct from small circular sac opening between them (Fig. 39 b). Female terminalia (Fig. 40): subgenitale stalked, base weakly sclerotised,

apical lobe with concave margin, no cavity, no transverse callus; spermatheca vela erect; duct spiculate; bursa copulatrix small.

DISCUSSION OF VARIATION

The face of the Drumheller specimen was shorter than usual for the new species (Figs. 38 a, f), but this did not mean taxonomic separation. The black markings on the clypeus varied, too.

DISTRIBUTION IN CANADA

The new species was represented in Canada by the unique Drumheller specimen. Additional collecting would probably reveal it east of the Rocky Mountains in southern Alberta and Montana, since it occurs in basins and plateaus in Idaho, Nevada, Oregon, Utah, and Wyoming (Adams & Garland 1981). The specific locality was (Map 8):

ALBERTA Drumheller (Adams & Garland 1981; UAE).

EXAMINED FROM CANADA

One male (paratype in Adams & Garland 1981).

GENUS CHRYSOPA LEACH 1815

Chrysopa Leach 1815. *in* Edinburgh Encyclopaedia conducted by D. Brewster 9(1): 138.

INTRODUCTION

On the basis of the male genitalia of the type-species, C. perla (L.) (sensu Schneider in Tjeder 1952), seven species in the Canadian fauna were in this genus. Tjeder (1966 b) drew attention to C. chi, C. nigricornis, and C. oculata. He delimited Chrysopa sensu stricto in terms of the male genitalia, and these three Nearctic species were known to him. Previously, Bram and Bickley (1963) had shown that C. quadripunctata belonged to the same species-group.

In order to appreciate the restricted generic traits which Tjeder outlined, this study received a male Chrysopa perla from Dr. P.C. Barnard, British Museum (Natural History). At the same time, he commented on the name Chrysopa chrysops (L.), saying (Barnard in litt. 2.V.1980), "The names perla and chrysops seem to be used as if interchangeable by several authors, but they

do refer to the same species. Although the specimens of '*chrysops*' in the Linnean collection in London are not the correct species [*cf.* Killington 1936: 220], Tjeder has found that the ones in the De Geer collection *are* correct, and these probably form the type series (1952. *Ent. Tidskr.* *73*: 203-206). However, no lectotypes have been designated, and the problem will not be resolved until someone applies the first reviser principle and synonymizes *chrysops* with *perla*, the latter name being more commonly used." The type-species can be discussed as *Hemerobius chrysops* L. *sensu* Tjeder 1952, or *Chrysopa perla* (L.) *sensu* Schneider 1851, the latter being in accord with popular usage.

This study treated Tjeder's (1966 b) subgenera as full genera to give equal weight to genitalic characters used in other contexts (Adams 1962). By so doing, species were admitted to *Chrysopa* provided

1) the mandibles were asymmetric, the left one with a tooth (Fig. 73 h);

2) the pretarsal claws were excised (Fig. 74 f);

3) the wings had two series of gradate crossveins (Fig. 76 a, b), and the intramedian cell of the fore wing was triangular (Fig. 76 c);

4) the male terminalia had a pair of entoprocessus associated with the gonarcus, a mediuncus in the dorsal membrane of the gonosaccus, caudolateral fields of long recurved tuberculate gonosetae on the bilobed gonosaccus, and ventrolateral imbricated dentate gonocristae on the hypovalva, but no tignum or gonapsis (Fig. 78).

Other characters distinguishing C. perla may be specific, including a black pattern on the head (Fig. 75), thorax and abdomen (Figs. 75 b, 77), microtholi in the male on all sterna except VIII+IX (Fig. 78 a), microsetae on the proximoental aspect of the mediuncus (Fig. 78 d, e), and small dorsolateral protuberances on the gonarcus (Fig. 78 g).

In the Canadian fauna, seven species satisfied these criteria: C. nigricornis, C. quadripunctata, C. coloradensis, C. excepta, C. oculata, C. pleuralis, and C. chi.

KEY TO SPECIES OF CHRYSOPA IN CANADA

1 a	Frons unmarked, or with orange interantennal spot; clypeus without prominent setae	2
1 b	Frons black, or black around margin of antennal sockets; clypeus with prominent setae on anterior margin	3
2 a	Dorsolateral orange spots on head, thorax, and abdomen; gradate crossveins of fore wing black; pedicel unmarked	quadripunctata

2 b	No dorsolateral orange spots; gradates dark in middle or at ends, not black throughout; pedicel ringed reddish-brown	*nigricornis*
3 a	Frontal mark on lateral margin of antennal sockets, weak or absent medially	4
3 b	Frontal mark broadly surrounding antennae, or confined to interantennal region	5
4 a	Scape with longitudinal black band laterally; gradates of fore wing green, or with isolated patches of dark green; pronotum green, no bands	*excepta*
4 b	Scape unmarked; gradates of fore wing black; pronotum with dark lateral bands	*coloradensis*

5 a	Frons with Y- or X- shaped interantennal mark, may be continuous with subantennal lunules	*chi*
5 b	Frons black, around antennae and anteriorly	6
6 a	Vertex with posterior transverse band, dorsolateral streaks or spots, and a lateral band bordering eye and extending onto postgenae; pleura outlined on sutures	*pleuralis*
6 b	Vertex lacking transverse and lateral bands, but with dorsolateral streaks or spots, which may be much reduced; pleura unmarked	*oculata*

CHRYSOPA NIGRICORNIS BURMEISTER 1839
(Figs. 42, 43, 44, 45, 46, 47, 73, 74; Map 9)

Chrysopa nigricornis Burmeister 1839. Handb. Ent. 2: 980.

Chrysopa crotchi Banks 1938. Psyche, Camb. 45: 76. SYN. NOV.

TYPE-LOCALITY

North America

CANADIAN REFERENCES

Chrysopa columbiana; Smith 1932: 585; Spencer 1942: 27; Bickley & MacLeod 1956: 190 (partim).

Chrysopa crotchi Banks 1938 a: 76; Spencer 1942: 27; Bickley & MacLeod 1956: 197.

Chrysopa majuscula; Gibson 1912: 110; 1914: 127; Smith 1932: 597; Spencer 1942: 27; Bickley & MacLeod 1956: 195.

Chrysopa nigricornis; Provancher 1877 a: 120-121; 1877 b: 203, 205; Banks 1903: 149-150; Gibson 1912: 110; 1915: 149; Smith 1932: 584; Putman 1932 b: 121-126; 1937: 29-37; Spencer 1942: 27; Garlick 1955: 282, 326-327, 329; Bickley & MacLeod 1956: 190; Bram & Bickley 1963: 9-10; Throne 1971: 69.

Meleoma signoretti; Smith 1932: 584 (partim); Spencer 1942: 26 (partim).

DESCRIPTION

HEAD (Figs. 42, 43, 44): scape unmarked; pedicel ringed blackish-brown on apical half, paler in some specimens; flagellum blackish-brown proximally, tan-brown or pale in some specimens; maxillary palpi amber-brown apically; labial palpi amber; mandibles

(Fig. 73 a) an asymmetric tooth on left side; labrum unmarked, many small setae; clypeus blackish-brown posterolaterally, small setae along anterior margin; frons unmarked, slightly swollen; genae markings grading from a trace of reddish-brown to a broad blackish blotch near the base of the mandibles, not reaching eye; vertex unmarked.

THORAX: pronotum whitish setae, small dark cervical mark anterolaterally; alinotum and pleura unmarked, setae whitish; fore wing amber setae, veins pale green, crossveins and gradates dark in middle or at ends; hind wing similar; legs pale, whitish-amber setae, claws excised (Fig.74 g).

ABDOMEN: setae amber. Male terminalia (Fig. 45): sclerotised bar (tignum?) below subrectal setae; gonarcus concealed projections in dorsolateral angles; entoprocessus pointed caudad, long and tapering; mediuncus angular; gonosaccus tuberculate recurved gonosetae; gonocristae on hypovalva, denser medially.

Female terminalia (Figs. 46, 47): subgenitale sclerotised proximally, transverse ridges; apical lobe shallow transverse callus and proximoental cavity; spermatheca vela short, erect; duct smooth.

DISCUSSION OF VARIATION

This study recognised Chrysopa crotchi as a synonym under C. nigricornis. This was possible because collecting in Penticton yielded a long series of C. nigricornis, showing a range of colour variation. Indeed, specimens taken at light throughout an entire summer season displayed variation in head markings and antennal colour (Fig. 42).

For comparison, the type of C. crotchi, a female, loaned from the Museum of Comparative Zoology, had a light brown flagellum, and the pedicel was ringed only very faintly with reddish-brown. The genae had a reddish-brown blotch near the base of the mandibles (Fig. 43). The terminalia were of C. nigricornis (cf . Figs. 46, 47).

DISTRIBUTION IN CANADA

C. nigricornis has been considered part of the Canadian fauna for a very long time (Provancher 1877 a). However, a confusing array of names was applied to this species, especially in British Columbia (Bickley & MacLeod 1956, as *C. crotchi*, *C. columbiana*, and *C. majuscula*, in addition to *C. nigricornis*).

Synonymy with *C. majuscula* has been established (Bram & Bickley 1963). In the case of *C. columbiana*, the type came from Washington, District of Columbia, and was a poorly marked specimen of *Glenochrysa lineaticornis* (Bram & Bickley *op. cit.*, as *Chrysopa lineaticornis*). Smith, who first attributed specimens to that taxon (Smith 1932), must have had small unmarked individuals of *C. nigricornis*.

As a final comment, this study synonymised C. crotchi under C. nigricornis. Consequently after years of confusion, the real distribution of C. nigricornis was appreciated for the first time. The species was found in all Provinces except Newfoundland and Prince Edward Island, though likely in the latter. In British Columbia, C. nigricornis extended far to the north, possibly finding a route into the Great Plains through Pine Pass. On the prairies, it seemed north of the agricultural zone, but this may be an artifact due to insufficient collecting. The same might be said of other regions.

C. nigricornis is capable of moving upward into the boughs of high trees when disturbed. At lights, it usually rests high on the wall, making it difficult to collect in such situations. These comments seem necessary to remind the reader that, in spite of its size, this lacewing is able to elude even the experienced collector.

Nevertheless, this study received many specimens of C. nigricornis, and almost all of the earlier records were verified. There were localities for which this was not the case. For instance, no specimens were seen from Grimsby, Ontario (Putman 1932 b). Again, there were none from Hemmingford (Smith 1932) or Sherbrooke (Banks 1903), Québec. But, these are not exceptional locations. In fact, there were specimens from nearby and the only difficulty was that the identification may originally have been in error. For every other record, specimens were seen, being the specimen upon which the record was based. Specific localities were (Map 9):

BRITISH COLUMBIA Agassiz (SEM). Barkerville (SEM). Bear Lake [near Prince George] (USNM). Cache Creek (SEM). Cowichan Lake (SEM). Departure Bay [Nanaimo] (Gibson 1914, as C. majuscula; Smith 1932, as C. majuscula, also cited by Spencer 1942, and by Bickley & MacLeod 1956; Spencer 1942, as C. crotchi; CNC; ROM). Essondale (SEM). Green Timbers Forestry Station [New Westminster](CNC). Kamloops (Spencer 1942, as

C. crotchi; SEM). Kaslo (USNM). Langford (PFRC). Lillooet (CNC). Okanagan Lake (Spencer 1942, as C. crotchi; SEM). Oliver (Smith 1932; Smith 1932, as M. signoretti, also cited by Spencer 1942; Smith 1932, as C. columbiana, also cited by Spencer 1942, and by Bickley & MacLeod 1956; CNC). Osoyoos (Smith 1932; CNC). Penticton (Gibson 1912, as C. majuscula; LEM). Pitt Meadows (UG). Quesnel (SEM). Revelstoke (LEM). Sullivan [unspecified] (SEM). Summerland (SEM). Terrace (MCZ). Vancouver, including North and West Vancouver (Smith 1932, cited and confirmed by Spencer 1942; Spencer 1942, as C. crotchi; BCPM; CNC; MCZ; SEM; UG). Vernon (Smith 1932, also cited by Spencer 1942 as Okanagan Valley; CNC). Victoria (Smith 1932, also cited by Spencer 1942; Banks 1938 a, as C. crotchi, also cited by Bickley & MacLeod 1956; BCPM; CNC; MCZ). Westwick Lake, Cariboo District (SEM).

ALBERTA Elk Island Nat'l Pk (CNC). Lethbridge (Smith 1932; CNC).

SASKATCHEWAN Prairie River (CNC). Sutherland [Saskatoon] (CNC).

MANITOBA Brandon (UMW). Husavick (Gibson 1912; MCZ). Otto (CNC). Stockton (CNC). Winnipeg, including Glenlea Research Station, Fort Garry, and St James (LEM; UMW).

ONTARIO Biscotasing (CNC). Black Rapids, Rideau River (CNC). Brantford (MCMU). Burlington (MCMU). Chaffeys Locks (ROM). Chatham (UWO). De Grassi Point (Gibson 1915: ROM). Fennela (UG). Grimsby (Putman 1932 b). Hamilton (MCMU). Hornings Mills (ROM). Lake Couchiching (ROM). McIntyre [unspecified] (ROM). Niagara (Smith 1932; Putman 1932 b, as Niagara River; UG). Norval (UG). Orillia (Smith 1932; CNC). Ottawa (Smith 1932; CNC; UAE). Point Pelee (CNC; ROM). Port Arthur [Thunder Bay] (MCMU). Port Credit (ROM). Rondeau Prov Pk (ROM). St Davids (Smith 1932; UG). Severn Bridge (ROM). Stittsville (MCMU). Tillsonburg (CNC). Toronto (ROM). Vineland (Putman 1932 b; Garlick 1955; CNC). Zion [near London] (UWO).

QUEBEC Berthierville (UdeM). Duchesnay (CSQ). Hemmingford (Smith 1932). Kirks Ferry [Chelsea] (CNC). Knowlton (CNC). Lachine (CNC). Lac-Mercier (CNC). Lac-Mondor, Ste-Flore (CNC). Lac Victor [unknown] (CNC). Lanoraie (LEM). Laval (LEM). Montréal (LEM). Mont-St-Hilaire (LEM). Parc du Mont Tremblant (UdeM). Québec (Provancher 1877 b; UL). Ste-Anne-de-Bellevue (LEM). Ste-Clotilde (SJRS). St-Felix-de-Kingsey (CFRL). Ste-Foy (UL). St John's Co [unspecified] (LEM). Shawbridge (LEM). Sherbrooke (Banks 1903).

NEW BRUNSWICK Gagetown, Fredericton (ROM).

NOVA SCOTIA Armdale (USNM). Willowdale [unspecified] (CNC).

EXAMINED FROM CANADA

109 males, 125 females, 16 indeterminate; total 250 specimens.

CHRYSOPA QUADRIPUNCTATA BURMEISTER 1839
(Figs. 48, 49, 50, 73; Map 10)

Chrysopa quadripunctata Burmeister 1839. Handb. Ent. 2: 980.

TYPE-LOCALITY

North America

CANADIAN REFERENCES

Chrysopa quadripunctata; Walker 1852: 246; Smith 1932: 597; Putman 1932 b: 121-126; Spencer 1942: 27; Garlick 1955: 282, 326-327, 329; Bickley & MacLeod 1956: 194; Bram & Bickley 1963: 8-9; Lafrance 1970 b: 38, pl. 14; Throne 1971: 70.

DESCRIPTION

HEAD (Fig. 48): scape, pedicel, flagellum unmarked; flagellum darker at extremity; maxillary and labial palpi unmarked, amber-brown distally; mandibles (Fig. 73 b) asymmetric tooth on left side; labrum unmarked, scattered setae; clypeus unmarked, scattered setae along anterior margin; frons orange inter-antennal mark; genae longitudinal band from eye to base of mandible, variable in intensity, bordered medially by narrow orange stripe; vertex orange streak along posterior margin of eye.

THORAX: pronotum four dorsolateral orange dots, two anteriorly and two posteriorly; alinotum two orange streaks on scutum; pleura unmarked, setae whitish; fore wing veins green, setae amber, crossveins dark mainly at ends, gradate crossveins brownish-black; hind wing similar; legs pale, setae amber.

ABDOMEN: setae whitish; orange dorsolateral marks on anterior terga. Male terminalia (Fig. 49): no tignum or sclerotised element between gonarcus and subrectal setae; gonarcus concealed dorsolateral protuberances, variable; entoprocessus broad, not elongate; mediuncus obtuse; gonosaccus recurved tuberculate setae; gonocristae broad band across hypovalva, large imbricated dentate gonosetae. Female terminalia (Fig. 50): subgenitale proximally sclerotised, no ridges; apical lobe shallow transverse callus, proximoental cavity narrow; spermatheca concretions on duct; vela short, erect.

DISCUSSION OF VARIATION

C. quadripunctata varied in intensity of the genal band, and in the extent to which the orange spotting was developed both on the head, and on the thorax and abdomen. These marks were reduced in specimens in alcohol.

Despite geographic separation of the Vancouver Island population, specimens showed no differences except that they were very old and faded. We had no reason to doubt their authenticity, yet more recent collecting did not corroborate the early record[1].

DISTRIBUTION IN CANADA

One of the earliest records of C. quadripunctata (Walker 1852) already received comment; it must be questioned since the specimen could not be found at the British Museum. Otherwise, it was possible to verify all citations except one (Garlick 1955: Vineland). The much cited record from Vancouver Island was supported by two specimens taken prior to the turn of the century. Similarly, Smith's (1932) and Putman's (1932 b) accounts of specimens from St. Davids and Niagara, Ontario, were verified by specimens that those workers had seen.

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[1] Toschi (1965) records one male adult taken in 1962, and one first instar larva in 1963, from Strawberry Canyon, University of California, Berkeley, California.

C. quadripunctata was known from Ontario and British Columbia, and now Nova Scotia, Prince Edward Island, Québec, and Saskatchewan, and it occurs in neighbouring Minnesota (Parfin 1952). Anticipated in Manitoba, specific localities were (Map 10):

BRITISH COLUMBIA Vancouver Island (Smith 1932, also cited by Spencer 1942, by Bickley & MacLeod 1956, by Bram & Bickley 1963, and by Throne 1971; CNC).

SASKATCHEWAN Fort Qu'Appelle (SMNH).

ONTARIO Biscotasing (CNC). Bobcaygeon (CNC). Chaffeys Locks (ROM). Dundas Marsh, Hamilton (MCMU). Georgian Bay, Island 421 (UG). Marmora (CNC; UG). Niagara (Smith 1932; Putman 1932 b; UG). Port Credit (ROM). Port Dover (UG). Rondeau Prov Pk (ROM). St Davids (Smith 1932; Putman 1932 b; UG). [?] St. Martin's Falls, Albany River [near Ogoki] (Walker 1852). Toronto (ROM). Vineland (Garlick 1955).

QUEBEC Covey Hill (CNC). Ile Perrot [near Montréal] (LEM). Laval (LEM). Masham Mills (ROM). Mont-St-Hilaire (LEM). Parc du Mont Tremblant (UdeM: larvae, determination by Dr. C.A. Tauber in litt. 11.VII.1980). Ste-Anne-de-Bellevue (LEM). Shawbridge (LEM).

PRINCE EDWARD ISLAND Dalvay House [Delvay Beach, PEI Nat'l Pk] (CNC).

NOVA SCOTIA Green Bay, Lunenburg Co (NSM).

EXAMINED FROM CANADA

Twenty males, twenty-two females, three indeterminate; total 45 specimens.

CHRYSOPA COLORADENSIS BANKS 1895
(Figs. 51, 52, 53, 73; Map 11)

Chrysopa coloradensis Banks 1895. Trans. Am. ent. Soc. 22: 314-315.

TYPE-LOCALITY

Fort Collins, Colorado, U.S.A.

CANADIAN REFERENCES

Chrysopa coloradensis; Gibson 1910: 127; 1914: 127; Smith 1932: 585, 601; Spencer 1942: 27.

DESCRIPTION

HEAD (Fig. 51): scape unmarked; pedicel black-ringed; flagellum black proximally; maxillary and labial palpi all divisions blackish-brown; mandibles (Fig. 73 c) asymmetric tooth on left side; labrum unmarked, marginal setae; clypeus laterally brownish-

black, four pairs of prominent setae along anterior margin; frons black bordering the lower and outer rims of antennal sockets; gena broad black longitudinal band from eye to base of mandibles, not reaching anterior tentorial pits; vertex posterolateral black streak bordering the dorsal and posterior margins of eyes.

THORAX: pronotum wide blackish-brown dorsolateral bands, short black setae, longer whitish setae; alinotum continuation of pronotal bands; pleura unmarked, setae amber; fore wing most veins and gradate crossveins black, other crossveins dark at ends, setae dark brown; hind wing costal crossveins and bases of radial crossveins dark at ends, setae brown; legs brown, darker setae.

ABDOMEN: setae amber, darker posteriorly on venter. Male terminalia (Fig. 52): entoprocessus curved; mediuncus arched; gonosaccus recurved tuberculate gonosetae; gonocristae two lateral fields on hypovalva, connected medially. Female terminalia (Fig.

53): cleft in sclerotised region of subgenitale; small pit proximoental to shallow transverse callus on apical lobe; spermatheca duct wart-like concretions; vela short, erect.

DISCUSSION OF VARIATION

No noticeable variation recorded, though older specimens were faded.

DISTRIBUTION IN CANADA

C. coloradensis is restricted to British Columbia, with populations on Vancouver Island (Gibson 1914), and in the southern interior of the Province (Gibson 1910; Smith 1932; Spencer 1942). Specimens substantiated previous records and included new localities (Map 11):

BRITISH COLUMBIA Cache Creek (LEM). Creston (Smith 1932; CNC). Departure Bay [Nanaimo] (Gibson 1914; ROM). Kamloops (Spencer 1942; SEM). Kaslo (USNM). Keremeos (Smith 1932; CNC). Lytton, and vicinity (SEM; UG). Oliver, including Vaseux Lake and White Lake (Smith 1932; CNC). Peachland (Gibson 1910; MCZ). Penticton (Smith 1932; BCPM; LEM). Richter Pass, Osoyoos (CNC). Salmon Arm (Smith 1932; CNC). Seton Lake, Lillooet (Smith 1932; CNC). Westbank (CNC). West Summerland (SEM) Winslow [Summerland] (Spencer 1942; SEM).

EXAMINED FROM CANADA

Fifty-six males, fifty-seven females, four indeterminate; total 117 specimens.

CHRYSOPA EXCEPTA BANKS 1911
(Figs. 54, 55, 56, 57, 73; Map 12)

Chrysopa excepta Banks 1911. Trans. Am. ent. Soc. 37: 340.

TYPE-LOCALITY

Fort Wingate, New Mexico, U.S.A.

CANADIAN REFERENCES

Chrysopa excepta; Smith 1932: 585; Spencer 1942:27.

DESCRIPTION

HEAD (Figs. 54, 55): scape dorsomedial mark and lateral longitudinal band; pedicel ringed brownish-black; flagellum black proximally; maxillary and labial palpi all divisions black; mandibles (Fig. 73 d) asymmetric tooth on left side; labrum unmarked, scattered setae; clypeus unmarked, three or four pairs

of prominent setae along anterior margin; frons dark ring encircling all of antennal socket except ventromedial region, interantennal zone green; genae variable black longitudinal band extending from near eye to base of mandible, not reaching anterior tentorial pit; vertex short black dorsolateral streak bordering posterior margin of eye, grading to faint brown posterolaterally.

THORAX: pronotum black setae and dark patch at anterolateral margin; alinotum unmarked, setae black or amber-brown; fore wing venation green, darker at costal crossveins, inner gradates marked dark green, setae black; hind wing similar; legs black setae.

ABDOMEN: dense black setae on venter posteriorly. Male terminalia (Fig. 56): gonarcus narrow collar; entoprocessus curved caudad, abrupt taper at apex; mediuncus arched, microsetae at base on ental aspect; gonosaccus tuberculate recurved gonosetae; gonocristae laterally on hypovalva, sparse ventromedially. Female terminalia (Fig. 57): subgenitale sclerotised proximally; apical lobe shallow transverse

callus, narrow proximoental cavity; spermatheca wart-like concretions on duct; vela short, erect.

DISCUSSION OF VARIATION

The dark ring around the antennal sockets varied in the degree of completeness medially. Some specimens had an entire ring, or with only a short interantennal zone unmarked (Fig. 55 b).

Other head marks were variable. For instance, the genal band was broad in some specimens, reaching the eye. Other specimens had a narrower band, and in some it did not reach the eye (Fig. 54 c). Also, the marks on the scape varied, the lateral band being best developed proximally.

Gradate crossveins of fore and hind wings were invariably green, providing a basis for easy separation from C. coloradensis.

DISTRIBUTION IN CANADA

Although there were not many specimens of C. excepta from Canadian localities, the few available delimited the distribution well. This species occurs in the southern interior of British Columbia. Perhaps, further south, it passes east of the Rocky Mountains, since it was also found in Alberta and southern Saskatchewan.

One citation could not be corroborated, from Oliver, British Columbia (Smith 1932, also cited by Spencer 1942). However, there was a specimen from Penticton, just north of Oliver. Another record, from Nicola, was correctly determined, the specimen still being in the Canadian National Collection.

Earlier workers, therefore, recognised this species from southern British Columbia and Alberta. The Saskatchewan records were more recent, being due to collecting by Mr. A.R. Brooks. Specific localities were (Map 12):

BRITISH COLUMBIA Nicola (Smith 1932, also cited by Spencer 1942; CNC). Oliver (Smith 1932, also cited by Spencer 1942). Penticton (CNC).

ALBERTA Lethbridge (Smith 1932, also cited by Spencer 1942; CNC). Manyberries (CNC).

SASKATCHEWAN Elbow (CNC). Lumsden (CNC).

EXAMINED FROM CANADA

Four males, six females.

CHRYSOPA OCULATA SAY 1839
(Figs. 58, 59, 60, 61, 62, 63, 73; Map 13)

Chrysopa oculata Say 1839. J. Acad. nat. Sci., Philadelphia 8: 45.

Chrysopa assimilis Banks 1899. Trans. Am. ent. Soc. 25: 202. SYN. NOV.

TYPE-LOCALITY

United States of America

CANADIAN REFERENCES

Chrysopa albicornis; Provancher 1877 a: 119; 1877 b: 203, 204; Brodie & White 1883; Briand 1931: 123-126.

Chrysopa assimilis; Gibson 1914: 127; Smith 1932: 590.

Chrysopa chi; Robinson 1952: 36.

Chrysopa cholorophana; Walker 1852: 259-260; Banks 1903: 147-148; British Columbia Dept. Agric. 1906: 3; Gibson 1910: 127; 1913: 137; 1914: 127.

Chrysopa euryptera; Provancher 1869: 140.

Chrysopa illepida; Provancher 1877 a: 119; 1877 b: 203-204; Brodie & White 1883.

Chrysopa latipennis; Walker 1852: 259; Hagen 1861: 214; Provancher 1877 a: 120; 1877 b: 203, 205; Brodie & White 1883; Banks 1892: 358.

Chrysopa oculata; Walker 1852: 260; Hagen 1861: 211; Provancher 1869: 140; 1871 a: 142; 1871 b: 269; Saunders 1875: 153; Provancher 1877 a: 119; 1877 b: 203-204; Brodie & White 1883; Banks 1903: 147; Gibson 1913: 137; Briand 1931: 123-126; Steenburgh 1931: 64; Smith 1932: 584 (footnote 4); Putman 1932 a: 44-45; 1932 b: 121-126; 1937: 29-37; Garlick 1955: 282, 326-327, 329; Bickley & MacLeod 1956: 191-192; Putman & Herne 1960: 200; Wilde 1962: 847; 1963: 48; Watson & Wilde 1963: 435-438; Wilde & Watson 1963:

958-959; McMullen & Jong 1967 a: 35-36; 1967 b: 1293; Westigard et al. 1968: 740; McMullen 1971: 34; Throne 1971: 69; Downes 1974: 122, figs.; Hagley 1975: 34-35; Madsen & Morgan 1975: 13-14; New 1975: 131-132; Hagley 1979: 17; Philogene & Chang 1979: 56.

Chrysopa oculata albicornis; Smith 1932: 590; Spencer 1942: 27.

Chrysopa oculata bipunctata; Smith 1932: 589-590; Spencer 1942: 27.

Chrysopa oculata carei Smith 1932: 588-589; Brown 1934: 141; Spencer 1942: 27.

Chrysopa oculata chlorophana; Smith 1932: 587-588; Spencer 1942: 27.

Chrysopa oculata illepida; Smith 1932: 590; Spencer 1942: 27.

Chrysopa oculata oculata; Smith 1932: 587, 601; Spencer 1942: 27.

Chrysopa oculata separata; Smith 1932: 590-591; Spencer 1942: 27.

Chrysopa oculata xanthocephala; Smith 1932: 589; Spencer 1942: 27.

Chrysopa transmarina Hagen 1861: 213; Provancher 1869: 140; 1871 a: 142; 1871 b: 269; 1877 a: 119-120; 1877 b: 203-204; Brodie & White 1883; Banks 1892: 358.

Chrysopa oculata; Dutilly 1946: 43.

? Hemerobius perla; Gosse 1840: 197-198; Anon. in Provancher 1871 a: 142.

DESCRIPTION

HEAD (Figs. 58, 59): scape unmarked; pedicel ringed blackish-brown; flagellum pale, darker at tip; maxillary and labial palpi dark, cardo black mark; mandibles (Fig. 73 e) asymmetric tooth on left side; labrum unmarked; clypeus lateral marks not extensive; frons broad blackish-brown band around antennae and anteriorly; genae black from eye to base of mandibles, continuous to anterior tentorial pits; vertex two pairs of dorsolateral spots, reddish-brown streaks or reddish-brown smudges near dorsal rim of antennae; gula of some specimens black on margin.

THORAX: pronotum three pairs of faint dots dorsolaterally, irregular pattern; setae dark, some light; alinotum faint scutal spots, setae amber, pleura unmarked, setae pale; fore wing crossveins dark at ends, gradates dark at middle; hind wing similar, gradates paler, costal crossveins mostly dark; legs pale, setae dark; sternum of prothorax dark between coxae in some specimens.

ABDOMEN: setae amber-brown, darker posteriorly on venter; male sterna with microtholi, absent on VIII+IX. Male terminalia (Fig. 60): gonarcus pointed processes; entoprocessus curved caudad, tapering at apex; mediuncus arched, microsetae proximally on ental aspect; gonosaccus recurved tuberculate gonosetae; gonocristae imbricated, two ventrolateral fields on hypovalva, none medially. Female terminalia (Fig. 61): subgenitale sclerotised pouches proximally; apical lobe shallow transverse callus, proximoental cavity; spermatheca spiculate concretions on duct; vela short, erect.

DISCUSSION OF VARIATION

C. oculata was variable, especially regarding markings on the head. The vertex and genae presented a wide assortment of coloured marks, even in specimens from the same locality. For instance, the spots on the vertex were enlarged, forming dorsolateral streaks (Fig. 59 c). More generally, specimens had smudges of reddish-brown adjacent to the frontal markings above the antennal socket, the more posterior spots being much reduced (Fig. 59 d). Often, a postgenal patch of brownish-black was present, usually confined to the posteroventral aspect of the head behind the eye (Figs. 58 a, 59 e). Similarly, the longitudinal band on the genae varied in proportions, being broad and reaching the eye, or narrower and incomplete posteriorly. At its anterior margin, the band in some specimens extended mesad to the anterior tentorial pits.

Variation in head markings has already been much studied (Bickley 1952). Most of the named colour varieties which Smith (1932) discussed in the Canadian fauna have been resolved as synonyms under C. oculata (Bickley & MacLeod 1956).

However, one taxon remained valid (Bickley & MacLeod op. cit.), though Smith (1932) thought that it was a synonym of C. oculata var. albicornis. The taxon, Chrysopa assimilis Banks, was based on a male from Ashland, Oregon, made available by the Museum of Comparative Zoology. The specimen was typical of C. oculata in head pattern (Fig. 62), as well as in terminalia (Fig. 63). For this reason, C. assimilis was here synonymyised under C. oculata.

DISTRIBUTION IN CANADA AND ALASKA

Although Bickley and MacLeod (1956) did not state that C. oculata occurs in Alaska, they indicated that it occurred throughout the Nearctic Region. In this study, there were specimens from Alaska, as well as from all Territories and Provinces of Canada. This species was one of the more ubiquitous chrysopids. Without further comment, specific localities were (Map 13)[1] :

ALASKA [not mapped] Fairbanks (NSM).

YUKON TERRITORY Dawson (SEM). Kluane Nat'l Pk, including Sheep Mt, and Slims River Flats (SEM). Pelly Crossing (SEM). Whitehorse (CNC; SEM).

[1] see p. 412 for late additions [YUKON, QUEBEC]

NORTHWEST TERRITORY Fort Resolution (Dutilly 1946, as Chrysopoda oculata). Fort Simpson (CNC). Fort Smith (CNC).

BRITISH COLUMBIA Adams Lake (CNC). Agassiz (Smith 1932, as C. oculata separata, also cited by Spencer 1942; Smith 1932, as C. oculata chlorophana; CNC; SEM). Alert Bay (Spencer 1942, as C. oculata oculata; SEM; UWO). Aspen Grove (CNC). Barrière (CNC). Bevan (CNC). Chilcotin [unspecified] (Spencer 1942, as C. oculata chlorophana; SEM). Chilliwack, including MacGillivray Creek Game Reserve (CNC). Christina Lake (ROM). Clinton (CNC; ROM). Comox, including Pt Holmes (Smith 1932, as C. oculata xanthocephala, also cited by Spencer 1942; CNC). Courtenay (USNM). Cowichan, including Cowichan Bay and Cowichan Lake (Spencer 1942, as C. oculata oculata; CNC; SEM). Cranbrook (Smith 1932, as C. oculata carei, also cited by Brown 1934, and by Spencer 1942; CNC). Creston, including 5 mi W (Smith 1932, as C. oculata carei, also cited by Brown 1934, and by Spencer 1942; Wilde 1962; CNC; SEM). Cultus Lake Prov Pk (ROM). Cummings Lake (SEM). Dawson Creek (CNC). Downie Creek (CU). Fort Nelson (SEM). Fort St John (CNC). Galiano Island (SEM). Goldstream (SEM). Grand Forks, including

9 mi E (CNC). Hagensborg (SEM). Haney, as The University of British Columbia Forest (ROM). Harrison Mills (CNC). Hat Creek (SEM). Hatzik Lake (CNC). Hope, 15 mi E (CNC). 100 Mile House (CNC; SEM). Jesmond (SEM). Kootenay Valley (Wilde 1962, 1963). Kamloops (CNC; SEM). Kaslo (USNM). Kersley (SEM). Kitwanga, 5 mi W (SEM). Ladysmith (Spencer 1942, as C. oculata chlorophana; SEM). Lillooet, including Pavilion Lake, Pavilion Mt, and Seton Lake (CNC; SEM). Lytton (SEM). Mission City, including Nicomen Slough (CNC; ROM). Nanaimo, including Departure Bay (Gibson 1914, as C. chlorophana; Spencer 1942, as C. oculata oculata; CAS; ROM; SEM). Nelson (Smith 1932, as C. oculata bipunctata, also cited by Spencer 1942; Smith 1932, as C. oculata separata, also cited by Spencer 1942; CNC; JEC). New Westminster, including Green Timbers Forestry Station (CNC; UWO). Nicola (CNC). Okanagan Valley (Wilde & Watson 1963; McMullen & Jong 1967 b; New 1975, based on Madsen 1961, McMullen 1964, and Westigard et al. 1968). Okanagan Falls, including Green Lake, and White Lake (CNC). Okanagan Landing (Gibson 1914, as C. assimilis). Oliver, including Vaseux Lake, and White Lake (Smith 1932, as C. oculata oculata; Smith 1932, as C. oculata chlorophana, also cited by Spencer 1942; Smith 1932, as C. oculata albicornis, also cited by Spencer 1942; CNC; SEM). Osoyoos, including Osoyoos Lake (Spencer 1942, as C. oculata oculata; BCPM; SEM). Oyster River, including

Miracle Beach, and Saratoga Beach (CNC). Paul Lake, Lolo Mt (ROM). Penticton (BCPM; LEM). Pitt Meadows (CNC). Pouce Coupē (Smith 1932, as C. oculata carei, also cited by Brown 1934, and by Spencer 1942; CNC). Prince George (SEM). Qualicum (CNC). Quesnel (SEM). Radium (SEM). Revelstoke (CNC; CU; LEM). Rolla (Smith 1932, as C. oculata bipunctata, also cited by Spencer 1942; Smith 1932, as C. oculata carei, also cited by Brown 1934, and by Spencer 1942; Smith 1932, as C. oculata separata, also cited by Spencer 1942; Smith 1932, as C. oculata xanthocephala; Spencer 1942, as C. oculata chlorophana; CNC). Rossland, 8 mi W (CNC). Ruskin (CNC). Saanich (SEM). Salmon Arm (Smith 1932, as C. oculata oculata; Smith 1932, as C. oculata illepida, also cited by Spencer 1942; Smith 1932, as C. oculata separata, also cited by Spencer 1942; Smith 1932, as C. oculata xanthocephala, also cited by Spencer 1942; CNC). Shawnigan Lake, 10 mi W (ROM). Similkameen Valley (Wilde & Watson 1963). Smithers (SEM). Soda Creek (SEM). South Okanagan (CNC; SDARS). Sproat Lake [Alberni District] (CNC). Squamish, Garibaldi Prov Pk (CNC). Strathnaver (SEM). Summerland (Spencer 1942, as C. oculata oculata; Madsen & Morgan 1975; CNC; SDARS; SEM). Taylor (CNC). Terrace, including Lakelse Lake, Gagnon Rd, and Spring Creek (CNC; SEM; USNM). Tofino (ROM). Tranquille (CNC). Vancouver, including North Vancouver, and the University of British Columbia (Spencer 1942, as C. oculata oculata

Spencer 1942, as C. oculata chlorophana; BCPM; MCZ; SEM). Vanderhoof (SEM). Vernon, including Irish Creek Road, and Goose Lake (Smith 1932, as C. oculata oculata, also cited by Spencer 1942; Smith 1932, as C. oculata albicornis, also cited by Spencer 1942; Smith 1932, as C. oculata chlorophana, also cited by Spencer 1942; Smith 1932, as C. oculata illepida, also cited by Spencer 1942; BCPM; CNC; SEM). Victoria (Smith 1932, as C. oculata oculata, also cited by Spencer 1942; CNC; SEM). Wellington (BC Dept Agric 1906, as C. chlorophana; Smith 1932, as C. oculata oculata; CNC; MCZ). West Crescent Valley [49°24' 117°39'] (SEM). Winslow (Spencer 1942, as C. oculata chlorophana; MCZ; SEM).

ALBERTA Banff (Gibson 1913, as C. oculata and as C. chlorophana; Smith 1932, as C. oculata oculata; CAS; CU). Banff Nat'l Pk, Johnson Canyon Campground, and Banff-Jasper Hwy (CNC; ROM). Beaverlodge (CNC; UAE; UG). Bilby [NW of Stony Plain] (CAS; CU). Brk L [unknown] (UAE). Calgary (CU; UAE). Cypress Hills (CNC; UAE; UMW). Drumheller (CNC; UAE). Edmonton, including White Mud Creek (PIDAA; UAE). Elkwater Park, including Elkwater (CNC). Empress (CNC). Fort Chipewyan (USS). Grande Prairie (CNC). High Prairie (CNC). High River (CNC). Iron Springs (Smith 1932, as C. oculata oculata; Smith 1932, as C. oculata bipunctata; Smith 1932, as C. oculata chlorophana; Smith 1932, as C. oculata xanthocephala; CNC). Lac la Biche (CNC). Lethbridge (Smith 1932, as C. oculata oculata; Smith 1932, as

C. oculata carei, also cited by Brown 1934; Smith 1932, as C. oculata chlorophana; CNC; UAE; UdeM; UMW; USS). Manyberries (CNC). Medicine Hat (CNC; UAE). Okotoks (CAS). Onefour (CNC). Oyen (UG). Peace River (CNC). Peace River District, including White Mud River (CNC). Pincher Creek (CNC). Red Deer (CNC). Rycroft (CNC). Seebe (CNC). Stettler (USS). Steveville (USS). Sturgeon Lake (CNC). Tofield (UAE; included cocoon with helorid parasite). Valleyview (CNC). Wabamun (UAE). Waterton Lakes Nat'l Pk, including Waterton (Smith 1932, as C. oculata chlorophana; CNC; UAE; WLNP). Wetaskiwin (LEM; UAE).

SASKATCHEWAN Assiniboia (CNC). Avonlea (RARS; SMNH). Bagley [name rescinded, formerly SW of Nipawin] (CNC). Beaver Creek [unspecified] (CNC). Big River (CNC; UG). Blaine Lake (RARS). Broadview (CNC). Burnham (RARS). Corinne (RARS). Christopher Lake (CNC). Cut Knife (CNC). Cypress Hills Prov Pk, including Cypress Hills (ROM; SMNH). Davin (RARS). Delmas (BMNH). Dilke (RARS). Duck Lake (CNC). Elbow (CNC). Esterhazy (CNC). Estevan (CNC; RARS). Estuary (SMNH). Fort-à-la-Corne (CNC). Gainsborough (SMNH). Glen Ewen (SMNH). Gray (RARS). Indian Head (Smith 1932, as C. oculata chlorophana; CNC; IHTN; RARS; UMW). Jameson (RARS). Jan Lake (SMNH). Kenosee (CNC; USS). Lebret (CNC). Liebenthal, 10 mi S (ROM). Lumsden (CNC). MacDowall (SMNH). Macklin (USS). Maple Creek (ROM). Melfort (RARS). Moose Mt Prov Pk (ROM; SMNH). Nipawin (UG). Oyama (RARS). Oxbow (USNM). Pike Lake Prov Pk (ROM; SMNH). Prince Albert (CNC).

Qu'Appelle Valley (RARS). Regina (RARS; SEM; UMW). Roche Percée (SMNH). Rowatt (RARS). Outlook (UG). St-Victor (CNC). Saskatoon (Smith 1932, as C. oculata oculata; Smith 1932, as C. oculata chlorophana; CNC; USS). Scout Lake (CNC). Snowden (CNC). Somme (CNC). Stenen (RARS). Tantallon (SMNH). Val Marie (CNC). Wakaw (CNC). Weyburn (LEM). Whitefox (CNC).

MANITOBA Beaconia (UMW). Brandon, including 6 mi N (Robinson 1952, as C. chi; CNC; LEM; UMW). Carberry, including 5 mi W (CNC). Dauphin (CNC). Elma (UMW). Flin Flon (UMW). Forrest, including 9 mi N [Forrest Station] (CNC). Gillam (CNC). Glenboro (CNC). Glenlea Research Station [S of Winnipeg] (UMW). Lockport (UMW). Minitonas (MMMN). Minnedosa, 5 mi N (CNC). Morden (Robinson 1952, as C. chi; CNC; UMW). Ninette (CNC). Norgate, 5 mi W (CNC). Pilot Mound (CNC). Portage-la-Prairie (UMW). Riding Mt Nat'l Pk, including Katherine Lake Campground (CNC; ROM). Sandilands (MMMN; NFRC; UMW). Shilo, 5 mi SW, 3 mi S (CNC). Sprague (CNC). Stockton (CNC). The Pas (CNC). Treesbank, including Aweme (Smith 1932, as C. oculata oculata; Smith 1932, as C. oculata chlorophana; CNC). Wanless (CNC). Whitewater, 4 mi N [Whitewater Lake] (CNC). Winnipeg, including Fort Garry, Transcona, and University of Manitoba (Gibson 1910, as C. chlorophana; CNC; MMMN; NFRC; ROM; UMW; USS).

ONTARIO Aberfoyle (UG). Agincourt (UG). Algonquin Prov Pk, including Lake Opeongo and Smoke Lake (Smith 1932, as C. oculata oculata; Smith 1932, as C. oculata bipunctata; CNC; MCMU; ROM). Ancaster (MCMU; UG). Appin (CNC). Apple Hill (LEM). Arkell (UG). Aylmer (Smith 1932, as C. oculata oculata; MCMU). Bala (CNC). Bancroft (CNC; ROM). Batchewana Bay, Lake Superior (ROM). Baxter (UG). Beachburg (ROM). Beardmore, 7 mi S (ROM). Belleville (LEM; RARS; ROM). Bell's Corners (CNC). Belwood [unspecified] (UG). Blackburn (UG). Black Lake, near Stanleyville (Downes 1974, as third instar larva; LEM). Black Sturgeon Lake (ZMUH). Blenheim (UG). Boat Lake, Bruce Co (ROM). Bradford (UG). Brantford (MCMU). Brighton (CNC). Brooklin (UG). Caistor Centre (UG). Calabogie (ROM). Cambridge, including Galt, Hespeler, and Preston (MCMU; UG). Cawaja Beach, Tiny Tp, Simcoe Co (ROM). Cayuga (UG). Chaffeys Locks (ROM). Chalk River (LEM). Chatham (Smith 1932, as C. oculata oculata; CNC; UG; UWO). Chatterton (CNC; UG). Clinton (UG). Cochrane (UG). Coldstream (CNC). Constance Bay (CNC). Cooksville (ROM). Cornwall (Smith 1932, as C. oculata xanthocephala; CNC). Credit Forks [Caledon] (ROM). Cumberland (UG). Dalrymple (UG). De Grassi Pt, Lake Simcoe (ROM). Dover Tp, Kent Co (CNC). Dryden (CNC). Dundas (UG). Dunnville (ROM). Dyers Bay (UG). Elmira (UG). Elora (UG). Elphin, 2 mi W (ROM). Fishers Glen

(CNC). Fonthill [unknown] (Hagley 1979). French River, Bertram Tp (ROM). Gananoque (LEM; UG). Garvel River [unknown] (ZMUH). Georgian Bay, Island 421 (UG). Go Home Bay (CNC). Gold Lake [unspecified] (UG). Golden Lake [unspecified] (LEM). Grassie (UG). Gravenhurst (UG). Grimsby (CNC; UG). Guelph (LEM; UG). Hamilton (MCMU; UG). Harrow (CNC; UG). Hasting (UG). Havelock (UG). Hawkesbury (LEM). Hepworth (UG). Iron Bridge (CNC). Jordan Station, or Jordan (Hagley 1979; CNC). Kearney (Smith 1932, as C. oculata xanthocephala; CNC). Kendal (ROM). Keswick (UG). Killarney Prov Pk (UG). Kingsville (CNC; ROM). Lake of Bays, Norway Pt (ROM). Lake Nipissing, including 52nd Creek (ROM). Lavant Station (ROM). Leamington (CNC). Leaside (UG). Leskard [Newcastle] (ROM). Limoges (ROM). London (Saunders 1875). London, 22 mi E (LEM). London, as Byron Bog, and Zion (MCMU; UWO). Lyn (Smith 1932, as C. oculata oculata; CNC; ROM). Maberly (LEM). Mallorytown (ROM). Marmora (CNC). Mer Bleue (CNC). Merivale (CNC; UG). Midland (UG). Miller Lake [unspecified] (UG). Mississauga (ROM). Morpeth (UG). Neebing Tp, Thunder Bay District (ROM). Nepean Tp, Carleton Co (CNC). Newmarket (UG). Niagara District, including Niagara River, Niagara

Falls, Grimsby, Queenston, and St Davids (Briand 1931, as C. oculata, and as C. albicornis; Steenburgh 1931; Smith 1932, as C. oculata oculata, C. oculata albicornis, and C. oculata illepida; Putman 1932 a; 1932 b as C. oculata albicornis, C. oculata chlorophana, C. oculata illepida, and C. oculata xanthocephala; UG). Nichol Tp [unknown] (UG). Nipigon (LEM). Noelville (UG). Peterborough Co, Nogies Creek Research Station, 6 mi NE (ROM). North Gower (CNC). Norval [Halton Hills] (UG). One Sided Lake (CNC). Ormond Beach (UWO). Orono [Newcastle] (UG). Orwell (UG). Ottawa, including Black Rapids on Rideau River, and Highland Park (Smith 1932, as C. oculata oculata, as C. oculata bipunctata, as C. oculata illepida, and as C. oculata xanthocephala; CNC; ROM; UG). Ottawa River, junction with the Madawaska River, Renfrew Co (ROM). Parry Sound (CNC). Pelee Island (ROM). Perkins [unspecified] (UG). Peterborough (UG). Pickering (ROM; UG). Pinery Prov Pk (ROM; WLUM). Point Pelee (Smith 1932, as C. oculata oculata; CNC; ROM; UG). Port Colborne (UG). Port Credit (ROM). Port Elgin (UWO). Port Hope (UG). Powassan (UG). Primrose (UG). Rainy River (CNC). Rondeau Prov Pk (ROM). St Catherines (CNC). St Martins Falls, Albany River [Ogoki] (Walker

1852, as C. latipennis, and as C. oculata, also cited by Hagen 1861 as C. latipennis and C. oculata, also cited by Throne 1971 as C. oculata at Hudson's Bay, based on Hagen 1861). St Thomas (Smith 1932, as C. oculata oculata; Smith 1932, as C. oculata carei, also cited by Brown 1934; CNC). Sand Lake [near Redditt, Kenora District] (Smith 1932, as C. oculata oculata; CNC). Sauble Falls Prov Pk, 35 km E (ROM). Sault Ste Marie (CNC; LEM). Severn Bridge [Gravenhurst] (ROM). Shirley's Bay (CNC). Silver Lake (LEM). Singhampton (ROM). Smithville (UG). Smoky Falls, Mattagami River [near Kapuskasing] (CNC; ROM). Spanish (UG). Spenceville (CNC). Stirling (UG). Stoney Creek (UG). Strathroy (Smith 1932, as C. oculata xanthocephala; CNC). Sudbury (ROM; UG). Tews Falls (MCMU). Thedford (UG). Thessalon (LEM). Thunder Bay, including Fort William, and Port Arthur (CNC; UG). Toronto (ROM; UG). Trenton (ROM). Vermillion Bay, Cedar Lake Field Station; also Cedar Lake, 20 mi S (CNC; UG). Vineland Station, including Vineland (Putman 1932 a; 1932 b, as C. oculata albicornis, as C. oculata chlorophana, as C. oculata illepida, and as C. oculata xanthocephala; Garlick 1955; Putman & Herne 1960; Hagley 1975, 1979; UG). Wagarville (CU). Waterford (CNC). Waterloo (WLUM). Westport (ROM). Wilkesport (UG). Windsor (UG).

QUEBEC Ancienne Lorette (UL). Avoca (LEM). Aylmer, including Queen's Park (Smith 1932, as C. oculata oculata, as C. oculata albicornis, and as C. oculata xanthocephala; Smith 1932, as C. oculata carei, also cited by Brown 1934; CNC). Baie Comeau (CNC). Beauharnois (LEM). Beech Grove (CNC). Berthier [Berthierville] (CNC; UdeM). Berthierville (CFRL; CNC; CSQ; UdeM). Brossard (UdeM). Cap Rouge (CNC). Chambly Canton (LEM). Chelsea (CNC; CU). Clova (CNC). Compton (Gosse 1840, as Hemerobius perla). Covey Hill (Smith 1932, as C. oculata oculata, as C. oculata albicornis, and as C. oculata xanthocephala; CNC). Duchesnay (CSQ). Gaspé (CNC). Godbout (ROM). Gracefield (CNC). Havre du Brick, Anticosti (UL). Hemmingford (Smith 1932, as C. oculata oculata, as C. oculata albicornis, and as C. oculata illepida; CNC; UQC). Hudson Heights (LEM; ZMUH). Hull, including Ottawa Club (Smith 1932, as C. oculata separata, and as C. oculata xanthocephala; CNC). Ile Jésus (UdeM). Ile-Perrot (LEM). Kazabazua (Smith 1932, as C. oculata xanthocephala; CNC). Kirks Ferry (CNC). Knowlton (Smith 1932, as C. oculata albicornis, and as C. oculata separata; CNC; ROM). Lac-Cameron, Labelle (LEM). Lac-Carré, Terrebonne (LEM). Lac-Mercier (CNC). Lac-Mondor, Ste-Flore (CNC). Lac St Louis (UdeM). Lac Serpent, Notre-Dame-du-Laus

(LEM). Lachine, Montréal (Walker 1852, as C. chlorophana; Hagen 1861, as C. transmarina). Laniel (LEM). Lanoraie (CNC; LEM). Laval (LEM). Louiseville (UdeM). Magog (LEM). Matapedia, 3 mi E (CNC). Mistassini (UdeM). Mont Albert (LEM). Montcalm Co [unspecified] (LEM). Montréal (CU; CSQ; LCCU; LEM; UdeM; USNM). Monts [unspecified] (CNC). Mont St. Hilaire (CU; LEM). Nomininque (UdeM). Oka [La Trappe, Oka-sur-la-Lac] (CSQ; UdeM). Parc du Mont Tremblant (UdeM). Piopolis, Frontenac (UL). Pointe-Claire (LEM). Pointe-des-Cascades (LEM). Québec (Provancher 1871 b, as C. oculata, and as C. transmarina; CNC; UL). Rawdon (LEM; UdeM). Rigaud (LEM; UdeM). Rivière-à-la-Chase, Hauterive (UdeM). Rougement (CNC). St-Barthélémy (UdeM). St-Aubert, L'Islet (CFRL). St-Eugène (UdeM). St-Louis-de-Blandford, Arthabaska (CSQ). St-Henri, Lévis (CFRL). St-Hyacinthe (Anon. in Provancher 1871 a, as Hémérobe perle). St-Martin, Beauce (CSQ). St-Martin Jonction (CSQ; LEM). St-Pie, Bagot (UQC). St-Thomas-de-Joliette (CSQ). Ste-Anne-de-Bellevue (LEM; USNM). Ste-Catherine, Portneuf (CNC). Ste-Clotilde, Châteauguay (SJRS). Ste-Foy (CFRL; CSQ; UL). Sept-Isles (Smith 1932, as C. oculata illepida; CNC). Shawbridge (LEM). Shawinigan Falls, 4 mi S (LEM). Sherbrooke (Banks 1903, as C. chlorophana). Tadoussac (LEM). Vaudreuil (LEM).

NEW BRUNSWICK Ashton [near Newcastle] (NFRC). Bathurst (CNC). Canterbury (CNC). Chipman (NFRC). Fredericton (CNC; MFRC; ROM). Fundy (NFRC). Green River, Madawaska Co (CNC). Jaquet Head, Restigouche Co (LEM). Kouchibougouac (CNC). Nictau (CNC). Oak Bay (NFRC). Petitcodiac (USNM). St Andrews (CNC). St John (UG). St Quentin (NFRC). Sussex (NFRC).

NOVA SCOTIA [locality unspecified: Walker 1852, as C. chlorophana; Hagen 1861, as C. transmarina, also cited, as C. oculata by Throne 1971]. Fairmont Road, Antigonish (NSM). Argyle, Yarmouth (USNM). Aylesford (NSM; USNM). Baddeck (CNC). Bridgewater (NSM). Centreville (NSM). Chester (NSM). Cheticamp (CNC). Dean (CNC). Durham (LEM). Economy Point (USNM). Halifax, including Armdale, and Boulderwood (NSM; USNM). Isle Haute, Bay of Fundy (USNM). Kentville (Smith 1932, as C. oculata oculata, as C. oculata bipunctata, as C. oculata carei, and as C. oculata xanthocephala; CNC; LEM). Kings Co, including Gaspero Road, Porter's Point, and White Rock (NSM). Kejimkujik Lake (USNM). Liverpool (CNC). Lockeport (CNC). Pictou (ROM). Portapique (LEM). Sable Island (NSM). South Ohio (LEM). Springhill (LEM). Truro (CU). Willowdale (CNC). Wolfville (KARS; LEM). Woodville [unspecified] (LEM). Wundham [unknown] (LEM).

PRINCE EDWARD ISLAND PEI Nat'l Pk, including Brackley Beach, Cavendish Beach, and Dalvay House (CNC). Charlottetown (CARS; LEM). Hunter River (CNC). Stanhope (CNC; LEM). York (CARS).

NEWFOUNDLAND [locality unspecified: Walker 1852, as C. chlorophana]. Bishops Falls (SJARS). Codroy Pond (USNM). Cornerbrook (MU; NFRC). Cow Head [N of Woody Point] (ZMUH). Deer Lake, jn Hwy 430 and Humber River (MU). Doyles (USNM). Gros Morne Pk (MU). North Branch (USNM). St George's (SJARS). St John's (Hagen 1861, as C. transmarina). Terra Nova Nat'l Pk (MU). Tompkins (SJARS).

BIOLOGICAL NOTES IN CANADA

When the adult of C. oculata is disturbed, it emits an odour (Provancher 1869). Though other chrysopids have similar habits, C. oculata is particularly well-known for its malodourous character. For this reason, and because of its abundance, Gosse's comments (1840) were attributed to this species.

As shown above, C. oculata is widespread. Perhaps we can assume that it is abundant wherever it occurs, too. Understandably, this species could be one of the very important naturally-occurring predators in the countryside, making a survey of its biology interesting, at least in relation to Canada. During studies in the Niagara Peninsula, for instance, larvae of C. oculata fed on eggs of the Oriental fruit moth (Steenburgh 1931), a pest mentioned previously in connection with Meleoma. Commenting on that outbreak, however, Putman (1932 a) said that, "C. oculata is distinctively terrestrial, ovipositing and usually resting on low vegetation. As the larvae very rarely occur on trees, it is of no value in the control of the Oriental fruit moth." For instance, Putman (1932 b) found eggs on rape and turnips, being most common in orchards with weeds or cover crops. Putman continued his observations, and he has been unfairly quoted in connection with his earlier statement (McMullen & Jong 1967 a). He delved into larval food habits and reassessed egg populations in orchards (Putman 1937). Other workers took an interest in chrysopids, too. For example, Garlick (1955) witnessed a larva of C. oculata sucking the egg of a clover mite.

Sometimes, adults of C. oculata have been caught in bait traps (Garlick 1955), or on sticky boards (Madsen & Morgan 1975). Under natural circumstances, this species has been entrapped in spiders webs in crotches of pear trees (Wilde 1963).

The presence of C. oculata in pear blocks could not help but arouse curiosity about the potential of its larva in the natural control of pear psylla, Psylla pyricola Först. (Wilde 1962; Watson & Wilde 1963; Wilde & Watson 1963; McMullen & Jong 1967 a, b). Evidence indicates that C. oculata is effective against the pear psylla (Westigard et al. 1968; McMullen 1971; New 1975), if not also against aphids in apple orchards (Hagley 1975, 1979).

As a final note, C. oculata has been host to Tetrastichus chrysopae (Crawford) [Chalcidoidea: Eulophidae] with as many as twenty-two parasites on the body of a single larva (Wilde & Watson 1963). Also in Canada, this study had one cocoon of C. oculata from which Helorus anomalipes Panzer [Proctotrupoidea: Heloridae] had emerged. The latter is well-known as a parasite of Chrysopidae (Townes 1977).

EXAMINED FROM CANADA

The total number of specimens of C. oculata may have been several thousand; no attempt was made to tally them.

CHRYSOPA PLEURALIS BANKS 1911
(Figs. 64, 65, 66, 67, 68, 73; Map 14)

Chrysopa pleuralis Banks 1911. Trans. Am. ent. Soc. 37: 341-342.

TYPE-LOCALITY

North Boulder Creek, Boulder County, Colorado, U.S.A.

CANADIAN REFERENCES

Chrysopa pleuralis; Smith 1932: 591, 601; Spencer 1942: 27; Bickley & MacLeod 1956: 192.

DESCRIPTION

HEAD (Figs. 64, 65): scape dark medially and along base near antennifer; pedicel ringed blackish-brown; flagellum pale, darker toward extremity, setae dark; maxillary and labial palpi dark, cardo black, palpiger dark; mandibles (Fig. 73 f) asymmetric tooth on left side; labrum narrow submarginal dark line, numerous small setae, a few more prominent; clypeus dark laterally, broadly reddish-brown postero-laterally, two or three pairs of prominent setae along anterior margin; frons entirely black around antennal sockets, narrow green zone along eye margin; genae longitudinal dark band eye to base of mandible, not continuous to anterior tentorial pits; vertex reddish-brown dorsolateral streaks from antennae to posterior transverse band, a brownish-black lateral band bordering eye and linking frontal markings to the posterior transverse band, continuous posteriorly on postgenae, occiput, to base of maxillae and along gular sutures ventrally; setae black.

THORAX (Fig. 66 a): pronotum dark anterolateral margin, including cervical sclerites, setae dark; alinotum sutures outlined, setae black; pleura sutures margined, setae black; fore wing with erect black setae, crossveins darkened at ends, gradates brown, outer series completely dark; hind wing with only costal crossveins dark, rest of venation green, setae black; legs (Fig. 66 b) coxal base black, setae black; trochanters and intersternites black.

ABDOMEN (Fig. 66 a): setae black, anterior segments black margins on pleural and intersegmental regions of sterna; microtholi on all sterna of male, absent on VIII+IX (Fig. 67 a). Male terminalia (Fig. 67): gonarcus narrow dorsal collar, produced dorsomedially as two caudad directed up-curved processes; entoprocessus broad proximally, down-curved distally; mediuncus arched, microsetae on proximoental aspect; gonosaccus recurved tuberculate gonosetae; gonocristae imbricated in two ventrolateral fields on hypovalva, none medially. Female terminalia (Fig. 68): subgenitale swollen proximo-medially; apical lobe shallow transverse callus, narrow proximoental cavity; spermatheca duct spiculate wart-like distortions; vela short, erect.

DISCUSSION OF VARIATION

As in C. oculata, the markings on the head of C. pleuralis varied in intensity. For instance, the genal band was subject to almost total obliteration (Fig. 65 a). Then, too, clypeal marks tended to be more extensive posterolaterally. Also, there was a variable amount of black on the maxillary stipes and palpiger.

On the ventral aspect of the head, there was much darkening around the gula and on the postgenae. However, the width of the dark area varied as did the intensity of the colour. These markings were often obscured by the cervical membranes (Fig. 64 d). Similarly, the transverse band on the dorsum of the vertex was sometimes concealed (Fig. 64 b).

In addition, variation affected the wings. Although the gradate crossveins were dark in the fore wing, the intensity of the colour varied. Also other crossveins tended to have differing amounts of dark at their ends.

DISTRIBUTION IN CANADA

C. pleuralis was found in the southern interior of British Columbia, and in the Rocky Mountains of southwestern Alberta (Smith 1932, also cited by Spencer 1942, paraphrased by Bickley & MacLeod 1956). This study added several more specific localities, filling gaps in the range.

Because some specimens had been caught at considerable altitude, C. pleuralis is probably more widely distributed than indicated here and, undoubtedly, it is more abundant than indicated by the small number of specimens available. Specific localities were (Map 14):

BRITISH COLUMBIA Ainsworth (USNM). Bootahnie Valley [Mr. D.F. Pearson, BC Representative, Canadian Permanent Committee on Geographic Names, writes (in litt. 22.VII.1980), "This is very likely Botanie Valley. Botanie Creek flows south into the Thompson River near its junction with the Fraser River at Lytton. Botanie Lake is at the head of Botanie Creek and Botanie Mtn is also in the area. Bootahnie Indian Reserve No 15 is north of Botanie Lake. Map reference N.T.S. sheet 92 I/5 at 1:50000 scale."] (ROM). Clinton (CNC). Hedley (Smith 1932, also cited by Spencer 1942; CNC). Lillooet (ROM). Merritt (Smith 1932, also cited by Spencer 1942; CNC). Nicola (SEM).

ALBERTA Banff (Smith 1932; CNC; USNM). Waterton, including Waterton Lakes (Smith 1932; CNC).

EXAMINED FROM CANADA

Four males, sixteen females, four indeterminate; total 24 specimens.

CHRYSOPA CHI FITCH 1856

(Figs. 69, 70, 71, 72, 73, 74; Map 15)

Chrysopa chi Fitch 1856. First Report Insects New York: 87.

TYPE-LOCALITY

New York, U.S.A.

CANADIAN REFERENCES

Chrysopa chi; Provancher 1869: 140; 1871 a: 142; 1871 b: 269; 1877 a: 120; 1877 b: 203-205; Brodie & White 1883; Gibson 1914: 127; 1915: 149; Bickley & MacLeod 1956: 192; Tjeder 1960: 148; Bram & Bickley 1963: 8; Throne 1971: 70.

Chrysopa chi chi; Smith 1932: 592; Spencer 1942: 27.

Chrysopa chi upsilon; Smith 1932: 592; Spencer 1942: 27.

Chrysopa upsilon; Provancher 1871 a: 142; 1871 b: 269; 1877 a: 120; 1877 b: 203, 205; Brodie & White 1883.

Chrysopa ypsilon; Banks 1903: 148; Gibson 1912: 110; 1913: 137; 1914: 128; Brown 1934: 211.

DESCRIPTION

HEAD (Figs. 69, 70): scape unmarked; pedicel ringed black; flagellum pale; maxillary and labial palpi all divisions blackish-brown, cardo unmarked; mandibles (Fig. 73 g) asymmetric tooth on left side; labrum unmarked, small setae and a few more prominent; clypeus broad black lateral patches, several prominent setae along anterior margin; frons black interantennal mark, continuous beneath antennal sockets; genae broad black longitudinal band anteriorly, not reaching margin of eye; vertex pair of dorsolateral brownish-black spots posteriorly, variable in extent, another pair of postero-lateral black patches on postgena near attachment of cervical membranes.

THORAX: pronotum three pairs of dorsolateral black patches (Fig. 69 b), setae black mixed with pale ones, alinotum black spots, setae amber; pleura unmarked, setae pale; fore wing crossveins dark at extremities, gradates black; hind wing similar, costal crossveins mostly black; legs unmarked, setae dark, claws excised (Fig. 74 e); venter black on membrane and intersternites.

ABDOMEN: setae amber, darker on venter; male microtholi on all sterna, absent on VIII+IX (Fig. 71 a). Male terminalia (Fig. 71): gonarcus unmodified dorsally; entoprocessus arched distally, tapering to point at apex; mediuncus obtusely angled, microsetae proximoentally; gonosaccus recurved tuberculate gonosetae; gonocristae narrow, imbricated in two ventrolateral fields on hypovalva, none medially. Female terminalia (Fig. 72): subgenitale partly membranous proximally; apical lobe shallow transverse callus, proximoental cavity; spermatheca duct spiculate; vela short, erect.

DISCUSSION OF VARIATION

Fitch (1856) described this species as two separate taxa, basing his definitions upon extremes in a contiuum of variable interantennal and other head markings. At a later date, biological studies demonstrated that only one species was involved (Smith 1922).

Here, again, variation was noticed, especially in the head markings but also in the terminalia. It was useful to examine the terminalia of many specimens in order to be convinced that, across Canada, there was only one species (Bram & Bickley

1963). To illustrate the problem, a number of specimens from Dawson, Yukon, were much darker on the venter of the thorax and abdomen. Even among themselves, though, there was variation in the male mediuncus (Fig. 71 i-l), in thickness and in the extent of arching. Similarly, the entoprocessus (Fig. 71 m-p) differed in thickness and distal curvature, as well as in the acuteness of the apex. The subgenitale in females differed, too, although the variation compared favourably with what had been observed in eastern specimens (cf. Fig. 74 c-h with a, i-j). Evidently, the black colour on the cervix, thorax, and abdomen in Yukon specimens was superficial variation. Indeed, C. chi in alder thickets on Ile Perrot, Québec, had the full range of variation, including a darkened venter.

Reviewing head patterns, the markings most variable are interantennal and subantennal, and on the vertex (Smith 1922). Sometimes, the inter-antennal mark was Y-shaped (Fig. 69 a), spots on the vertex and below the antennae tending to be isolated. However, some specimens had expanded subantennal lunules (Fig. 70 a), representing a gradation toward the extreme in which the interantennal mark was X-shaped. In the latter case, the spots on the vertex coalesced with the dorsal arms of the interantennal mark (Fig. 70 b).

DISTRIBUTION IN CANADA AND ALASKA

C. chi has been found in all Canadian Provinces and Territories, as well as in Alaska where, formerly, it had not been documented (Bickley & MacLeod 1956; Throne 1971). In this analysis, specimens corroborated most previous records, with few exceptions (Gibson 1914, re Departure Bay; Smith 1932, re Teulon and Blacksburg; Brown 1934, re Timagami; Tjeder 1960, re Kittysbrook). Specific localities were (Map 15)[1] :

ALASKA [not mapped] Big Delta (CNC). Fairbanks (NSM). Mile 290, Richardson Hwy (CNC).

YUKON TERRITORY Dawson (CNC).

NORTHWEST TERRITORY Fort Smith (CNC). Norman Wells (CNC).

BRITISH COLUMBIA Agassiz (Smith 1932, as C. chi chi, and as C. chi upsilon, the latter recorded by Spencer 1942; CNC). Barrière (CNC). Bear Lake [Cariboo District] (USNM). Burnaby (SEM). Carbonate, Columbia River (CU). Clinton (CNC). Coquitlam (SEM). Departure Bay (Gibson

[1] see p. 413 for late additions [YUKON]

1914, as C. ypsilon). Downie Creek, 10 mi N (SEM). Haney, as The University of British Columbia Research Forest (ROM). Hazelton (Smith 1932, as C. chi chi; CNC). Kamloops (Spencer 1942, as C. chi upsilon; SEM). Kaslo (USNM). Liard Hot Springs [Liard River] (CNC). MacGillivray Ck Game Reserve near Chilliwack (CNC). Milner (MCZ). Mission City (CNC). New Westminster (UWO). Nicola (CNC). Pouce Coupé (CNC). Quesnel (SEM). Rolla (Smith 1932, as C. chi chi; CNC). Sicamous (Smith 1932, as C. chi chi; CNC). Slocan Park (SEM). Soda Creek (SEM). Terrace, including Gagnon Rd, Kleanza Ck, and Lakelse Lake Bog (CNC). Trinity Valley (SEM). Vancouver (Smith 1932, as C. chi chi, and as C. chi upsilon, the latter also cited by Spencer 1942; MCZ; SEM). Vancouver Island (Smith 1932, as C. chi chi; CNC). Vernon (Smith 1932, as C. chi chi; CNC; SEM). West Crescent Valley [Crescent Valley] (SEM).

ALBERTA Banff (CU). Beaverlodge (UAE). Bellevue (BCPM). Calgary (UAE). Claresholm (UAE). Cooking Lake (UAE). Delburne (UG). Demmitt (CNC). Edmonton (Smith 1932, as C. chi chi; CNC; UAE). Fawcett (UAE). Grande Prairie (CNC). Gull Lake (UAE). High Prairie (CNC). Hines Creek (CNC). Kananaskis (CNC). Lac la Biche (CNC). Lethbridge (Smith 1932, as C. chi chi; CNC). Rycroft (CNC). Seebe (CNC). Wabamun (UAE). Waterton Lakes Nat'l Pk (CNC; WLNP). Wetaskiwin (UAE).

SASKATCHEWAN Big River (UG). Indian Head (IHTN). Kenosee (CNC). La Ronge (SMNH). Love (USS). Milliken Lake (SMNH). Nesslin Lake (USS). Prince Albert (Gibson 1914, as C. ypsilon; CNC; ROM). Saskatoon (Smith 1932, as C. chi chi; CNC).

MANITOBA Aweme (Smith 1932, as C. chi chi; CNC). Carberry (CNC). Cedar Lake (MCZ). Dauphin (Gibson 1914, as C. ypsilon; MCZ; ROM). Duck Mt Forest Reserve (CNC). Falcon Lake Campground, Whiteshell Prov Pk (ROM). Forrest, 2 mi N [Forrest Station] (CNC). Lockport (UMW). Ninette (CNC). Red Rock (CNC). Rennie (CNC). Riding Mt Nat'l Pk (CNC). Shilo, 5 mi SW (CNC). Teulon (Smith 1932, as C. chi chi). Treesbank (Smith 1932, as C. chi upsilon; MCZ). Winnipeg (Gibson 1912, as C. ypsilon; Smith 1932, as C. chi upsilon; CNC; LEM; MCZ).

ONTARIO Algoma (CNC). Algonquin Pk, including Lake Opeongo (APM; MCMU; ROM; UG). Bainsville (LEM). Belwood (UG). Biscotasing (CNC). Blackburn (UG). Blacksburg [unknown] (Smith 1932, as C. chi upsilon). Brittania [Ottawa] (Smith 1932, as C. chi upsilon; CNC). Brooklin [Whitby] (UG). Burk's Falls (Smith 1932, as

C. chi upsilon; CNC). Calabogie, 2 mi SE (ROM). Carson Lake, N of Algonquin Pk (ROM). Cochrane (CNC). Cumberland (UG). Favourable Lake (ROM). Finland (CNC). Go Home Bay (CNC). Guelph (UG). Harris Hill (CNC). Hornings Mills (ROM). Islington (MCZ). Kendal (ROM). Kenora (CNC). Lake Nipissing (ROM). Leskard (ROM). Marmora (UG). Miner's Bay (CNC). Minnitaki (CNC). Nestor Falls (CNC). Nipigon (Gibson 1914, as C. chi, also as C. ypsilon; Smith 1932, as C. chi chi; ROM). Ogoki (CNC). One Sided Lake (CNC; ROM). Orono [Newcastle] (ROM). Ottawa, including Merivale (CNC; UG). Plantagenet (ROM). Rainy River District (ROM). Rushing River Prov Pk (ROM). Sand Lake (Smith 1932, as C. chi upsilon; CNC). Smoky Falls, Mattagami River (CNC). Neebing, South Neebing Tp [Neebing Tp, Thunder Bay District] (ROM). Thunder Bay (UG). Timagami (Brown 1934, as C. ypsilon, on Bear Island, Lake Temagami). Toronto (Gibson 1913, as C. ypsilon; ROM). Vermilion Bay (CNC). Waubamik (CU).

QUEBEC Aylmer (Smith 1932, as C. chi chi; CNC). Avoca (LEM). Baie James (UdeM). Berthierville (UdeM). Bic (UdeM). Cap Rouge (CNC). Cascade (Smith 1932, as C. chi chi; CNC). Cascapedia, including Cascapedia River (CNC). Chelsea (CNC). Chicoutimi (UQC). Covey Hill (Smith 1932, as C. chi chi; CNC). Fort Coulonge (CNC). Foster (UQC). Gaspé Co [unspecified] (CNC).

Georgeville (CNC). Hudson Heights (ZMUH). Hull (CU). Ile Perrot, including Pincourt, and Point-du-Moulin (LEM). Kazabazua (Smith 1932, as C. chi chi; CNC). King Mt [Gatineau Prov Pk] (CNC). Kingsmere (CNC). Knowlton (Smith 1932, as C. chi chi, also as C. chi upsilon; CNC). Lac-Cameron (LEM). Lac-Mondor, Ste-Flore (CNC). Lacoste (CNC). Lac St Louis (UdeM). Laniel (CNC). Lanoraie (CNC; LEM). La Trappe [Oka-sur-la-Lac] (UdeM). Laval (LEM). Meach Lake (CNC). Megantic (CU). Mont Albert (CNC). Montfort (CU). Montigny (CNC). Mont-St-Hilaire (CU; LEM). Montréal, including Mount Royal (LEM). Norway Bay (USNM). Parc du Mont Tremblant, including Ruisseau Beattie (UdeM). Port Cartier, 107 mi N (UdeM). Québec (Provancher 1871 b, as C. chi, also as C. upsilon; UL). Rigaud (LEM). Rivington, 6 mi E (LEM). Rougemont (CNC). Routhierville (USNM). Ste-Anne-de-Bellevue, including Morgan Arboretum (LEM; USNM). Ste-Clotilde, Châteauguay (SJRS). Ste-Foy (CRFL; CSQ). St-Hippolyte (UdeM). St-Théodore-de-Chertsey (LEM). Shawbridge (LEM). Sherbrooke (Banks 1903, as C. ypsilon; CU). Val-Cartier (UL). Wright (CNC).

NEW BRUNSWICK Fredericton (Smith 1932, as C. chi upsilon; CNC). Kouchibouguac Nat'l Pk (CNC). St John (UG).

NOVA SCOTIA Antigonish, including 5 mi E, and Beech Hill

(NSM; USNM). Armdale (NSM; USNM). Aylesford (USNM). Blomidon (CNC). Canard (CNC). Chester (NSM). Durham (LEM). Fairmont (NSM). Inverness (USNM). Kentville (Smith 1932, as C. chi chi; CNC). Meat Cove (UdeM). Pictou (Gibson 1915, as C. chi; ROM). Portapique (LEM). St Paul Island, Cabot St (USNM) Truro (CU; LEM).

PRINCE EDWARD ISLAND Alberton (CNC). Dalvay House, PEI Nat'l Pk (CNC).

NEWFOUNDLAND Bell Island (SJARS). Bishops Falls, including Exploits River near Bishops Falls (SJARS; USNM). Bloomfield, NW Arm, Bonavista Bay (USNM). Deer Lake, including 5 mi SW (MU; USNM). Eastport (USNM). Exploits River, Pond Bridge [unknown] (USNM). Holyrood, Conception Bay (USNM). Gander (CNC; USNM). Glenwood, including 12 mi S (Tjeder 1960, as C. chi; MU). Grand Falls (MU). Kittysbrook (Tjeder 1960, as C. chi). Millville, Codroy River (USNM). Mt Pearl (SJARS). Norris Point (SJARS). Pasadina (MU). Portugal Cove (MU). Rocky Harbour (SJARS). St George's, including 3 mi SE (SJARS; USNM). St John's, including Oxen Pond (CNC; MU; SJARS). Shoal Harbour (SJARS). Terra Nova Nat'l Pk (USNM). Tompkins (SJARS).

EXAMINED FROM CANADA

244 males, 279 females, and 33 indeterminate; total of 556 specimens.

GENUS CHRYSOPERLA (STEINMANN 1964) SEMERIA 1977

Chrysoperla Steinmann 1964. Annls. hist.-nat. Mus. natn. hung. 56: 260.

INTRODUCTION

On the basis of the genitalia in the type-species, Chrysoperla carnea (Stephens), three species in the Canadian fauna were assigned to this genus. Tjeder (1966 b) included Chrysopa comanche Banks, a North American member of the carnea-group in which, "the arcessus is slender and the entoprocessus rather small; cell im with its tip not extending beyond the 1st radio-medial crossvein." Bram and Bickley (1963) showed that C. rufilabris and C. harrisii in Maryland belonged to the same species-group. The characteristic was a tignum (Bram & Bickley op. cit., as transverse arch), and absence of gonocristae.

By elevating the subgenus Chrysoperla Steinmann to generic rank, Sémériа (1977 a) took larval habitus and overwintering state into consideration, noting that, "La larve de Anisochrysa (Chrysoperla) carnea Stephens ne montre que fort peu de points communs avec celles d'Anisochrysa; elle se rapproche beaucoup, au contraire, des larves de Chrysopa: même cycle rapide, même voracité et, surtout même nudité complète. D'un

autre côté, par le régime alimentaire de l'imago, carnea s'apparenterait plutôt à Anisochrysa. On se trouve donc devant un problème fort ambigue: par sa larve, principalement, on classerait volontiers cette espèce dans le genre Chrysopa (Tjeder, Hölzel), mais par son imago, on la rangerait plutôt dans le genre Anisochrysa (sensu Hölzel). --- Les arguments de Tjeder et Hölzel n'incluent qu'accessoirement la biologie des espèces des différents genres. De plus en plus, il deviendra nécessaire de faire appel à d'autres dimensions génériques, telles que celles de l'écologie et de l'éthologie. En ce qui nous concerne, outre l'aspect et le comportement des larves qui justifient la distinction entre Chrysopa et Anisochrysa, il nous semble que l'on rencontre chez les Chrysopinae, doivent constituer des critères taxonomiques complémentaires et décisifs. Les formes du genre Anisochrysa passent l'hiver à l'état larvaire, celles du genre Chrysopa à l'état prénymphal et celles de Chrysoperla à l'état imaginal. --- Compte tenu des considérations précédentes, il semble souhaitable de proposer d'élever le sous-genre Chrysoperla au rang d'un genre." [read Mallada for Anisochrysa (Adams 1975)]

Consequently, Chrysoperla was treated here as a genus. Tjeder's (1966 b) subgeneric characterisation admitted species to Chrysoperla provided:

1) the mandibles were asymmetric, the left one with a tooth (Fig. 98);
2) the pretarsal claws were excised (Fig. 74 i);
3) the wings had two series of gradate crossveins (Fig. 97), and the intramedian cell of the fore wing was triangular;
4) the male terminalia (Fig. 93) had a tignum, a pair of entoprocessus associated with the gonarcus, a mediuncus associated with the gonarcus in the form of a slender arcessus, a tongue-like gonosaccus with short straight gonosetae, but no gonapsis or gonocristae.

In the female, at least in Canadian representatives, the subgenitale was membranous proximally, with microsetae. Also, the male did not have microtholi on the abdominal sterna. Another trait, spinellae on the gonosaccus ventrally, was variable within the genus (Tjeder 1966 b) and not found in the type-species, C. carnea.

In the Canadian fauna, three species satisfied these criteria: C. rufilabris, C. harrisii, and C. carnea. Although C. comanche was not seen from British Columbia, it was included for comparative purposes. In the key, C. comanche would follow the sequence leading to C. harrisii, because the two taxa are so similar. Further analysis was beyond the scope of this study, though C. harrisii was east of the Great Plains, and C. comanche, if present at all, would be intermontane.

KEY TO SPECIES OF CHRYSOPERLA IN CANADA

1 a	Gradate crossveins black	rufilabris
1 b	Gradates green	2
2 a	MALE: arcessus deflected at apex; gonosaccus with sparse gonosetae; spinellae absent; FEMALE: subgenitale with shallow transverse callus	carnea
2 b	MALE: arcessus tapering to a point at apex; gonosaccus with dense gonosetae, and spinellae; FEMALE: subgenitale with prominent transverse callus	harrisii

CHRYSOPERLA RUFILABRIS (BURMEISTER 1839) NEW COMBINATION (Figs. 79, 80, 81, 82, 98; Map 16)

Chrysopa rufilabris Burmeister 1839. Handb. Ent. 2: 979.

TYPE-LOCALITY

Central America

CANADIAN REFERENCES

Chrysopa rufilabris; Gibson 1913: 137; 1915: 149; Putman 1932 a: 44-45; 1932 b: 121-126 Ross 1932: 40-43; Smith 1932: 597; Ross & Putman 1934: 37; Putman 1937: 29-37; Garlick 1955: 281-282, 326-328; Putman 1955: 24; Bickley & MacLeod 1956: 194; Putman 1956: 520; Putman & Herne 1958: 668, 670-671; 1960: 200; Dustan 1961: 224; Putman 1963 a: 37; Herne & Putman 1966: 937, 939; Putman & Herne 1966: 811-812; Throne 1971: 74; Tauber 1974: 1149-1150; New 1975: 129; Hydorn & Whitcomb 1979: 293.

DESCRIPTION

HEAD (Fig. 79): antennae unmarked; maxillary and labial palpi dark on ectal aspect; mandibles (Fig. 98 a) asymmetric tooth on left side; labrum scattered setae; clypeus faintly marked posterolaterally, scattered setae, several more prominent anteriorly; frons marked along frontogenal sutures narrow reddish-streak; genae longitudinal reddish band from eye to base of mandibles, continuous mesad to anterior tentorial pit and posterolateral angle of clypeus; vertex raised, reddish above antennae.

THORAX: pronotum two pairs lateral marks, dorsolateral bands, setae whitish-amber; alinotum continuation of pronotal bands, setae whitish; pleura unmarked, setae amber to white; wings (Fig. 82) gradate crossveins black, other crossveins darkened at extremities, setae amber; legs unmarked, setae amber-brown.

ABDOMEN: setae amber. Male terminalia (Fig. 80): arcessus arched; entoprocessus fused with gonarcus, reduced dorsally; tignum, acumen; gonosaccus straight gonosetae, spinellae. Female terminalia (Fig. 81): subgenitale membranous proximally, microsetae; apical lobe prominent transverse callus, proximoental cavity; spermatheca duct long, smooth; vela arched.

DISCUSSION OF VARIATION

C. rufilabris had reddish genae, forming a regular band. A more diffuse reddish tint on the vertex and dorsolaterally on the thorax was faded after prolonged storage.

Some males of C. rufilabris from Texas, Kansas, and Florida have microsetae on the arcessus (Bram & Bickley 1963). In ten males from throughout the range of the species' Canadian distribution, the arcessus had weak striae proximoentally, but no microsetae (Fig. 80e).

DISTRIBUTION IN CANADA

Previous workers recorded this species from southern Ontario (Gibson 1913; 1915; Putman 1932 a; Smith 1932), repeated a number of times (Bickley & MacLeod 1956, also cited by Throne 1971; Tauber 1974; Hydorn & Whitcomb 1979). The earlier accounts were based upon very few specimens. For instance, Smith (1932) had only four specimens. Despite the small number of specimens to support earlier citations, determinations were verified with the exception of records from Grimsby and Niagara (Putman 1932 b), as well as the many biological accounts for which there appear to have been no voucher specimens.

Nevertheless, now the range of C. rufilabris included southern Québec, and Sable Island in the Atlantic Ocean 150 miles off Halifax, Nova Scotia (Howden 1970). Specific localities were (Map 16):

ONTARIO Algonquin Prov Pk, as Lake Opeongo (MMU). Biscotasing (CNC). Chatham (UWO). Grimsby (Putman 1932 b). Guelph (UG). Harrow (MMU; UG). Niagara (Putman 1932 b). Niagara Peninsula, including west of Ste Catharines (Ross 1932; Ross & Putman 1934; Putman 1955; 1956; Putman & Herne 1958; Putman 1963 a; Putman & Herne 1966). Ottawa (Smith 1932; CNC). Pt Pelee Nat'l Pk, including Pt Pelee (CNC; LEM). Port Credit (ROM). Rondeau Prov Pk (ROM). St Davids (Putman 1932 a; UG). Southampton (CNC). Toronto (Gibson 1913; 1915; MCZ; ROM). Vineland (Smith 1932; Putman 1932 a, b; Garlick 1955; Putman & Herne 1960; CNC).

QUEBEC Laval (LEM). Ste-Anne-de-Bellevue (LEM).

NOVA SCOTIA Sable Island, including Main Station, and Met Station (NSM).

BIOLOGICAL NOTES IN CANADA

For a species which was not very plentiful in museums, C. rufilabris has figured importantly in biocontrol and toxicological studies in Canada. During the outbreak of fruit moth in the 1930's in the Niagara Peninsula, this species was typically arboreal and present in large numbers on peach trees (Ross 1932; Putman 1932 a; Ross & Putman 1934; Dustan 1961). Its eggs and larvae were found in orchards between Niagara and Grimsby (Putman 1932 b), encouraging study of its life history and bionomics (Putman 1932 a, b; 1937). At a later date, in apple orchards in the Niagara Peninsula, it was an important predator of codling moth eggs, Laspeyresia pomonella (L.) (Putman 1963 a).

As a result of these early studies, the larva is now known to be an important general predator in eastern Canadian orchards, feeding freely on all stages of certain phytophagous mites, including European red mite, Panonychus ulmi (Koch) which, apparently, forms a large part of its diet (Putman & Herne 1958; 1966). Eggs and immature stages of other predators fall prey, too, such as the coccinellid, Stethorus punctillum Weise (Putman 1955).

Adult C. rufilabris feed on honeydew and nectar from peach tree leaf-glands (Putman 1963 a; Putman & Herne 1966).

The relative abundance of C. rufilabris in the Niagara Peninsula very drastically declined from its level during the 1930's. There is no longer any question about the susceptibility of its larvae to pesticides, such as DDT (Putman 1956; Putman & Herne 1958), whereas only sulphur had been in vogue during the earlier era, evidently without toxic effects (Herne & Putman 1966). Understandably, other recent pesticides, such as parathion and carbaryl, are toxic to larvae of C. rufilabris (Putman & Herne 1960; Herne & Putman 1966; New 1975). The history of this species shows a decline in adult captures in bait traps (Garlick 1955), and it appears to have been virtually eliminated from Niagara orchards (Herne & Putman 1966).

EXAMINED FROM CANADA

Fourteen males, twenty-two females, two indeterminate, total 38 specimens.

CHRYSOPERLA HARRISII (FITCH 1856) NEW COMBINATION
(Figs. 83, 84, 85, 86, 98; Map 17)

Chrysopa harrisii Fitch 1856. First Report Insects New York: 90.

TYPE-LOCALITY

New York State, U.S.A.

CANADIAN REFERENCES

Chrysopa downesi; Putman 1932 b: 121-126; Smith 1932: 584 (footnote 4); Putman 1937: 29-37.

Chrysopa harrisii; Smith 1932: 595-596 (partim); Judd 1949: 461-464; Garlick 1955: 282, 326, 328; Bickley & MacLeod 1956: 193; Throne 1971: 73; Tauber 1974: 1148-1149; Tauber & Tauber 1974: 969.

DESCRIPTION

HEAD (Fig. 83): antennae unmarked; maxillary and labial palpi amber-brown; mandibles (Fig. 98 b) asymmetric tooth on left side; labrum unmarked, setae short; clypeus diffuse reddish-brown laterally; frons reddish-brown laterally, to frontogenal sutures; genae suffused with reddish-brown from eye to base of mandible, continuous to anterior tentorial pits and clypeus, narrow region between eye and frontogenal suture unmarked; vertex reddish streak bordering eye posteriorly.

THORAX: pronotum dorsolateral reddish-brown bands, continuous on alinotum, setae amber-brown; pleura unmarked, setae pale; wings (Fig. 86) green membrane, venation, and gradates, setae amber-brown; legs unmarked, setae amber.

ABDOMEN: setae whitish anteriorly, amber-brown posteriorly. Male terminalia (Fig. 84): arcessus arched; entoprocessus fused with gonarcus; tignum, acumen; gonosaccus gonosetae, spinellae. Female terminalia (Fig. 85): subgenitale proximally membranous, microsetae; apical lobe prominent transverse callus, proximoental cavity; spermatheca duct smooth, long; vela long, arched.

DISCUSSION OF VARIATION

The wings of C. harrisii were dark green; the veins were pale green, including the gradates. The wings were elongate and pointed at the apex. The only noticeable variation was in overall size. The point is that the wings of this species closely resembled the winter form of Chrysoperla carnea [C. downesi auctorum], undoubtedly the reason why certain eastern records were referred to C. downesi (Putman 1932 b; Smith 1932; Putman 1937). Conversely, this may explain why some western specimens were called C. harrisii (Smith 1932, re Comox and Victoria, paraphrased as British Columbia by Tauber & Tauber 1974).

Yet, the genitalia of C. harrisii were sufficiently distinctive to obviate misidentification. Only the wings were similar. The markings on the head of C. harrisii were invariably reddish-brown and extensive on the genae and laterally on the frons. C. carnea from the northwest, particularly overwintered individuals, had more red.

Regarding the other eastern species, C. rufilabris, the only difference from C. harrisii was the colour of the gradate crossveins. In C. harrisii, the crossveins were entirely green, like the remainder of its venation. The reddish suffusion of the genae and frons in C. harrisii was often much faded.

DISTRIBUTION IN CANADA

The close resemblance of C. harrisii to C. rufilabris was increased by their distribution in Canada. Both were eastern, despite a contrary statement to the effect that C. harrisii occurs across southern Canada (Tauber 1974). That statement simply repeated earlier mistakes and, in this instance, the error traces to Smith's (1932) erroneous British Columbia records. His specimens were C. carnea, misidentified. This probably was the case, also, with the Fort Yukon, Alaska, record (Bickley & MacLeod 1956), though the specimen could not be verified (Bickley in litt. 22.XII.1980).

The only reliable western record of C. harrisii was from Minnesota (Parfin 1952), while this study had specimens from southern Manitoba and northwestern Ontario. Otherwise, the range of C. harrisii must be completely revised, eliminating the western component but, at the same time, noting Manitoba, Québec, and Sable Island, Nova Scotia. Specfic localities were (Map 17):

MANITOBA Winnipeg, as Fort Garry (CNC).

ONTARIO Agincourt [Scarborough] (UG). Ballantrae (CNC). Baxter (LEM). Biscotasing (CNC). Chalk River (LEM). Chatham (UWO). Dunnville (UG). Eldyne [unknown] (CNC). Ft Frances (CNC). Go Home Bay (CNC). Grimsby (UG). Guelph (UG). Hamilton (Judd 1949; MCMU). Madawaska (CNC). Meaford (UG). Niagara Peninsula, including Niagara (Putman 1932 b, as C. downesi; Smith 1932, as C. downesi; Putman 1937, as ?C. downesi). Ottawa (CNC). ?Paris (CNC: including a larva). Pontypool (CNC). Port Credit (ROM). St Davids (Smith 1932, as C. downesi; UG). Sault Ste Marie (GLFRC). Sauble Beach (GLFRC). Toronto (ROM). Vineland (Garlick 1955). Whitby (UG).

QUEBEC Berthierville (CSQ; UdeM). Ste-Anne-de-Bellevue (LEM).

NOVA SCOTIA Sable Island, including Main Station, and Met Station (CNC; NSM).

BIOLOGICAL NOTES IN CANADA

C. harrisii was present in Niagara Peninsula orchard studies during the 1930's, but never common (Putman 1932 b, as C. downesi). Nevertheless, it was reared and described (Putman 1937, as ?C. downesi). Again, in apple orchards near Vineland, it was caught in bait pails (Garlick 1955), though the specimens probably were not retained as voucher material.

In addition to the earlier life history studies, cocoons of C. harrisii were obtained from Austrian pines on the McMaster University campus and parasites were reared (Judd 1949). The parasites (MCMU) were re-determined here by Mr. M. Ivanochko and Dr. C. Yoshimoto, Biosystematics Research Institute, Ottawa, as the ichneumonids Dichrogaster crassa (Provancher) and Gelis tenellus (Say), and the chalcidoid pteromalid Pachyneuron altiscutum Cook.

EXAMINED FROM CANADA

101 males, 104 females, 9 indeterminate; total 214 adults, one larva.

CHRYSOPERLA COMANCHE (BANKS 1938) NEW COMBINATION (Figs. 87, 88, 89, 90, 98)

Chrysopa comanche Banks 1938. Can. Ent. 70: 119-120.

TYPE-LOCALITY

Laredo, Texas, U.S.A.

DESCRIPTION

HEAD (Fig. 87): antennae unmarked; palpi amber; mandibles (Fig. 98 c) asymmetric tooth on left side; labrum unmarked, scattered setae; clypeus unmarked, several longer setae anteriorly; frons reddish laterally along frontogenal sutures; genae broad longitudinal reddish band from eye to base of mandible, continuous to anterior tentorial pits; vertex unmarked.

THORAX: dorsolateral bands faint; setae yellowish-amber; pleura unmarked, setae pale; wings (Fig. 90) dark setae, venation yellowish-green; legs pale, setae darker.

ABDOMEN: setae amber-brown. Male terminalia (Fig. 88): tignum, acumen; entoprocessus fused to gonarcus, obscure; arcessus smooth dorsally, arched; gonosaccus gonosetae, spinellae. Female terminalia (Fig. 89): subgenitale proximally membranous, microsetae; apical lobe prominent transverse callus, proximoental cavity; spermatheca duct smooth, vela erect, arched.

DISCUSSION OF VARIATION

A long series of C. comanche from Arizona havewell-defined reddish genal markings or none at all, the holotype from Texas having only faint red marks (Adams 1957). On the vertex, there is a lateral dot or line of red bordering the eye (Banks 1938 b). In the wing, the cubital cells are less than twice as high as broad (Banks op. cit.). The wing was narrower than in C. carnea, with which C. comanche might be confused (cf. Figs. 90, 97).

CHRYSOPERLA CARNEA (STEPHENS 1836) SEMERIA 1977
(Figs. 74, 91, 92, 93, 94, 95, 96, 97, 98; Map 18)

Chrysopa carnea Stephens 1836. Illustrations of British Entomology 6: 103.

Chrysopa downesi Smith 1932. Ann. ent. Soc. Am. 25: 594-595. SYN. NOV.

Chrysoperla carnea; Séméria 1977. Nouv. Rev. Ent. (VII) 2: 235-238.

TYPE-LOCALITY

"Britain" [Barnard in litt. 9.II.1981]

CANADIAN REFERENCES

Chrysopa californica; BC Dept Agric 1906: 3.

Chrysopa carnea; Wilde 1962: 847; Putman 1963 a: 37; 1963 b: 109; Wilde 1963: 48-49; Judd 1964: 990; Herne & Putman: 1966: 937, 939; Putman & Herne 1966: 811-812; Judd 1967: 54; McMullen & Jong 1967 a: 35, 36; 1967 b: 1293; McMullen 1971: 34; Tauber & Tauber 1973: 1159-1163, 1165; New 1975: 124, 129; Bucher & Bracken 1976: 26-30; Philogene & Chang 1979: 56; Burgess 1980: 745-746.

Chrysopa downesi Smith 1932: 594-595, 601; Brown 1934: 141; Spencer 1942: 27; Bickley & MacLeod 1956: 193; MacLeod 1967: 1348; Tauber 1974: 1145, 1148.

Chrysopa externa; Saunders 1875: 153; Brodie & White 1883.

Chrysopa harrisii; Smith 1932: 595-596 (partim); Foster 1942: 22; Spencer 1942: 27; Bickley & MacLeod 1956: 193; Throne 1971: 73 (partim).

Chrysopa harrisii externa; Smith 1932: 596; Spencer 1942: 27; Robinson 1952: 36.

Chrysopa plorabunda; Putman 1932 a: 44-45; 1932 b: 121-126; Smith 1932: 584 (footnote 4), 593, 601; Ross & Putman 1934: 37; Putman 1937: 29-37; Spencer 1942: 27; Garlick 1955: 281-282, 326-328; Putman 1955: 24; Bickley & MacLeod 1956: 192-193; Putman 1956: 520; Putman & Herne 1958: 668, 670-671; 1960: 200, 201; Dustan 1961: 224.

Chrysopa plorabunda californica; Smith 1932: 594; Spencer 1942: 27; Robinson 1952: 36.

Chrysopa sperryae; Bickley & MacLeod 1956: 194.

DESCRIPTION

HEAD (Figs. 91, 92): antennae unmarked; maxillary and labial palpi dark on ectal aspect, stipes dark streak; mandibles (Fig. 98) asymmetric tooth on left side; labrum unmarked, scattered setae; clypeus reddish-brown laterally, several longer setae anteriorly; frons unmarked, or reddish-brown laterally; genae reddish-brown or brownish- black longitudinal band from eye to base of mandibles, continuous with clypeal markings; vertex unmarked.

THORAX: pronotum dark along margin of cervix, dorsolateral reddish bands; setae dark amber, some lighter; alinotum unmarked, darker dorso-laterally; pleura unmarked, setae amber; wings (Fig. 97) dark erect setae, venation entirely green; legs pale, setae darker.

ABDOMEN: setae amber-brown. Male terminalia (Fig. 93): arcessus dorsal ridges, apex deflected; tignum, acumen; entoprocessus distinct laterally, fused with gonarcus; gonosaccus gonosetae

sparse, no spinellae. Female terminalia (Fig. 96): subgenitale membranous proximally, microsetae; apical lobe shallow transverse callus, proximoental cavity small; spermatheca duct smooth; vela erect, arched.

DISCUSSION OF VARIATION

The most significant variation in C. carnea involved a winter phenotype, formerly known as Chrysopa downesi, notwithstanding biological differences (Henry 1979; Tauber & Tauber 1979)[1]. The types of C. downesi in the Canadian National Collection, and other sources, included an holotype female and forty-two paratypes (Smith 1932), though some were not labelled as such. To correct the type locality, the holotype was from Vernon on the specimen's label, not Kelowna (Smith op. cit., also cited by Brown 1934, and by Bickley & MacLeod 1956). The types were collected during October to January, with the exception of five paratypes collected in April, May, June, and July. The latter were indistinguishable from C. carnea in colour pattern of the head and body, and in wing conformation. These five specimens, labelled as paratypes, established that

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[1] New (1975) discussed these biological anomalies in a context of research on the phenology of other species, including [Chrysoperla] carnea and Chrysopa perla, reminding the reader of Canard's work (Canard in New op. cit.) in which evidence demonstrated that, in both of these species, discrete generations may be obscured to some extent by diapause effects occurring in only part of each generation, and making it necessary for prudent interpretation of experimental study of behavioural and physiological ecology.

the concept of "downesi" as a species was vague. The remaining paratypes, and the holotype, were collected during the winter, probably from under bark (Dennys 1927). This was the source of material for biocontrol projects in New Zealand (Smith 1932, also cited by Bickley & MacLeod 1956)[1]. The winter insects had narrower wings (Fig. 97 c, d), and a darker green oily appearance not present in summer-collected specimens such as the five odd paratypes. Similar tendencies in colour and oiliness were evident during September in southwestern Québec. Taxonomically, this study found nothing upon which "downesi" could be structured to retain it as a species.

In specimens of the winter phenotype, exemplified by the types of C. downesi, the head was reddish-orange, and there was reddish-brown laterally on the frons. Dorsolaterally on the thorax, there were reddish bands which varied in individual specimens.

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[1] New (1975) records a more recent attempt to establish C. carnea in New Zealand from Californian stocks, noting that its failure may have been due to the absence in New Zealand of readily available symbiotic yeasts, such as a Torulopsis yeast which may be important in the synthesis of essential amino acids lacking in natural honeydews.

Similar facial marks, especially the heavy frontal blotches, characterised specimens from Yukon and Alaska (Fig. 92 a-e). However, the same reddish marks were on specimens collected earlier or later in the season from many parts of Canada. One difference in northwestern specimens was a more distinct interantennal reddish-brown mark (Fig. 92 c), though not always present.

Also in the winter phenotype, thoracic setae tended to be more robust with generally amber-brown setae laterally on the pronotum and scutum. In addition, the genae had markings much more reddish than brown, and much more extensive, almost reaching the frontogenal sutures (Fig. 92 d). The brownish-black, more usual in summer generations, was not present. Many winter specimens displayed this reddish suffusion, the most complete expression of which occurred in specimens from far north. These northern specimens resembled C. harrisii, explaining why other workers concluded that C. harrisii occurred in Alaska (Bickley & MacLeod 1956, also cited by Throne 1971). Of course, the wings were different and so were the genitalia.

Considering terminalia, though, an interesting variation appeared in the northwestern component of C. carnea. Males, though not all specimens, had reduction in sterna VIII+IX, losing the apical part to varying degrees (Fig. 93). A similar condition was seen in one specimen from Winslow, British Columbia, though that specimen was much smaller and the mandibles were narrow, the asymmetric tooth being poorly defined or worn down (Fig. 98 e). Also, the arcessus was much shortened (Figs. 94 g, 95 c). In northern specimens, though, reduction was a morphological variation, affecting many specimens.

One final example of variation was the presence on the ental aspect of the scape, in two specimens from Vancouver, of a brownish dot (Fig. 92 f). It was reminiscent of a similar condition in a newly described subspecies of C. carnea in France (Séméria 1980 b). Here, it was only variation, there being many specimens from the lower mainland of British Columbia with unmarked scapes.

DISTRIBUTION IN CANADA

A plethora of names has been available for Chrysoperla carnea, especially in British Columbia. By amalgamating the distributions for the synonymous taxa, and by incorporating additional localities based on specimens examined, C. carnea extended from Sable Island to Bathurst Inlet, well beyond tree-line (Scudder 1979).

However, the distribution in the north, especially, did not imply a permanently resident population. Evidence exists for high-level movement of C. carnea (Glick 1939, as C. plorabunda; Bowden 1979) and, apparently, adults make downwind dispersal flights soon after emergence (Duelli 1980 a). Also, they enter an obligatory preovipository migration which enables them to succeed in environments where changes in the quality of the habitat are unpredictable and drastic (Duelli 1980 b). Such behaviour may account for the absence of clinal gradation in this chrysopid.

Records from Fort Yukon and Kotzebue, Alaska (Bickley & MacLeod 1956) could not be verified. Other unsubstantiated records were from Grimsby, Ontario (Putman 1932 b), Agassiz, Rock Creek, the latter being a paratype locality of C. downesi (Smith 1932),

and Creston, British Columbia (Smith 1932; Wilde 1962). In Manitoba, there was a record from near Portage la Prairie (Tauber & Tauber 1973), which may be supported by specimens not made available. The numerous Niagara Peninsula studies did not appear to have been supported by voucher specimens. With these exceptions, specific localities were (Map 18)[1] :

ALASKA [not mapped] Big Delta [Delta Junction] (CNC). Chitina (USNM). Circle (USNM). College (CU). Elkutna (USNM). Fairbanks (CNC; NSM; USNM). Fort Yukon (Bickley & MacLeod 1956, as C. harrisii, also cited by Throne 1971; Bickley & MacLeod 1956, as C. plorabunda). Kotzebue (Bickley & MacLeod 1956, as C. plorabunda). Lower Tonsina (USNM). Nenana (USNM). Palmer (USNM). Richardson Hwy, Mile 315 (CNC). Shaw Creek, Mile 289 Richardson Hwy (CNC).

YUKON TERRITORY Dawson, including 14 mi E (CNC; SEM). Eagle River, Dempster Hwy (SEM). Haines Junction (CNC). Klondike Hwy, Mile 30, and km 621 Willow Creek (CAS; SEM). Kluane (SEM). Mayo (SEM). Rampart House (CNC). Whitehorse (CNC).

[1] see p. 414 for late additions [YUKON]

NORTHWEST TERRITORY Aklavik, including 50 mi NE (CAS; CNC). Bathurst Inlet (CNC). Dempster Hwy, km 503 (ROM). Fort McPherson (CNC). Fort Simpson, including No Name Creek 3 mi SE (CNC). Mackenzie River [unspecified] (CAS). Norman Wells (CNC). Yellowknife (CNC; USNM).

BRITISH COLUMBIA Agassiz (Smith 1932, as C. plorabunda). Arras (SEM). Bald Mt [unspecified] (SEM). Barrière, including Chu-Chua, Louis Creek Road, Noble Creek (CNC). Baynes Lake (CNC). Birch Island (CNC). Box Lake, near Nakusp (CNC). Bowser (CNC). Chase (CNC). Cherryville, including Sugar Lake (CNC). Chilcotin [unspecified] (SEM). Clinton (CNC). Comox (Smith 1932, as C. harrisii, also cited by Spencer 1942; CNC). Cowichan, including Cowichan Bay and Cowichan Lake (CNC; LEM; SEM). Cranbrook (CNC). Creston (Smith 1932, as C. plorabunda; Wilde 1962). Cummings Lake (SEM). Deer Park, Lower Arrow Lakes (CNC). Departure Bay (Smith 1932, as C. plorabunda; SEM). Duncan, including Indian Reservation (CNC). Edgewood (CNC). Eholt (CNC). Fort Nelson (CNC). Gibsons (SEM). Goldstream (SEM). Halfway (SEM). Hazelton, including Glenvowel Indian Reservation (CNC). Huscroft (CNC). Kamloops, including Lac du Bois, and Greene Lake (MCZ; SEM). Kaslo (Smith 1932, as C. plorabunda; CNC; USNM). Kelowna (Smith 1932, as C. downesi, also cited by Brown 1934, and by Bickley & MacLeod 1956; CNC; KSU). Keremeos (Smith 1932, as C. plorabunda, as C. downesi, and as C. harrisii

externa, the latter also cited by Spencer 1942; CNC; JEC). Kettle Valley (CNC). Ladysmith (CNC). Langford (CNC; PFRC). Langley (SEM). Lemon Creek, Slocan Valley (CNC). Liard Hot Springs (CNC; SEM). Lillooet, including Seton Lake (Smith 1932, as C. downesi, and as C. plorabunda californica, the latter also cited by Spencer 1942; CNC). Lower Post (CNC). Lytton (UWO). Mandarte Island (SEM). McLeod Meadows, Kootenay Nat'l Pk (CNC). Mission Flats (SEM). Mt Revelstoke (CNC). Nakusp, including Kuskanax Creek (CNC). Nanaimo, including 5 mi S (CAS; CNC; MCZ; UWO). New Westminster, including Green Timbers Forestry Station (UWO; SEM), Okanagan Valley, including the south Okanagan (Wilde 1963; McMullen & Jong 1967 a, 1967 b; CNC). Oliver, including Vaseux Lake (Smith 1932, as C. plorabunda, as C. plorabunda californica, as C. harrisii externa, the latter two also cited by Spencer 1942; CNC). Osoyoos (Spencer 1942, as C. plorabunda; CNC; MCZ; SEM). Peachland, including Deep Creek (CNC). Pemberton (PFRC). Penticton (CNC; LEM; SDARS). Pioneer Mine (CNC). Pouce Coupé (CNC). Powell Lake (CNC). Powell River (SEM). Prince George, including McMillan Creek (CNC). Princeton (CMC). Quadra Island (SEM). Quesnel (CNC; SEM). Renata (CNC). Robson (CNC; SEM). Rock Creek (Smith 1932, as C. downesi). Ross Creek

[unspecified] (CNC). Rossland (CNC). Royal Oak (CNC). Saanich District (SEM). St Marys [Kimberley] (Smith 1932, as C. plorabunda; CNC). Salmon Arm (Smith 1932, as C. downesi, and as C. plorabunda; BCPM; CNC; KSU; SEM). Sechelt, including Indian Reservation (CNC). Shuswap Falls (SEM). Skeena Crossing (CNC). Smith River (CNC). Soda Creek (SEM). Spences Bridge, 15 mi E (CAS). Steelhead (SEM). Summerland (CNC; ROM; SEM; SDARS). Swinton, near Morrisey [unspecified] (CNC). Trinity Valley (CNC). The University of British Columbia Forest, near Haney (SEM). Upper Arrow Forest, Trout Lake (CNC). Vancouver, including University of British Columbia, Lions Bay, and Point Grey (Smith 1932, as C. plorabunda, and as C. harrisii externa, the latter also cited by Spencer 1942; Foster 1942, as C. harrisii; Spencer 1942, as C. harrisii, and as C. plorabunda; CNC; SEM). Vernon (Smith 1932, as C. downesi, and as C. plorabunda; Spencer 1942, as C. plorabunda; CNC; MCZ; SEM). Victoria, including Mt Douglas, and Oak Bay (Smith 1932, as C. downesi, as C. plorabunda, and as C. harrisii, the latter also cited by Spencer 1942; CNC; MCZ; PFRC; SEM). Walhachin (SEM). Wellington (BC Dept Agric 1906, as C. californica; Smith 1932, as C. plorabunda californica, also cited by Spencer 1942; CNC; MCZ). West Crescent Valley [Crescent Valley] (SEM). Westwick Lakes (SEM). Williams Lake, including 5 mi N (CNC). Winslow (SEM). Yale (CNC). Yoho Nat'l Pk (CNC).

ALBERTA Banff Nat'l Pk, including Banff (CNC). Beaverlodge (CNC; UAE; UG). Belly River (CNC). Bilby (CAS). Calgary (Smith 1932, as C. plorabunda; CNC; UMW). Chip Lake (CNC). Claresholm (CNC). Clymont [unknown] (UAE). Cochrane (CNC). Colinton (CNC). Cow Creek [unspecified] (CNC). Crowsnest Lake (CNC). Cypress Hills (CNC). Delburne (UG). Dovercourt (CNC; NFRC). Drumheller (CNC). Edmonton (UAE; UMW; PIDAA). Edson (CNC). Elkwater Pk, including Elkwater (CNC). Entrance (CNC). Entwhistle (CNC). Fawcett (CNC). Fort Assiniboine (CNC). Gleichen (UG). Grande Prairie (CNC). High Prairie (CNC). Horburg (CNC). Jasper Nat'l Pk, including Fiddle Creek, Jasper, Miette Hot Spring, and Pocahontas (CNC). KEFS [Kananaskis?] (CNC). Kinuso (CNC). Lac la Biche (CNC). Lake Minnewanka (CNC). Leedale (NFRC). Lethbridge (Smith 1932, as C. plorabunda, and as C. plorabunda californica; CNC; UAE). Medicine Hat (CNC; UAE). Midnapore (Smith 1932, as C. harrisii externa; CNC). Mt Laurel, Waterton (CNC). Nordegg, 28 mi W (CNC). Onefour (CNC). Peace River, Athabasca [unspecified] (MCZ). Pedley (CNC). Red Deer (CNC). Reno (CNC). Rocky, 27 mi SW [unknown] (CNC). Salway [unknown] (CNC). Saunders, 12 mi W (CNC). Seebe (CNC). Smith, 20 mi SE (CNC). Stettler (USS). Sundre (CNC). Sylvan Lake (CNC). Tawatineau (CNC). Valleyview (CNC). Waterton (CNC). Whitecourt (CNC). Wildwood (CNC). Yahatinda Ranch, 14 mi E [unknown] (CNC).

SASKATCHEWAN Amisk Lake (CNC). Ardill (RARS). Avonlea (RARS; SMNH). Beauprē (CNC). Big River (CNC). Canora (CNC). Crestwynd (UMW). Cut Knife (CNC). Cypress Hills (SMNH). Debden (CNC). Delmas (BMNH). Dilke (RARS). Dunblane (CNC). Edenwold (RARS). Estevan (CNC). Findlater (RARS). Fort-à-la-Corne (CNC). Fort Qu'Appelle (Smith 1932, as C. plorabunda; CNC). Great Deer (CNC). Hudson Bay (CNC). Indian Head (CNC; IHTN; UMW). Jameson (RARS). Kamsack (SMNH). Kenosee (CNC). Kronau (RARS). Lac la Ronge (CNC). Lanigan (RARS). Lebret (CNC). Loon Lake (CNC). Meacham (RARS). Mozart (CNC). Nisbet Prov Forest [N of Prince Albert] (NFRC). Pelican Narrows (SMNH). Prince Albert (CNC). Punnichy (SMNH). Qu'Appelle Valley [unspecified] (RARS). Regina (RARS; SEM). Roche Percée (SMNH). Rockglen (CNC; USS). St Gregor (Burgess 1980; SARS). Saskatoon (Smith 1932, as C. downesi, as C. harrisii externa, as C. plorabunda, and as C. plorabunda californica; CNC; USNM; USS). Val Marie (SMNH). White City (RARS). Whitefox (CNC).

MANITOBA Agassiz Forest Reserve (CNC). Altona (CNC). Aweme (Smith 1932, as C. plorabunda; CNC). Bald Head Hills, 13 mi N of Glenboro (CNC). Beausejour (UMW). Bissett (NFRC). Cedar Lake (CNC; MCZ). Cross Lake (CNC). Brandon, including 6 mi NW (Robinson 1952, as C. harrisii externa, and as C. plorabunda californica; CNC; UMW). Carberry (CNC; UMW). Carey (CNC). Clear Lake,

Riding Mt Nat'l Pk (CNC). Falcon Lake, Whiteshell Prov Pk (ROM). Flin Flon (CNC). Gladstone (CNC). Glenlea Research Station, S of Winnipeg (Bucher & Bracken 1976; LEM; UMW). Husavick (CNC). Ile-des-Chênes (UMW). Kenville (CNC). Mafeking (CNC; USS). Maple Leaf Campground, near Portage-la-Prairie (Tauber & Tauber 1973). Minnedosa, 5 mi N (CNC). Morden (Robinson 1952, as C. plorabunda californica CNC; UMW). Morris (CNC). Napinka (CNC). Neepawa (CNC). Ninette (CNC). Ninga (CNC; USS). Norgate, 5 mi W (CNC). Pilot Mound (CNC). Pinawa (UMW). Pine Falls (UMW). Portage-la-Prairie (UMW). Rennie, including RR swamp [Red Rock Lake Forestry Station] (CNC; UMW). Riding Mt Nat'l Pk (CNC). Ste-Rita (MMMW). Sandilands (MMMW). Sanford (UMW). Sasaginnigak Lake (CNC). Selkirk (UMW). Shilo, 5 mi SW (CNC). Shortdale (UMW). Starbuck (UMW). Stockton, 2 mi W (CNC). Stony Mountain (CNC; MCZ). Swan River (CNC). Telford (UMW). The Pas (CNC). Treesbank (CNC). Wabowden (CNC). Wanless (CNC). Whitemouth (CNC). Whitewater Lake, 4 mi N of Whitewater (CNC). Winnipeg, including Fort Garry, and La Barrière Pk (CNC; LEM; MCZ; MMMN; NFRC; UMW).

ONTARIO Agawa Bay (UG). Amethyst (UG). Ancaster (CNC). Attawapiskat (ROM). Batchawana (LEM). Beardmore (NFRC). Belleville (RARS; UG). Biscotasing (CNC). Black Sturgeon Lake (CNC; ZMUH). Brighton (CNC). Carp (CNC). Cawaja Beach, Tiny Tp, Simcoe Co (ROM). Cedar Lake

[unspecified] (CNC). Chaffeys Locks (ROM; UG). Chatham (CNC; UWO). Clinton (UG). Cooksville [Mississauga] (ROM). Crystal Lake [unspecified] (UMW). Dunn Tp, Haldimand Co (Judd 1964, 1967; UWO). Elmira (UG). Eramosa (UG). Fort Francis (CNC). Foxborough (UG). Georgian Bay Island 421 (UG). Goderich (ROM). Gogama (GLFRC). Grimsby (Putman 1932 b, as C. plorabunda). Guelph (NSM; UG). Hamilton (MCMU; UWO). Harrow (MCMU; UG). Hawk Lake (NFRC). Hunta (GLFRC). Ignace (CNC). Island Falls (CNC). Iron Bridge (CNC). Iroquois (ROM). Jordan (CNC; USNM). Kendal (ROM). Kenora, including 5-10 mi N (CNC; UMW). Kingsville (CNC). Lambeth (UWO). London (Saunders 1875, as C. externa; UG). London, 22 mi E (LEM). Longlac (GLFRC). Magpie (CNC). Malachi (CNC). Manitoulin (UG). Marathon (GLFRC). Marmora (CNC). Mattice (GLFRC). Niagara Peninsula, including Niagara, Niagara River, and the Niagara area (Smith 1932, footnote 4, as C. plorabunda; Putman 1932 b, as C. plorabunda; Ross & Putman 1934, as C. plorabunda; Putman 1955, 1956, as C. plorabunda; Putman & Herne 1958, as C. plorabunda; Putman 1963; Herne & Putman 1966; Putman & Herne 1966; New 1975; UG). Nipigon (LEM). Ogoki (CNC). One Sided Lake (ROM). Orono (ROM). Ospringe (UG). Ottawa, including Bell's Corners, Eastview, and Merivale (CNC). Paris (UG). Pelee Island

(ROM). Petawawa Res Sta (CNC). Peterborough (UG). Point Pelee (CNC). Port Credit (ROM). Red Lake (GLFRC). Ryland (GLFRC). St Davids (Smith 1932, as C. plorabunda in footnote 4; Putman 1932 a, 1937, as C. plorabunda; UG). Sauble Falls Prov Pk, 3.5 km E (ROM). Sault-Ste-Marie (CNC). Sioux Lookout (CNC). Southampton (CNC). South Neebing Tp [Neebing Tp] (ROM). Spanish (UG). Stoney Creek (UG). Sudbury (ROM). Tashota (CNC). Thessalon (LEM; UG). Thunder Bay (UG). Tillsonburg (LEM; UG). Timmins (CNC). Toronto, including Leaside (GLFRC; ROM; UG). Unaka (CNC). Vermilion Bay, 3-5 mi N (CNC). Vineland, including Vineland Station (Putman 1932 a, 1932 b, 1937, as C. plorabunda; Garlick 1955, as C. plorabunda; Putman & Herne 1960, as C. plorabunda; Putman 1963). Whitby (UG). Woodstock (UG).

QUEBEC Authier, Abitibi Ouest (CSQ). Berthier [Berthierville] (CSQ; UdeM). Bousquet [Lac Bousquet] (CSQ). Cap-Chat (CNC). Cap-Rouge (UL). Choisy, near Rigaud (ZMUH). Cox Canton, Bonaventure (CSQ). Des Combes Canton, Abitibi Est (CSQ) Duparquet Canton, Abitibi Ouest (CSQ). Duquesne Canton, Rimouski (CSQ). Farnham (UdeM). Forestville (CSQ). Fournière Canton, Abitibi (CSQ). Hudson Heights [Hudson] (ZMUH). Kirks Ferry (CNC). Lac du Brochet, Roberval Canton, Lac St Jean Ouest (CSQ). Lac Brulé, Labelle [unknown] (CSQ). Lac des

Pins, Labelle (CSQ). Lac Harrington, Gatineau (CNC). Lac-Mondor, Ste-Flore (CNC). Lac Serpent, Notre-Dame-du-Laus (LEM). Lacolle (LCCU). Laniel (CNC; UAE). Lanoraie (UdeM). Laval (LEM). Low Canton, Gatineau (CSQ). Montréal (LEM; UdeM). Mont-St-Hilaire (LEM). Nominingue (UdeM). Padoue, Cabot Canton, Matapedia (CSQ). Parc du Mont Tremblant (UdeM). Plessis Canton, Chicoutimi (CSQ). Pointe-des-Cascades (LEM). Preissac Canton, Abitibi (CSQ). Rivière-à-Pierre, Portneuf (CSQ). Rougemont (CNC). Saguenay Canton, Charlevoix Est (CSQ). Ste-Anne-de-Bellevue (LEM). Ste-Clotilde, Châteauguay (SJRS). Senneterre, Abitibi Est (CSQ). Val-d'Or, Abitibi Est (CSQ). Villedonne, Pontiac (CSQ). York (LEM).

NEW BRUNSWICK Fredericton (CNC; MFRC). Green River, Madawaska (CNC). Jacquet Head, Restigouche (CNC). McGraw Brook (NDFRC). New Denmark (MFRC).

NOVA SCOTIA Aldershot (KARS). Cambridge (KARS). Centreville (NSM; USNM). Sable Island, as Met Station (NSM). Wellington [unspecified] (USNM).

NEWFOUNDLAND Avalon Peninsula [unspecified] (MU). Bishops Falls (SJARS). Lewisporte (SJARS). St John's (MU).

BIOLOGICAL NOTES IN CANADA

In the Okanagan Valley of British Columbia, there has been a tradition of winter collecting under bark. Large numbers of hibernating chrysopids were accumulated in this way during the 1920's in response to a request from Dr. R.J. Tillyard, who wanted to liberate them in New Zealand (Dennys 1927; Smith 1932; as C. downesi, also cited by Bickley & MacLeod 1956). The specimens were, in fact, C. carnea. They were sent, about 2000 in 1925 and nearly 6000 in 1926 (Dennys 1927), and presumably they were released. However, C. carnea does not appear to have become a permanent addition to the New Zealand fauna (Hudson 1950; Wise 1972).

On another occasion, sometime between November 1939 and March 1940, C. carnea was active in the forest near Vancouver (Foster 1942)[1]. The information suggests only that one specimen was collected, and that it was not hibernating. At other seasons, adults have been caught in bait pails (Garlick 1955).

In laboratory studies, adults fed on nectar from peach tree leaf-glands, being active mainly at night and resting during the day (Putman 1963 b). In the wild, the adult may be more a scavenger suggested by

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[1] see p. 386, U.B.C. forest

the presence of insect cuticle and cestode oncospheres in the frass of one specimen (Putman & Herne 1966, also cited by New 1975).

Like several other chrysopids, C. carnea was important in natural control of the Oriental fruit moth in the Niagara Peninsula during the 1930's (Putman 1932 a, also cited by Dustan 1961; Ross & Putman 1934). Its immature stages were present in every peach orchard examined (Putman 1932 b), being plentiful on tall weeds and young trees where they preyed upon eggs of the fruit moth (Putman 1932 a). Life history studies, in Canada, were started during the fruit moth outbreak, treating larval feeding and development, voltinism, oviposition, and parasites (Putman 1937).

During the fruit moth outbreak in the Niagara Peninsula, only sulphur was used and it did not affect C. carnea (Herne & Putman 1966). With the advent of other pesticides, larvae of C. carnea developed DDT-tolerance and became an abundant species, even in unsprayed orchards (Putman 1956, also cited by Putman & Herne 1958, by Herne & Putman 1966, and by New 1975). Subsequently, sevin [carbaryl in Scott 1979] and parathion virtually eliminated all chrysopid larvae in the Niagara orchards, though C. carnea was less susceptible to sevin (Putman & Herne 1960, also cited by Herne & Putman 1966, and by New 1975).

Other studies with C. carnea showed that its larva is a general predator on several species of mites, including the European red mite, P. ulmi (Putman & Herne 1958, 1966). It also feeds on eggs and nymphs of pear psylla, P. pyricola (Wilde 1962, also cited by McMullen & Jong 1967 a, b, by McMullen 1971, and by Philogene & Chang 1979), on eggs of codling moth, L. pomonella (Putman 1963 a), on early instars of the bertha armyworm, Mamestra configurata Walter (Bucher & Bracken 1976, on adult flea beetles, Phyllotreta cruciferae (G.) (Burgess 1980), as well as on the fruit moth discussed above.

Hyperpredation has been demonstrated, too (Wilde 1963). For instance, larvae of C. carnea have been known to prey on eggs and larvae of the coccinellid, S. punctillum (Putman 1955). In another instance, they attacked the nymphal stages of an anthocorid bug, Anthocoris melanocerus Reut. (Wilde 1963).

Finally, the larva and cocoon of C. carnea have been found in galls of the gelechiid Gnorimoschema gallaesolidaginis Riley, which may have involved foraging activity (Judd 1964, 1967).

EXAMINED FROM CANADA

524 males, 880 females, 87 indeterminate; total 1491 specimens; three larvae.

GENUS NINETA NAVAS 1912

Nineta Navás 1912. Brotéria 10: 98.

INTRODUCTION

On the basis of male genitalia of the type-species, Nineta flava (Scopoli), this genus should include the western Nearctic Region. Formerly, it was known by six species in continental Europe (Hölzel 1965, 1970; Séméria 1977 b), the United Kingdom (Barnard 1978, as Chrysopa flava and Chrysopa vittata Wesmael), and European regions of the USSR and Asia Minor (Dorokhova 1979). One species ranges into Siberia and Japan (Dorokhova op. cit.), and a seventh occurs along the west coast of North America. In Canada, it occupied southern Vancouver Island and, probably, undisturbed parts of the lower mainland of British Columbia.

For a while, Nineta was a subgenus of Chrysopa (Hölzel 1965). However, differences, in the mouthparts and tergal and sternal plates of the male redeemed it to a genus (Tjeder 1966 b; Hölzel 1970). As one species-group with symmetrical mandibles, Hölzel (1970) pointed out that, "Die Arten des Genus Nineta besitzen gute Kennzeichen im Geäder der Hinterflügel: Rs und Media sind nicht (teilweise) fusioniert, sondern

verlaufen knapp nebeneinander. Der Apex des männlichen Abdomens ist sehr signifikant (vgl. Hölzel, 1965), die Struktur der Genitalregion sind aus Gonarcus mit grossem Entoprocessus und Arcessus durchweg sehr einheitlich gestaltet - zusammengesetzt. Im weiblichen Abdomen ist die Spermatheca abweichend vom Genus Chrysopa s. str. gestaltet: die konische ventrale Incision fehlt." He differentiated Nineta from other genera with symmetrical mandibles, stressing differences between Nineta and Chrysopa. The relationship of Nineta to other genera with symmetrical mandibles was beyond the scope of this work.

Species were admitted to Nineta provided they conformed to a specimen of the type-species, N. flava, supplied by Dr. P.C. Barnard, British Museum (Natural History),

1) the mandibles were symmetric, each having a subequal tooth

2) the pretarsal claws were excised, but not deeply (Fig. 74 m);

3) the wings (Fig. 106) had two series of gradate crossveins, the intramedian cell was triangular, and Rs and M in the hind wing were not fused but very close to each other;

4) the male terminalia (Fig. 107; cf. Killington 1937: 158; Hölzel 1965) had terga and sterna modified caudally, with apical setal tufts; entoprocessus fused with gonarcus, developed dorsally; mediuncus as an arcessus, associated with gonarcus; gonosaccus no spinellae.

To this, Tjeder (1966 b) adds that the galeae are short and inflated. Also, the spermatheca does not have a conical impression in the ventral aspect of the bulb (Hölzel 1965, also quoted above from Hözel 1970). Only one species in the Canadian fauna satisfied these criteria: N. gravida.

NINETA GRAVIDA (BANKS 1911) NEW COMBINATION
(Figs. 74, 99, 100, 101, 102, 103, 104; Map 19)

Chrysopa gravida Banks 1911. Trans. Am. ent. Soc. 37: 343.

TYPE-LOCALITY

Yosemite, California, U.S.A.

CANADIAN REFERENCES

Chrysopa gravida; Smith 1932: 597; Spencer 1942: 27; Garland 1979: 745-746.

DESCRIPTION

HEAD (Figs. 99, 100): antennae unmarked, scape swollen; maxillary and labial palpi brown, darker ectally; mandibles (Fig. 104) symmetrical subequal tooth on each side; labrum dark proximally, small setae; clypeus dark on posterolateral margins, scattered setae; frons black around and below antennae, except rim of antennal socket; genae faintly darkened; vertex markings laterally along margin of eye, extending onto postgenae.

THORAX: dorsolateral purplish-black bands on pronotum and cervical membranes, continuous on alinotum, fainter posteriorly, setae pale; pleura unmarked, setae yellow-amber; wings (Fig. 101): pterostigmata brown, longitudinal veins blackened proximally, most crossveins dark, gradates green, darker areas on inner series in fore wing, intramedian cell triangular, setae short; legs pale, setae amber-brown, pretarsal claws weakly excised (Fig. 74 1).

ABDOMEN: setae yellowish-amber, sparse, short. Male terminalia (Fig. 102): tergum 9+ectoprocts produced caudad, apical tufts of setae; sterna VIII+IX produced caudad, long apical setae; gonarcus reduced laterally; entoprocessus dorsal, tapering at apex; mediuncus an obtuse arcessus, blunt at apex; gonosaccus long straight tuberculate gonosetae; no tignum, gonapsis, or gonocristae. Female terminalia (Fig. 103): subgenitale membranous proximally, microsetae; apical lobe prominent transverse callus, proximoental cavity; spermatheca shallow ventral impression; duct long, spiculate; vela erect, arched.

DISCUSSION OF VARIATION

The genae of the holotype had traces of black continuous with the pattern on the frons (Fig. 100 b). However, no females examined had a genal mark. In the fore wing, a female from Bellingham, Washington (Fig. 101 a), had supernumerary gradate crossveins, suggesting a partial third series. Although microsetae were not shown in the figures of the female subgenitale (Fig. 103 a-c), they were sparse and minute, and their occurrence was variable.

The holotype was the only male specimen available. Unfortunately, its terminalia were not attached. Dr. P.A. Adams, California State University, Fullerton, kindly supplied his own sketches of that specimen, prepared years ago. For this reason, two of the figures were outline drawings.

DISTRIBUTION IN CANADA

N. gravida was still represented by only three specimens in the Canadian National Collection (Smith 1932). However, a female captured at Bellingham, Washington, in 1962 (USNM), indicated that the species might be sought on the lower mainland of British Columbia, as well as on Vancouver Island. Specific localities were (Map 19):

BRITISH COLUMBIA Departure Bay (Smith 1932, also cited by Spencer 1942; CNC). Vancouver Island [unspecified] (Smith 1932, also cited by Spencer 1942; CNC). Victoria (Smith 1932, also cited by Spencer 1942; CNC).

EXAMINED FROM CANADA

1 female, 2 indeterminate.

GENUS GLENOCHRYSA ESBEN-PETERSEN 1920

Glenochrysa Esben-Petersen 1920. Ann. S. Afr. Mus. 17: 518.

INTRODUCTION

The type-species G. typica Esb.-Petersen is Ethiopian, in Nigeria and the Camaroons. Other species occur in widely disjunct parts of the world (Tjeder 1966 b). Figures of the male genitalia of species from Australia (Kimmins 1952; New 1980) confirmed the decision to assign Chrysopa lineaticornis Fitch to Glenochrysa. Tjeder (1966 b) already noted that two, more southern, Nearctic species should be included in this genus. At the same time, he pointed out that they had hyaline wings, differing from the genotype which had embossed pustules in the membrane.

Despite absence of pustules on the wings, G. lineaticornis did have highly irridescent wings. Recently caught specimens from an alder thicket on Ile Perrot, Québec, had dark infuscation on the pterostigmatic crossveins and, although faint, the gradate crossveins were margined in the fore wing. These markings were not apparent in other specimens. They were not as obvious as in other representatives of Glenochrysa (cf. Kimmins 1952; Tjeder 1966 b: 413; New 1980). Nevertheless, the markings supported other points of correspondence in the male abdomen.

This analysis elevated Tjeder's (1966 b) subgenera to generic status, giving equal weight to variation in the male genitalia and conforming to direction from other workers (New 1980). The Nearctic component of the genus might, on account of the absence of wing pustules, justify creation of a new subgenus. That would demand consideration of all Nearctic species, making it beyond the scope of this work.

Proceeding with the Canadian fauna, species were admitted to Glenochrysa provided,
1) the mandibles were asymmetric, with a tooth on the left side (Fig. 112);
2) the pretarsal claws were deeply excised (Fig. 74 h);
3) the wings had two series of gradate crossveins, the intramedian cell was triangular, and Rs and M in the hind wing were fused (Fig. 109);
4) the male (Fig. 110) had enlarged abdominal tracheal atria; entoprocessus not fused with the gonarcus; mediuncus as an arcessus with trifid apex, the inner point broader and longer than the lateral points; gonosaccus bilobed, short straight tuberculate gonosetae; gonapsis elongate, without expansions or modification; no tignum or spinellae, gonocristae sparse on lateral projections and on ventromedial aspect of hypovalva.

The female had abdominal tracheal atria of the usual size, and genitalia conformed to the Chrysopa-pattern (Tjeder 1966 b). G. lineaticornis displayed specific characters, employed in generic classification of females in an earlier section.

As with Nineta, only one species of Glenochrysa was considered here: G. lineaticornis.

GLENOCHRYSA LINEATICORNIS (FITCH 1856) NEW COMBINATION
(Figs. 74, 108, 109, 110, 111, 112; Map 20)

Chrysopa lineaticornis Fitch 1856. First Report Insects New York: 91-92.

TYPE-LOCALITY

New York State, U.S.A.

CANADIAN REFERENCES

Chrysopa lineaticornis; Putman 1932 b: 121-126; Smith 1932: 584 (footnote 4), 585; Bickley & MacLeod 1956: 190-191; Bram & Bickley 1963: 10; Throne 1971: 74-75.

DESCRIPTION

HEAD (Fig. 108): scape blackish-brown longitudinal band laterally; pedicel dark apically; flagellum dark proximally, lighter towards extremity; maxillary and labial palpi pale; mandibles (Fig. 112) asymmetric tooth on left side; labrum unmarked, setae small; clypeus unmarked, several longer setae anteriorly; genae and vertex unmarked.

THORAX: setae whitish, notum and pleura unmarked; wings (Fig. 109): setae amber-brown, intramedian cell triangular, gradates black in fore and hind wings, and margined in fore wing, infuscation at pterostigmatic crossveins; legs pale, setae amber, pretarsal claws deeply excised (Fig. 74 h).

ABDOMEN: setae amber; tracheal ampulae enlarged in male (Fig. 110 a). Male terminalia (Fig. 110): dorsal apodeme caudally serrate; gonarcus wide laterally; entoprocessus free, dorsally with pointed apex; mediuncus as an arcessus, pair of dorsal projections medially, trifid caudally; gonosaccus bilobed, straight tuberculate gonosetae; gonapsis long, narrow; gonocristae small, sparse on hypovalva. Female terminalia (Fig. 111): subgenitale sclerotised lateromedially, membranous fold proximally; apical lobe prominent transverse callus, no cavity; spermatheca duct short, coiled; vela long, tubular spiral.

DISCUSSION OF VARIATION

The character for recognition of this species is the lateral scape mark, though it varies in intensity. For example, the type of Chrysopa columbiana has the scape mark too faint to see (Bram & Bickley 1963). The colour of the ring on the pedicel varies, too. In this study, one specimen had a very pale-coloured pedicel.

Because the genae and vertex are unmarked, this species would not be confused with Chrysopa excepta on the prairies, now that G. lineaticornis is recorded here, for the first time, from Saskatchewan.

DISTRIBUTION IN CANADA

This study documented this species from Saskatchewan, based on a single specimen. Formerly, G. lineaticornis was known only from southwestern Québec (Smith 1932, also cited by Bickley & MacLeod 1956, by Bram & Bickley 1963, and by Throne 1971), and the Niagara Peninsula (Putman 1932 b; Smith 1932). Other mid-western records were from Michigan (Bickley & MacLeod 1956), and Wisconsin (Throne 1971). G. lineaticornis was not found in Minnesota (Parfin 1952), nor has it ever been known in Manitoba. On the strength of the present distribution in northwestern Ontario and Saskatchewan, it should be found along the Assiniboine River in Manitoba.

Of previously recorded localities, only Niagara could not be verified (Smith 1932). Otherwise, the earlier distribution of G. lineaticornis was confirmed, with additions in southern Ontario and Québec, Saskatchewan, New Brunswick, and Nova Scotia.

One new record, Black Lake near Stanleyville, Ontario, was based on a third instar larva collected by Mr. J.A. Downes, Biosystematic Research Institute. Dr. C.A. Tauber, Cornell University, confirmed the identification[1].

Specific localities were (Map 20):

SASKATCHEWAN Hazel Cliffe [NW of Moosomin] (CNC).

ONTARIO Bala (CNC). Black Lake, Stanleyville (LEM). Cawaja Beach, Tiny Tp, Simcoe Co (ROM). Chaffeys Locks (ROM). Constance Bay [Ottawa] (CNC). Fishers Glen (CNC). Go Home Bay (CNC). Marmora (CNC). Niagara (Smith 1932). One Sided Lake [Claxton Tp, Rainy River District] (CNC). Parry Sound (CNC). St Davids (Putman 1932 b. Smith 1932; UG). South Neebing Tp [Neebing Tp, Thunder Bay District] (ROM). Wagarville (CU). Zealand Tp [Kenora District] (CNC).

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[1] see p. 407

QUEBEC Aylmer (Smith 1932; CNC). Berthier [Berthierville] (UdeM). Ile-Perrot (LEM). Lac Meach (CU). Lac-Mondor, Ste-Flore (CNC). Rigaud (UdeM). Ste-Anne-de-Bellevue (LEM). Shawbridge (LEM).

NEW BRUNSWICK Chipman (CNC). Fredericton (CNC). Tabusintac (CNC).

NOVA SCOTIA Bridgetown (CNC). Mount Uniacke (USNM). South Milford (CNC).

EXAMINED FROM CANADA

Twelve males, twenty-one females, three indeterminate; total 36 adults; one larva.

GENUS OVIEDUS NAVAS 1913

Oviedus Navâs 1913. Ann. Soc. sci. Bruxelles 37: 326.

INTRODUCTION

Assignment of Chrysopa placita Banks to Oviedus was done with much hesitance, because salient differences were evident.

The type-species, O. auricollis Navás, and other congeneric species are Ethiopian (Tjeder 1966 b). The antennae exceed the length of the wings, and the mandibles are asymmetric, having a large tooth on the left and an obtuse dilation on the right. And, Oviedus has a subrectangular intramedian cell.

Considering terminalia, Oviedus has elongate lateral processes on the gonarcus, and there is no entoprocessus or gonapsis. The arcessus, however, is in the dorsal wall of the gonosaccus, protruding proximally as a down-curved hook, and there are no gonosetae. The lateral apodemes which brace the male terminalia are fused anteriorly. In these respects, Oviedus contrasted with the species here.

Differences in the female were more a matter of degree. In Oviedus, the spermatheca is of the usual pill-box type, with a deep conical ventral impression. The vela are tubularly arched. In addition, the praegenitale is in a posteromedian notch in sternum VII. The subgenitale is membranous proximally, and has no transverse callus on the apical lobe.

Two related genera in North America, Nodita Navás and Leucochrysa McLachlan, have long antennae and asymmetric mandibles. However, their terminalia differ from Oviedus, as well as from the species here, in numerous ways (Adams 1977, 1979; re Leucochrysa). [1]

Consequently, to assign C. placita to Oviedus required that the definition of that genus be expanded, admitting the likelihood of a new genus-group taxon for the component in the Western Hemisphere when better known. By expanding the definition of Oviedus (sensu Tjeder 1966 b), species were admitted provided,

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[1] cf Ceratochrysa Navás in southeastern Africa (Tjeder 1966 b)

1) the mandibles were symmetrically toothed (Fig. 117), or asymmetric to the extent that the right side was only obtusely dilated;
2) the pretarsal claws were deeply excised (Fig. 74 k);
3) the antennae were as long as the fore wing, or longer;
4) the wings (Fig. 114) had two series of gradate crossveins, a broad costal region, a subrectangular or triangular intramedian cell, and Rs and M in the hind wing fused;
5) the male (Fig. 115) had entoprocessus reduced, or developed dorsad as pointed shields; mediuncus as an arcessus, with or without protruding proximal hook; gonosaccus devoid of gonosetae; no tignum or spinellae, gonapsis narrow and spatulate, or absent; no gonocristae.

As with Nineta and Glenochrysa, only one species of Oviedus was in this analysis: O. placitus.

OVIEDUS PLACITUS (BANKS 1908) NEW COMBINATION
(Figs. 74, 113, 114, 115, 116, 117; Map 21)

Chrysopa placita Banks 1908. Trans. Am. ent. Soc. 34: 259.

TYPE-LOCALITY

Golden, Colorado, U.S.A.

CANADIAN REFERENCES

? Chrysopa intacta Navás 1912: 199-200; Smith 1932: 598; Bickley & MacLeod 1956: 196.

Chrysopa placita; Bickley & MacLeod 1956: 196.

Chrysopa species near rufilabris; Smith 1932: 599.

DESCRIPTION

HEAD (Fig. 113): antennae unmarked, scape elongate; maxillary palpi dark on ectal aspect of three terminal divisions; labial palpi amber; mandibles (Fig. 117) symmetric tooth on each side, uniformly sclerotised; labrum unmarked, setae scattered, medial

notch shallow; clypeus unmarked[1], some longer setae anteriorly; frons, genae, and vertex unmarked.

THORAX: unmarked, setae pale. Wings (Fig. 114): amber-brown gradates, fore wing costal cells longer than broad, intramedian cell triangular, Rs and M in hind wing fused; legs pale, claws deeply excised (Fig. 74 k).

ABDOMEN: setae amber. Male terminalia (Fig. 115): ventral apodeme expanded anteriorly; gonarcus round laterally, entoprocessus free from gonarcus dorsally, curved, tapering to a point at apex; mediuncus as an arcessus, embedded in membrane of gonosaccus, weakly united to gonarcus proximally; gonosaccus with dorsolateral finger-like expansions distally, no gonosetae or spinellae; gonapsis spatulate, serrate caudally; no tignum or gonocristae. Female terminalia (Fig. 116): praegenitale in proximal membranous part of subgenitale, asymmetric seta on left side; subgenitale proximally membranous; apical lobe deeply notched, no transverse callus or cavity; spermatheca duct spiculate; vela erect, short; ventral impression conical.

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[1] The HOLOTYPE of Chrysopa placita (MCZ) has black clypeal smudges.

DISCUSSION OF VARIATION

Facial markings occurred on the ectal aspect of the maxillary palpi. Their intensity varied.

The radial sectors of both wings were undulate between the inner and outer gradate series of crossveins. The costal region of the fore wing was expanded, giving rise to cells much longer [higher] than broad. These wing characteristics were not so much variable, as they were unusual.

Smith (1932) discussed Chyrsopa intacta, translating the original description from Navás' text. He was unable to trace the unique type specimen from Toronto. Yet, Navás (1912) did say, "Un ejemplar en mi coleccion donativo del Sr. Duchassoy, de Caudebec-lès-Elbeuf (Francia)." Again, an attempt was made to locate the type in one of the two-known sites where Navás collections have come to be housed, as indicated earlier. Rather than declare his taxon a nomen dubium[1], tentatively C. intacta was considered a synonym under O. placitus.

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1 The International Commission on Zoological Nomenclature would have to be petitioned in order to suppress this name as a nomen dubium, and this study indicated that initiation of just such a petition would be most appropriate.

DISTRIBUTION IN CANADA

Chrysopa intacta was described from Toronto and certainly would be embraced by the area of distribution of O. placitus if, indeed, it should be a junior objective synonym. The error in the type locality of O. placitus (Bickley & MacLeod 1956) was corrected earlier. O. placitus occurs in southwestern Québec and extreme southern Ontario. However, there were so few specimens that this is only an outline, at present. Fortunately, two older specimens (Smith 1932) were still available[1], being determined as Chrysopa placitus by Dr. P.A. Adams. Specific localities were (Map 21):

ONTARIO Chatterton (UG). [?] Toronto (Navás 1912, as C. intacta, also cited by Smith 1932, and by Bickley & MacLeod 1956).

QUEBEC Kazabazua (Smith 1932, as C. intacta, also cited by Bickley & MacLeod 1956; Smith 1932, as Chrysopa species near rufilabris; CNC).

EXAMINED FROM CANADA

One male, two females.

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[1] see p. 409

GENUS MALLADA NAVAS 1925

Mallada Navás 1925. Rev. Acad. Ci. Zaragoza 9: 24.

INTRODUCTION

Mallada, a masculine noun (Adams 1975), is recognised in North America in M. perfectus, and other species (Adams 1975, 1978). On the basis of the genitalia of the type-species, Chrysopa basalis Walker (Adams 1959; New 1980), species were admitted to Mallada provided,

1) the mandibles were asymmetric, with a tooth on the left side;

2) the pretarsal claws were deeply excised;

3) the wings had two series of gradate crossveins, the inner one in the fore wing converging on a branch of Rs, the intramedian cell was triangular, and Rs and M in the hind wing were fused;

4) the male had a transverse tignum, no acumen; entoprocessus fused to the gonarcus, rounded apically; mediuncus as an arcessus; gonosaccus rudimentary between entoprocessus, with minute sparse gonosetae; no spinellae; gonapsis three-pronged, having lateral wings and a caudal process; and sparse gonocristae on the hypovalva.

Males lacked microtholi, and sterna VIII+IX were indistinguishably fused. Females had the subgenitale membranous proximally, and the spermatheca had tubularly arched vela. Two species were found in Canada: M. perfectus, and M. slossonae, the latter being undescribed at the time of this writing.

KEY TO SPECIES OF MALLADA IN CANADA

1 a	Labrum entirely black	perfectus
1 b	Labrum green medially, black laterally	slossonae

MALLADA PERFECTUS (BANKS 1895) ADAMS 1975
(Figs. 74, 118, 119, 120, 121, 122; Map 22)

Chrysopa perfecta Banks 1895. Proc. Calif. Acad. Sci. (2). 5(1): 516-517.
Mallada perfectus; Adams 1975. Psyche, Cambridge 82: 171-172.

TYPE-LOCALITY

Baja, California, México

DESCRIPTION

HEAD (Fig. 118): antennae unmarked; maxillary palpi outer three divisions dark; labial palpi ultimate division dark; mandibles (Fig. 122): black ectally, tooth on left side, obtuse dilation on right side; labrum entirely black, scattered setae; clypeus black laterally, scattered setae, longer setae anteriorly; frons interantennal and subantennal suffusion of reddish-orange, raised above clypeus; genae black longitudinal band from eye to base of mandible, continuous with clypeal mark; vertex unmarked.

THORAX: setae whitish; pronotum reddish laterally; alinotum and pleura unmarked, setae whitish; wings (Fig. 119) two series of amber-brown gradates in both wings, other crossveins brown at ends, venation margined at base of fore wing, setae amber; legs pale, setae amber, claws deeply excised (Fig. 74 j).

ABDOMEN: setae whitish. Male terminalia (fig. 120): tignum narrow transverse bar; gonarcus elongate lateral arms; entoprocessus fused to gonarcus, developed dorsolaterally; mediuncus as an arcessus, hood-like; gonosaccus rudimentary; gonosetae short, sparse; gonapsis with lateral curved projections, also a caudal point; gonocristae small, distributed across hypovalva. Female terminalia (Fig. 121): subgenitale membranous proximally, microthecae laterally; apical lobe shallowly notched, transverse callus prominent, proximoental cavity large; spermatheca duct smooth, coiled; vela arched, reaching edge of bulb; conical ventral impression.

DISTRIBUTION IN CANADA

Previously, M. perfectus was unknown in Canada, though erroneously recorded, as Chrysopa cockerelli, from British Columbia (Smith 1932). However, intensive collecting in the southern Okanagan Valley revealed it at an elevation of 3000 feet. Specific localities were (Map 22):

BRITISH COLUMBIA Penticton (LEM). Summerland (SEM).

EXAMINED FROM CANADA

Ten males, six females, 1 indeterminate; total of 17 specimens.

MALLADA SLOSSONAE NEW SPECIES [in preparation] [1]
(Figs. 123, 124, 125, 126, 127; Map 23)

TYPE-LOCALITY

(HOLOTYPE not yet designated)

DESCRIPTION

HEAD (Fig. 123): antennae unmarked; maxillary palpi outer three divisions dark; labial palpi ultimate division dark; mandibles (Fig. 127): black ectally, asymmetric tooth on left side; labrum dark laterally, scattered setae; clypeus black laterally, scattered setae, longer setae anteriorly; frons raised above clypeus, unmarked; genae black laterally from eye to base of mandible, continuous with mark on clypeus; vertex unmarked.

THORAX: nota and pleura unmarked, setae whitish; wings (Fig. 124): two series of gradates in both wings, dark brown; other crossveins darkened, margined in fore wing; legs pale, setae darker.

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1 Emended for publication as Mallada macleodi n.sp. (Adams in litt. 12.III.1982)

ABDOMEN: setae amber, unmarked. Male terminalia (Fig. 125): tignum narrow transverse bar; gonarcus broad lateral arms; entoprocessus fused to gonarcus, dorsolateral rounded lobes; mediuncus as an arcessus, beak-like; gonosaccus rudimentary, gonosetae sparse, short; gonapsis lateral projections straight, caudal hook-like process; no gonocristae. Female terminalia (Fig. 126): subgenitale membranous proximally, microthecae laterally; apical lobe notched deeply, transverse callus prominent, proximoental cavity; spermatheca duct minutely spiculate, coiled; vela arched, reaching edge of bulb; conical ventral impression.

DISTRIBUTION IN CANADA

Though erroneously recorded as Chrysopa cockerelli from eastern Canada (Brown & Clark 1956), M. slossonae was seen here from southern Ontario. The identification as a new species was confirmed by comparison with types during a visit to the Museum of Comparative Zoology. Specific localities were (Map 23):

ONTARIO Kendal [Newcastle] (ROM). Pinery Prov Pk (ROM). White Lake [unspecified] (ROM).

EXAMINED FROM CANADA

One male, three females [to be designated PARATYPES].

SUBFAMILY N O T H O C H R Y S I N A E

GENUS NOTHOCHRYSA McLACHLAN 1868

Nothochrysa McLachlan 1868. Trans. ent. Soc. London (1868): 195.

INTRODUCTION

Based on the type-species, N. fulviceps (Stephens) (Banks in Adams 1967), for which male genitalia are figured (Killington 1937: 237), species were admitted to this genus provided,
1) the mandibles were asymmetric, with a tooth on the left side;
2) the pretarsal claws were entire;
3) the wings had dark venation, two series of gradates, a subrectangular intramedian cell, and Rs and M in the hind wing were fused;
4) the male terminalia had a mediuncus as an arcessus, gonosaccus with sparse short gonosetae, and no tignum, gonapsis, or gonocristae.

In addition, males had microtholi (Adams 1967 re cuticular glands). Females had a membranous subgenitale proximally, an apical lobe deeply notched with isolated setae, and no transverse callus or cavity (Killington 1937: 238).

The Canadian fauna had one species: N. californica.

NOTHOCHRYSA CALIFORNICA BANKS 1892
(Figs. 74, 128, 129, 130, 131, 132; Map 24)

Nothochrysa californica Banks 1892. Trans. Am. ent. Soc. 19: 373.

TYPE-LOCALITY

California, U.S.A.

CANADIAN REFERENCES

Nothochrysa californica; Smith 1932: 582, 601; Spencer 1942: 26; Bickley & MacLeod 1956: 183; Adams 1967: 223-225.

DESCRIPTION

HEAD (Fig. 128) : antennae black, pale spot on ental aspect of scape in teneral specimens; palpi all divisions blackish-brown, cardo and stipes blackened; labrum black, margin darker, scattered amber setae; mandibles (Fig. 132) asymmetric tooth on left side, dark ectally; clypeus dark anteriorly, extending to anterior tentorial pits as two lines, frontoclypeal suture dark, scattered amber setae longer anteriorly; frons black around antennae, extending laterally to anterior tentorial pits; vertex black medially and dorsolaterally, continuous with frontal markings; genae black spot at base of mandibles; labium and gular sutures black; ground colour of head yellowish-orange; eyes small.

THORAX: pronotum membranous medially, black sclerites laterally, short whitish setae; alinotum black, transverse cream band on mesoscutum; pleura mottled black, episterna mottled with cream patches; wings (Fig. 129) venation and pterostigmata brownish-black, jugal vein, jugum, frenulum, subrectangular intramedian cell in fore wing, two series of gradate crossveins in both wings, Rs and M fused in hind wing; legs blackish-brown, setae black, pretarsal claws entire (Fig. 74 a); cervical sclerites, sterna, and coxae black.

ABDOMEN: black, patches cream-coloured; setae amber-brown; microtholi in male. Male terminalia (Fig. 130): gonarcus narrow, dorsolateral projection; entoprocessus isolated in membrane of gonosaccus; mediuncus as an arcessus, hood-like; gonosaccus reduced, sparse small gonosetae; no spinellae, tignum, gonapsis, or gonocristae. Female terminalia (Fig. 131): subgenitale membranous proximally, scattered microthecae; apical lobe deeply notched, isolated setae proximally, no transverse callus or cavity; spermatheca ovate, duct smooth, vela short, ventral impression large.

DISTRIBUTION IN CANADA

Several specimens were collected on Mt. Seymour near Vancouver, corresponding to other moist coastal forested habitats for N. californica (Adams 1967).

All previous records were verified, except Nanaimo (Spencer 1942). Specific localities were (Map 24):

BRITISH COLUMBIA Bowser (Adams 1967; CNC). Departure Bay, Nanaimo (Spencer 1942). Sidney (SEM). South Pender Island (Adams 1967; CNC). Vancouver, including Mt Seymour (Spencer 1942; Adams 1967; SEM). Victoria (Smith 1932, also cited by Spencer 1942; Adams 1967; SEM).

EXAMINED FROM CANADA

Five males, four females.

SUMMARY AND CONCLUSIONS

NOMENCLATORIAL CHANGES

There were six new combinations: Chrysoperla comanche (Banks), Chrysoperla harrisii (Fitch), Chrysoperla rufilabris (Burmeister), Glenochrysa lineaticornis (Fitch), Nineta gravida (Banks), and Oviedus placitus (Banks).

There were three new synonymies: Chrysopa assimilis Banks was a male Chrysopa oculata Say. Chrysopa crotchi Banks was a female Chrysopa nigricornis Burmeister. Chrysopa downesi Smith was based on the winter phenotype of Chrysoperla carnea (Stephens).

Also, there was one doubtful name. Chrysopa intacta Navás, for which the type may be lost forever, was tentatively synonymised under Oviedus placitus (Banks).

SUMMARY OF CHRYSOPIDAE OF CANADA AND ALASKA

This survey included ten genera and twenty-four species, in two subfamilies.

Chrysopinae: Chrysopa chi, C. coloradensis, C. excepta, C. nigricornis, C. oculata, C. pleuralis, and C. quadripunctata; Chrysoperla carnea, C. harrisii, and C. rufilabris; Chrysopiella brevisetosa; Eremochrysa canadensis, E. fraterna, and E. punctinervis; Glenochrysa lineaticornis; Mallada perfectus, and M. slossonae; Meleoma dolicharthra, M. emuncta, M. schwarzi, and M. signoretti; Nineta gravida; and Oviedus placitus. Nothochrysinae: Nothochrysa californica.

On present evidence, the species were distributed by region as follows:

ALASKA [not mapped] 3 species: Chrysopa chi, and C. oculata; and Chrysoperla carnea.

YUKON and NORTHWEST TERRITORIES 3 species: Chrysopa chi, and C. oculata; and Chrysoperla carnea.

BRITISH COLUMBIA 18 species confirmed, 2 probable: Nothochrysa californica; Chrysopa chi, C. coloradensis, C. excepta, C. nigricornis, C. oculata, C. pleuralis, and C. quadripunctata; Chrysoperla carnea; Eremochrysa ?canadensis[1], E. fraterna, and E. punctinervis; Mallada perfectus; Meleoma dolicharthra, M. emuncta, M. schwarzi, and M. signoretti; and Nineta gravida; Chrysopiella brevisetosa and Oviedus placitus anticipated.

ALBERTA 8 confirmed species, 1 probable: Chrysopa chi, C. excepta, C. nigricornis, C. oculata, and C. pleuralis; Chrysoperla carnea; Chrysopiella brevisetosa; and Meleoma signoretti; Meleoma emuncta anticipated.

SASKATCHEWAN 7 species confirmed, 2 probable: Chrysopa chi, C. excepta, C. nigricornis, C. oculata, and C. quadripunctata; Chrysoperla carnea; Glenochrysa lineaticornis; possibly Meleoma emuncta; Meleoma signoretti anticipated.

MANITOBA 7 confirmed species, 2 probable: Chrysopa chi, C. nigricornis, and C. oculata; Chrysoperla carnea and C. harrisii; and Meleoma emuncta and M. signoretti; Chrysopa quadripunctata and Glenochrysa lineaticornis anticipated.

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1 see p. 108

ONTARIO 13 species confirmed: Chrysopa chi, C. nigricornis, C. oculata, and C. quadripunctata; Chrysoperla carnea, C. harrisii, and C. rufilabris; Eremochrysa canadensis; Glenochrysa lineaticornis; Mallada slossonae; Meleoma emuncta, and M. signoretti; and Oviedus placitus.

QUEBEC 12 species confirmed: Chrysopa chi, C. nigricornis, C. oculata, and C. quadripunctata; Chrysoperla carnea, C. harrisii, and C. rufilabris; Eremochrysa canadensis; Glenochrysa lineaticornis; Meleoma emuncta, and M. signoretti; and Oviedus placitus.

NEW BRUNSWICK 6 species confirmed, 2 probable: Chrysopa chi, C. nigricornis and C. oculata; Chrysoperla carnea; Glenochrysa lineaticornis; and Meleoma emuncta; Chrysopa quadripunctata and Meleoma signoretti anticipated.

NOVA SCOTIA 10 species confirmed: Chrysopa chi, C. nigricornis, C. oculata, and C. quadripunctata; Chrysoperla carnea, C. harrisii, and C. rufilabris; Glenochrysa lineaticornis; Meleoma emuncta, and M. signoretti; Chrysoperla harrisii and C. rufilabris on Sable Island, probable on mainland.

PRINCE EDWARD ISLAND 4 species confirmed, 4 probable: Chrysopa chi, C. oculata, and C. quadripunctata; and Meleoma emuncta; Chrysopa nigricornis, Chrysoperla carnea, Glenochrysa lineaticornis, and Meleoma signoretti anticipated.

NEWFOUNDLAND 4 species confirmed, 2 probable: Chrysopa chi, and C. oculata; Chrysoperla carnea; and Meleoma emuncta; Chrysopa nigricornis, and Meleoma signoretti anticipated.

Despite continued collecting since this writing, at least in the Yukon, British Columbia, Manitoba, and Québec, with late additions noted in the Yukon and in Québec, the information summarised here remained unaltered.

RELATIONSHIP TO OTHER FAUNAS

Chrysoperla carnea is the only holarctic species, being found in Siberia (Dorokhova 1979, as *Chrysopa carnea*), and elsewhere (Tjeder 1960, as *Chrysopa carnea*). In Canada, its range extended beyond 65°N, and it was present in western Alaska. High altitude movement across Bering Strait is plausible, considering its presence on Sable Island and its flight behaviour.

Chrysopa chi and *C. oculata* were almost as widely distributed in Canada and Alaska. However, on present evidence, they are entirely Nearctic. These, and other species, are unmistakably of the fauna to the south (Parfin 1952; Bickley & MacLeod 1956; Bram & Bickley 1963; Throne 1971).

Certain species were not represented in this analysis, though they might be occasional visitors. For instance, *Chrysopa incompleta* Banks occurs in Wisconsin (Throne 1971) and Massachusetts (Bickley & MacLeod 1956), so might enter southern Ontario or Nova Scotia. *Chrysopiella sabulosa* was seen from southern Montana, making it possible in Alberta. *Chrysoperla comanche*, however, though recorded from British Columbia (Bickley & MacLeod 1956), seems very unlikely.

Similarly, Oviedus placitus was seen from Oregon in the collection at the Université de Montréal, making it possible as an occasional visitor through the north-south valley systems of Washington State into the southern interior of British Columbia.

NEW TAXA

Chrysopiella brevisetosa was described in conjunction with this study, though separately (Adams & Garland 1981), representing the first record of the genus in Canada.

Another new species, Mallada slossonae, was discovered during the latter stages of this study and, for this reason, its description had not been finalised at the time of this writing. For instance, its range extends far beyond southern Canada, and it would be necessary to reinforce the description with additional specimens.

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MATERIAL EXAMINED

STATEMENT OF ACCESSIBILITY

The complete data-base was retained, as mentioned on p. 63, though it was too voluminous to have been incorporated into the body of the text by means of word-processing equipment for reasons of cost. Nevertheless, by retaining the data-base, future workers might accurately locate and be sure of knowing that they have found the specimens actually studied, particularly in the event that determination labels which were applied to all specimens examined in this study have subsequently been dislodged. Consequently, this section of the thesis attempts to make information in the data-base available while, at the same time, condensing some of it into a more concise symbolic representation. However, the complete data-base for all material examined from localities in Canada and Alaska was retained, intact.

For this purpose, a special file was created in the Lyman Entomological Museum and Research Laboratory at the request of the Department of Entomology, Macdonald College, where future workers might arrange to view the data-base and correspondence relating to this thesis, or to have copies of portions sent to them upon request.

SYMBOLS AND ABBREVIATIONS

♂	male
♀	female
♦	abdomen missing or damaged
+	artifacts attached, exuviae or cocoon
★	determination label by Dr. P.A. Adams
☆	*idem* by Dr. C.A. Tauber
▲	*idem* by Dr. R.C. Smith
△	*idem* by some other person
©	label employed an available junior synonym
®	label employed an erroneous name for taxon
em	emerged
ex	specimen of unknown sex
FIS	Forest Insect Survey
ft	feet elevation
HT	HOLOTYPE designated on label
(HT)	*idem* known from text only
km	kilometers
lt	light trap or other light source
mi	miles
nr	near
PT	PARATYPE designated on label
(PT)	*idem* known from text only
sp	species
uvl	ultra-violet or black light

Meleoma schwarzi

BRITISH COLUMBIA Penticton, 2800-3000 ft: 1♂, 13.VI.1977, 2♂♂, 20.VI.1977, J.A. Garland (LEM).

Meleoma dolicharthra

BRITISH COLUMBIA Galiano I(sland): 1♀, 16.VI.1974, G.G.E. Scudder (SEM). Kaslo: 1♂, 1♀, 24.VI.(1903), R.P. Currie (USNM). Langley: 1♀, 30.IV.1931, K. Graham (SEM). Pavilion Lake: 1♂☆©, 6.VI.1938, G.S. Walley (CNC). Penticton: 2800-3000 ft, 1♀, 4.VIII.1976, 1♂, 10.VIII.1976, 1♀, 18.VIII. 1976, J.A. Garland (LEM); at 1t, 1♀, 30.VIII.1976, 1♀, 1. IX.1976, J.A. Garland (LEM). Radium Hot Springs: 1♀+ ★© ☆©, em 20.III.1951, FIS 1950 A-2353A, D(ouglas) fir (CNC). Seton Lake, Lillooet: 1♀▲® ★© ☆©, 28.V.1926, J. McDunnough (CNC). Sugar Lake: 1♀● ★© ☆©, em 23.II.1944, FIS 1943 BC-4054C, on Pinus monticola (CNC). University of British Columbia Forest nr Haney, Garibaldi Pk, 1100 ft: 1♂★© ☆©, 6-7.VII. 1953, W.R.M. Mason (CNC). Victoria: at window, 1♀● ★© ☆©, 11.IX.1962, D. Evans (CNC).

Meleoma signoretti

BRITISH COLUMBIA Quesnel: 1♂$^{\Delta ®}$, 26.VII.1948, H.R. McCarthy (SEM); 1♂$^{\Delta}$, 16.VI.1949, R. Grace Smith (SEM). Trinity Valley: 1♂, 2.VI.1947, D. Evans (SEM). University of British Columbia Forest nr Haney, Garibaldi Pk, 1100 ft: 1♂*, 6-7.VII.1953, G.J. Spencer (CNC); 2♀♀*, 6-7.VII.1953, W.R.M. Mason (CNC). Vancouver, at lt: 1♀$^{\Delta ®}$, 6-7.IX.1962, S. Hansen, M.S. Jarial, G.G.E. Scudder (SEM).

ALBERTA Rocky Mountain House District: 1♀*, em 26.II.1944, FIS 1943 BC-4380, on Betula (CNC).

MANITOBA Brandon: 1♀*, 18.VII.1958, R.B. Madge (CNC). Glenlea Research Station: at lt, 1♀, 14.VII.1980, P.W. Arntfield (LEM). Ninette: 1♂*, 7.VI.1958, 1♂**, 7.VI.1958, 1♀*, 10.VI.1958, R.B. Madge (CNC). Stockton, 2 mi W: 1♀*, 16.VII.1958, R.L. Hurley, spruce-sand community (CNC). Winnipeg: 1ex, 19.VII.1977, M. & C. Tauber (CU in litt. Pechuman 1980).

ONTARIO Algonquin Pk: Head Lake, 2♀♀*, 8.VII.1935, F.P. Ide (ROM); 1♀, 7.VII.1979, W.J. Crins (APM). Bala: 1♀*, 19.VII.1932, G.S. Walley (CNC). Belleville: 1♂, 10.VIII. 1968, R.H. Parry (UG); at lt, 1♀, 24.VI.1977, D.N. Duffy (LEM). B(ig) Rideau L(ake): 1♀, 1.VII.1977, R.G. Bennett

(UG). Cawaja Beach, Tiny Tp, Simcoe Co: uvl, 1♀, 10.VII. 1968, 1♀, 6.VIII.1968, J.C.E. Riotte (ROM). Chaffeys Locks: uvl, 1♂, 23.VI.1963, 1♀, 25.VI.1963, 1♀, 14.VII.1963, 1♂, 15.VII.1963, 1♂, 18.VII.1963, 1♀, 26.VII.1963, 1♀, 29.VII. 1963, J.C.E. Riotte & I. Smith (ROM); uvl, 1♂, 25.VII.1966, Riotte & Kohalmi (ROM); uvl, 1♀, 27.VIII.1969, J.C.E. Riotte (ROM). Fraserburg, Muskoka District: 1♂, 21-24.VII. 1968, L. Kohalmi (ROM). Guelph: 1♀, 12.VI.1974, Donna J. McComb (UG). Hall's Lake (nr Haliburton, Stanhope Tp in litt. G.K. Morris 1980): 1♀, 19.VII.1961, G.K. Morris (UG). Horning's Mills: 1♂★, 11.VII.1928, W.E. Ricker (ROM). Kendal: uvl, 1♂, 30.VI.1967, Riotte & Kohalmi (ROM). Marmora: 1♂, 1♀, 30.VI.1957, 1♀, 17.VII.1957, K.D. Southern (UG). Meaford: 1♂, 2.VIII.1975, W.J. Moolenbeek (UG). Merivale: 1♀☆, 22.VIII.1932, L.J. Milne (CNC). Montieth: 1♀+ ★ ☆, em 7.II.1943, FIS 1942 7495C (CNC). One Sided Lake, Larsson's Camp: uvl, 1♀, 2.VII.1962, 1♀, 5.VII.1962, J.C.E. Riotte (ROM). Ottawa: 1♂, 5.VI.1968, J.E.H. Martin (CNC). Pinery Prov Pk, Lambton Co, Ausable River nr Burley: uvl, 1♀, 14.VII.1977, B. Marshall & D. Maddison (ROM 770140). Port Credit: 1♀, 4.VII.1965, 1♀, 16.VII.1978, Ian M. Smith (ROM). St Davids: 1♂, 4.VIII.1931, 1♀, 25.VIII.1931, W.L. Putman (UG). Silver Lake, Maberly: 1♀, 17.VII.1980, M.J. Sharkey (LEM). Sudbury: uvl, 1♀, 23.VII.1961, J.C.E. Riotte (ROM). Toronto: 1♀★, 6.VIII.1914, E.M. Walker (ROM); 1♀★, 29.VI.1924 (ROM); Fairbank, 1♀★®, 12.VIII.1932, F.C. Cooper

(ROM); at 1t, 1♀, 28.VIII.1961, J.C.E. Riotte (ROM); uv1, 1♂, 30.V.1962, 1♂, 1♀, 23.VI.1962, J.C.E. Riotte (ROM); 1♀, 24.VIII.1962, J.C.E. Riotte (ROM).

QUEBEC Belisle Beach, Luskville: 1♀★®, 12-19.VIII.1961, E.G. Munroe (CNC). Berthierville: 1♂, 28.VII.1932, L. Daviault (CRFL). Black Lake, King Mt, Gatineau Prov Pk: 3♂♂, 17.VI.1975, L. Crozier (LEM). Frelighsburg: at 1t, 1♀, 22.VII.1972, J.L. Laliberté (UL); 1♂, 28.VII.1972, J.L. Laliberté (UL). Gracefield: 1♂★ ☆, 23.VI.1937, 1♂☆, 24.VI.1937, O. Peck (CNC). Kingsmere: 1♀☆®, 18.VII.1919, R.H. Chrystal (CNC). Kirks Ferry: at 1t, 3♀♀☆®, 9.VIII. 1950, 1♀☆®, 10.IX.1950, B.P. Beirne (CNC). Knowlton: 1♀★ ☆, 9.VII.1927, G.S. Walley (CNC). Lac Mondor, Ste Flore: 1♀☆®, 18.VI.1951, 1♂☆, 25.VI.1951, 1♀, 8.VII.1951, 1♀☆, 21.VII.1951, 1♀☆, 27.VII.1951, 2♀♀☆, 31.VII.1951, E.G. Munroe (CNC). Lanoraie: 1♂, 1.VII.1952, G.A. Moore (LEM). La Trappe: 1♂△, 9.VIII.1932, J. Ouellet (UdeM). Laval: 1♀, 24.VIII.1976, 1♀, 22.VII.1977, 1♀♁, 30.VIII.1978, 1♀, 7.VIII.1979, 1♀, 30.VII.1980, A.C. Sheppard (LEM). Montfort, Laurentian Mts: 1ex, 30.VI.1916 (CU in litt. Pechuman 1980). Mont St Hilaire: malaise trap, 1♀, 22-26.VII.1977, A.T. Finnamore (LEM). Parc du Mont Tremblant, site 11: 1♀△®, 6.VII.1952, A. Robert (UdeM). Ste Anne de Bellevue: 1♀, 21.VII.1938 (LEM); 1♀, 26.VI.1965, J. Lovrity (LEM); 1♂, 16.VI.1967, R. Lalonde (LEM); Morgan Arboretum, 1♂, 6.VII.

1979, J.A. Garland, spruce association (LEM). Ste Clotilde: 1♀, 26.VII.1965, J. Lafrance (SJRS). Sherbrooke: 1ex, 2.VII.1916, W.T.M. Forbes (CU in litt. Pechuman 1980); 1♂*, em 4.I.1973, M. Forest (CRFL). Tadoussac: 1♂, 20.VII. 1932, A.F. Winn (LEM).

NOVA SCOTIA Acadia Forest Sta(tion): 1♂★ ☆, 7.VII.1944, T.F. (CNC). Chester: 1♀, 16.VII.1969, Barry Wright (NSM). Kentville: 1♀★, 6.VIII.1958, J.R. Vockeroth (CNC).

Meleoma emuncta

BRITISH COLUMBIA unspecified locality: 1♀Δ® ☆, 24.VII.1941, FIS 1941 BC-2492 (CNC). Ainsworth: 1♂☆, 11.VII.1903, R.P. Currie (USNM). Chilliwack: 1♂☆, 4.VI.1933, H.G. Fulton (CNC). Cowichan Lake: 1♀Δ©, 31.VII.1937, Idyll (SEM); 1♀Δ©, 11.VI. 1938, G. Boyd (SEM). Departure Bay: 1♀▲ ☆, 21.VII.1908 (CNC); 1♂Δ©, 10.VI.1925, G.J. Spencer (SEM). Galiano I(sland): 2♀♀, 6.VIII.1975, G.G.E. Scudder (SEM); Spanish Hills, 1♀, 28.VIII.1975, G.G.E. Scudder (SEM). Kaslo: 1♀☆, 8.VII.(1903), 1♀☆, 21.VII.(1903), 2♀♀☆, 3.VIII.(1903), 1♂☆, 6♀♀☆, 6.VIII. (1903), 4♀♀☆, 7.VIII.(1903), R.P. Currie (USNM); 6♀♀☆, 14. VIII.(1903), A.N. Caudell (USNM). Kootenay L(ake): 1♀★, VI-VIII.1949, R.G. Ferguson (ROM). Lakelse L(ake) Bog, S(outh) Terrace: 1♀☆, 24.VII.1960, W.R. Richards (CNC). Langford:

in flight, 1♀☆, 2.VII.1959, D. Evans (CNC); at 1t, 1♀★ ☆, 3.VIII.1962, FIS 1962 622092-20 (CNC). Lillooet: 1♀● ☆, 10.VI.1920, G. (CNC). Nanaimo: 1♀★, 10.VIII.1924, W. Clemens (ROM); 1♂, 23.VI.1929, G. Beall (UWO). Penticton: 2800-3000 ft, 1♂, 28.VII.1976, 1♀, 29.VII.1976, 1♂, 31.VII. 1976, 1♀, 2.VIII.1976, 1♂, 3♀♀, 4.VIII.1976, 1♀, 9.VIII. 1976, 1♂, 10.VIII.1976, J.A. Garland (LEM); at 1t, 1♀, 30. VIII.1976, 1♀, 31.VIII.1976, 2♀♀, 3.IX.1976, 1♀, 4.IX.1976, 1♀, 16.IX.1976, J.A. Garland (LEM). Quesnel: 1♀, 9.VIII. 1948, 1♀, 14.VI.1949, G.J. Spencer (SEM). Revelstoke: 1♀● ☆, 14.VIII.(1903), R.P. Currie (USNM). Skeena R(iver), Terrace: 1♂☆, 11.V.1960, B.S. Heming (CNC). Terrace: 1♀★, VIII.1925, A.P. Macdougall (ROM); 1♂☆, 20.VII.1960, 1♀☆, 25.VII.1960, W.R. Richards (CNC). U(niversity of) B(ritish) C(olumbia): 1♂, 7.VII.1974, M. Isman (SEM); 1♂, 12.VII.1974, M. Isman, from Thimbleberry (SEM). Vancouver: 1♀▲ ☆, 7.VII.1914, R.H. Chrystal (CNC); 1♀☆, 10.VIII.1937, N.D. (MCZ). Vancouver Isl(and): 1♂△ ☆, (MCZ). Victoria: 1♀▲® ☆, 10.V.1916, R.C. Treherne (CNC).

MANITOBA Cedar Lake: 1♂△ ☆, 20-30.VI.1936, F.M. Carpenter & C.T. Parsons (MCZ).

ONTARIO Algonquin Prov Pk: Joe Lake, 1♂▲© ☆, 7.VII.1926, F.P. Ide (CNC); uvl, 1♂, 16.VI.1977 (APM); 1♂, 6.VII.1978, D. McCorquodale (APM). Bancroft: 1♀, 7.VIII.1964, S.J.

Stark (ROM); 1♀, 4.IX.1966, S.J. Wilcox (ROM). Baysville, Muskoka District, Echo Lake: uvl, 1♀, 19.VII.1966, 1♀, 24.VII.1966, I.M. Smith (ROM). Bigwin Island: 1♀, 28.VIII, E.G.B. (UWO). Biscotasing: 1♀▲ ☆, 27.VI.1931, Karl Schedl (CNC). Chaffeys Locks: uvl, 1♀, 27.VIII.1969, J.C.E. Riotte (ROM). Fraserburg, Muskoka District: 1♀, 10-12. VIII.1966, L. Kohalmi (ROM). Hamilton: 1♀ (ROM). Horning's Mills, E. Cr(eek): 1♀★, 24.VII.1928, F.P. Ide (ROM). Iron Bridge: at 1t, 1♀★, 29.VIII.1959, R.E. Leech (CNC). Kirkwood Tp: 1♀△ ★, 31.VIII.1960, J.H. Grobler, pred(atory) on aphids (CNC). Lake Nipissing, Bass Cr(eek): 1♂★, 16.VII.1929, F.P. Ide (ROM). Niagara: 1♀△, 15.VIII.1931, W.L. Putman (UG). Port Credit: uvl, 1♀, 12.IX.1968, I.M. Smith (ROM). Rostrevor: 2♀♀☆, 2.IX.1907, Arthur Gibson (CNC). S(ault) S(te) Marie: 1♂, 21.VI.1963, D.B. Stolz (UG). Smoky Falls: Mattagami R(iver), at 1t, 1♀☆, 30.VI.1934, G.S. Walley (CNC); Kapuskasing, 1♀★, 4.VIII.1937, R.V. Whelan (ROM). Sudbury: uvl, 1♀, 13.VII.1961, J.C.E. Riotte (ROM). Thunder Bay District, Rossport Prov Pk, 2 mi E Rossport: uvl, 1♀, 19-20.VI.1971 (ROM 710435). Timiskaming District, Kap-kig-iwan Prov Pk, Englehart: uvl, 3♂♂, 1♀, 26.VI.1971 (ROM 710487). Timmins: 1♀, 14.VIII.1950, FIS 1950 550-4911.02 (GLFRC).

QUEBEC Aylmer, Queen's Pk: 1♀☆, 31.VIII.1923, C.B. Hutchings (CNC). Belisle Beach, Luskville: at 1t, 1♂★, 4♀♀★, 12-19. VIII.1961, E.G. Munroe (CNC). Berthierville: 1♂, 12.VII.1932,

L. Daviault (CRFL). Brandy Pot: 1♀, 4.VIII.1945, N.M. Comeau (UL). Canton Rouyn, Cté R(ouyn)-Noranda: 1♀, 19.VII.1951, (FIS) 1951 2108A (CSQ). Charlevoix Co: 1♀♂, 6.VIII.1918, 1♀♂, 11.VIII.1918, A.F. Winn (LEM). Cté Megantic: 1♀, 14.VIII.1973, (FIS) 5571, sur pin rouge (CSQ). Covey Hill: 1♀☆, 25.VI.1924, 1♂♂☆, 24.VI.1927, G.S. Walley (CNC). Duchesnay: 1♀, 26.VII.1946, R. Robitaille (CSQ). Frelighsburg, Missisquoi: at lt, 1♀, 17.VII.1972, J.L. Laliberté (UL). Hemmingford: 1♀☆, 7.VI. 1923, A.D. Baker (CNC). Kirks Ferry: at lt, 1♀♂☆, 21.VII-6.VIII.1950, B.P. Beirne (CNC). Knowlton: 1♀☆, 6.VII.1927, G.S. Walley (CNC); 1♀☆, 25.VI.1928, G.H. Fisk (CNC); 1♀☆, 26.VI.1928, J.A. Adams (CNC). Laval: 1♀, 4.VIII.1976, 1♀, 11.VIII.1976, 1♀, 12.VIII.1976, 1♀, 25.VIII.1976, 3♀♀, 28. VIII.1976, 1♀, 18.VIII.1980, A.C. Sheppard (LEM). Lac Mondor, Ste Flore: 1♀☆, 9.VII.1951, 4♀♀☆, 21.VII.1951, 3♀♀☆, 23.VII.1951, 4♀♀☆, 25.VII.1951, 1♀☆, 26.VII.1951, 1♀☆, 27.VII.1951, 3♀♀☆, 31.VII.1951, 1♀☆, 9.VIII.1951, 1♂☆, 10.VIII.1951, 4♀♀☆, 12.VIII.1951, 1♀★☆, 19.VIII.1951, 4♀♀☆, 21.VIII.1951, 7♀♀☆, 22.VIII.1951, 2♀♀☆, 24.VIII.1951, 2♀♀☆, 25.VIII.1951, 1♀☆, 27.VIII.1951, 1♀☆, 1.IX.1951, 1♀★☆, 2.IX.1951, 1♀☆, 6.IX.1951, E.G. Munroe (CNC). Lac Serpent, N(otre) D(ame) du Laus: 1♀♂, 27.VII.1970, S.D. Vickery (LEM). Laniel: 1♂☆, 3.VII.1951, G.V. Shearsmith (CNC). Laurentide Pk, Le Relais, 2500 ft: at lt, at bait, 1♀☆, 30.VIII.1955, 1♀☆, 31.VIII.1955, Martin & Munroe (CNC). Lorraine: 1♀△®, 25.VI.1977, M. Coulloudon (UdeM); 1♀, 25.

VII.1980, M. Coulloudon, sur saute pleuteur (UdeM). Montfort, Laurentian Mts: 1ex, 30.VI.1916 (CU in litt. Pechuman 1980). Montreal: 1♀, 13.VII.1972, F. Patenaude (UdeM). Parc du Mont Tremblant: 1♂△, Etiquette retiréé par M. Corboz (UdeM Collection A. Robert); tourbe (6), 1♂△, 17. VII.1954, (28), 1♂△, 1.VII.1957, (1a), 1♂△, 1♀△®, 14.VII. 1961, 1♀△®, 11.VII.1962, (1a), 1♂△, 20.VII.1962, (16b), 1♀△®, 8.VIII.1962, A. Robert (UdeM). (Quebec): 1♀△®, 1♀♦ △® (UL Provancher Collection); Quebec: 2♂♂☆, T.W. Fyles (USNM). St Augustin, Port(neuf): 1♀, 21.VIII.1971, J.P. Laplante (CRFL). Ste Angèle de Merici: 2♂♂, 18.VII.1974, P.P. Harper (UdeM). Ste Foy: 1♀, 7.VIII.1971, J.P. Laplante (CRFL). St Hippolyte: 1♀△®, 26.VI.1965, D. Oliviera (UdeM). St Théodore de Chertsey: 7th lake, 2♀♀, 14.VII.1979, A.C. Sheppard (LEM); 1♀, 21.VII.1979, A.C. Sheppard (LEM). Seigneurie Lac Metis, Cté Matapedia: 1♀, 21.VII.1971, (FIS) 4532 (CSQ). Shawbridge: 1♀, 2.VII.1926, 1♀, 29.VII. 1927, 1♂, 2.VIII.1927, 1♀, 8.VIII.192(9), 1♂, 6.VIII.19(30), A.F. Winn (LEM). Sherbrooke: 1♀+, 20.X.1972, 1♀+, 4.XI.1972, M. Forest (CRFL). Tadoussac: 1♀, 26.VIII.1931, 1♀, 25.VII. 1932, 2♀♀♦, 2.VIII.1932, A.F. Winn (LEM).

NEW BRUNSWICK Boomroad, North Co: 1♀, 11.VII.1966, (FIS) 66-1935-02, on Balsam fir (MFRC). Campbellton: at lt, 1♀, 25.VII.1968 (NDFRC). Fredericton: 1♂★, 12.VII.1933, 1♀★, 18.VI.1934, C.E. Atwood (ROM); 1♀☆, 17.VIII.1959, N.R.

Brown (CNC). McGraw B(roo)k, (nr Blissfield): at 1t, 1♀, 25.VIII.1968 (NDFRC). Petitcodiac: 1♀ ♦ ☆, 25.VI.1966, David R. Smith (USNM). Red Bank: 1♀☆, 10.VIII.1948, A.L. van Slyke (CNC). St John: 1♀, 1932, F. Lord (UG). St Quentin: at 1t, 1♀, 25.VII.1968 (NDFRC). Sussex: at 1t, 1♀, 25.VIII.1968 (NDFRC).

PRINCE EDWARD ISLAND unspecified locality: 1♀♦, 2.VIII. 1949, J.E.C. (LEM).

NOVA SCOTIA Armdale, Halifax Co: 1♂, 23.VI.1961, 4♂♂, 2.VII.1961, D.C. Ferguson (NSM). Baddeck, Cape Breton Island: 1ex☆(right forewing only), 12.VIII.1928 (MCZ); 1♂☆, 7.VII.1931, 1♀♦ ☆, 21.VII.1931, 1♂☆, 1♀☆, 7.VIII.1931, G. Fairchild (MCZ). Chester: 1♂, 22.VI.1968, 1♂, 1♀, 26. VI.1968, 2♂♂, 17.VII.1968, 6♂♂, 3♀♀, 16.VII.1969, Barry Wright (NSM). Debert: 1♂, 1♀, 18.VIII.1961, D.C. Ferguson (NSM); at 1t, 2♀♀, 30.VIII.1968 (NDFRC). Kentville: 1♂Δ® ☆, 3.VII.1923, R.P. Gorham (CNC); 1♂✦ ☆, em II.1957, H. Stultz, larva collected on apple IX.1956 (CNC); 1♀★, 6.VIII.1958, J.R. Vockeroth (CNC). Lac Ainslee, Cape Breton Is(land): 1♀, 14.VIII,1951, D.C. Ferguson (NSM). Lawrence Town: at 1t, 2♀♀, 14.VIII.1968 (NDFRC). MacNabs Island: 1♀☆, 26.VII.1914 (CNC). Malagash Mines, Cumberland Co: 1♂, 25.VII.1966, (FIS) 66-2600-02, on Trembling aspen (MFRC). North Sydney, Cape Breton Is(land): 1♂, 8.VIII.1967, Barry Wright (NSM).

Pictou: 2♂♂★, 1♀♦ ★, 22.VII.1914, 1♂△ ★, 22.VII.1914, E.M.W(alker) (ROM). Purcell's Cove' Halifax Co: 1♀, 12.VII.1962, P.M. Taschereau (NSM). Truro: 2♀♀, 18.VIII. 1961, P.M. Taschereau (NSM). West Dover, Halifax Co: 1♀, 11.IX.1961, D.C. Ferguson (NSM). Wolfville: 1♂☆ (MCZ Banks Collection); at 1t, 1♀☆, 7.VII.1957, H. Stultz (CNC).

NEWFOUNDLAND Eastport: 3♂♂☆, 2♀♀☆, 9.VII.1961, C.P. Alexander (USNM). Exploits R(iver) nr Bishop's Falls: 1♂, 1♀, 15.VII.1961, C.P. Alexander (USNM). Pynn's Brook: 1♂, 23.VI.1975, 2♀♀, 8.VII.1975, 1♂, 23.VII.1976, 2♀♀, 24.VIII. 1976, Ray F. Morris (SJARS). Romaine Br(oo)k: 1♀☆, VIII. 1961, C.P. Alexander (USNM). St George's: 4♀♀, 15.VII.1976, Ray F. Morris (SJARS); 3 mi SE, 1♀☆, 27.VI.1966, David R. Smith (USNM). St John's: 1♀, 14.VIII.1974, Ray F. Morris (SJARS); 1♀, 1979, K.E. Pardy (NDFRC). Shoal H(arbou)r: 1♂, 28.VI.1979, 1♀, 25.VII.1979, Greg Reid (SJARS). Terra Nova Nt'l Pk, Salton B(roo)k: 1♂, 21.VI.1971 (MU).

Eremochrysa canadensis

BRITISH COLUMBIA Penticton: at 1t, 1♂, 16.VII.1976, J.A. Garland (LEM).

ONTARIO Go Home: HT♀, 13.VII.1907 (MCZ 11379 Banks Collection). Parry Sound District, 6 mi W Magnetawan: 1ex (right forewing only), 2.VIII.1956, I.J. Cantrall (UMAA).

QUEBEC Knowlton: 1♀★, 29.VII.1930, L.J. Milne (CNC).

Eremochrysa fraterna

BRITISH COLUMBIA Oliver: 1♂★, 25.V.1959, L.A. Kelton (CNC); McIntyre Cr(eek), 27.V.1959, L.A. Kelton (CNC). Penticton, 2800-3000 ft: 1♀, 5.VI.1976, 1♀, 22.VII.1976, 1♀, 28.VII. 1976, 1♀, 29.VII.1976, 1♂, 11.VI.1977, 1♀, 20.VI.1977, J.A. Garland (LEM). Seton Lake, Lillooet: 2♀♀★, 28.V.1926, 1♂▲★, 29.V.1926, J. McDunnough (CNC). Vaseaux L(ake), Oliver: 1♂★, 15.V.1959, R.E. Leech (CNC).

Eremochrysa punctinervis

BRITISH COLUMBIA Oliver: 1♀▲★, 23.V.1923, C.B. Garrett (CNC); 1000 ft, 12♀♀★®, 7.VII.1953, 8♀♀★®, 10.VII.1953, J.E.H. Martin (CNC); 1000 ft, 2♂♂★®, 4♀♀★®, 12.VIII.1953,

D.F. Hardwick (CNC); 1♀★, 29.VIII.1953, J.E.H. Martin (CNC). Penticton: 2800-3000 ft, 1♀, 2.VIII.1976, J.A. Garland (LEM); at 1t, 1♀, 4.IX.1976, J.A. Garland (LEM). Seton Lake, Lillooet: 1♂★®, 9.VI.1926, J. McDunnough (CNC). South Okanagan (unspecified locality): 3♀♀★, VIII.1962, D. Logan (CNC).

Chrysopiella brevisetosa

ALBERTA Drumheller: PT♂, 14.VI.1946, E.H. Strickland (UAE).

Chrysopa nigricornis

BRITISH COLUMBIA Agassiz: 1♂, 13.VI.1939, 1♂, 30.VII.1939, B.A. Dickson (SEM). Barkerville: 1ex♂ △, 17.VII.1948, H.R. MacCarthy (SEM). Bear Lake: 1♀, 20.VII.1903, R.P. Currie (USNM). Cache Creek: 1♀, 11.VII.1974, G.G.E. Scudder (SEM). Cowichan Lake: 1♂, 4.VII.1938, 1♀△®, 31.VIII.1938, O.G. Boyd (SEM). Departure Bay: 1♀▲© ★, VII.1908 (CNC); 1♀★, 3.VIII (ROM Walker Collection). Essondale: 1♂, 25.VIII. 1935, 1♂, 10.IX.1935, W. Tomkinson (SEM). Green Timbers For(estry) Sta(tion): 1♂★, 14.VII.1938, R. Longmore (CNC).

Kamloops: 1♀, 13.VII.1941, 1♀, 9.VII.1944, 2♀♀, 2.IX. 1945, G.J. Spencer (SEM). Kaslo: 1♂, 12.VII.(1903), 1♀, 24.VII.(1903), 1♂, 7.VIII.(1903), R.P. Currie (USNM); 1♀, 14.VIII.(1903), A.N. Caudell (USNM). Langford: at 1t, 1♀, 6.IX.1964, D. Evans (PFRC). Lillooet, 1♀★, VII-IX. 1927, A. Phair (CNC). Okanagan Lake: 1♂Δ©, 6.VIII.1935, J.L. McHugh (SEM). Oliver: 1♀▲® ★, 7.VIII.1923, 1♂, 14.IX. 1923, C.B. Garrett (CNC). Osoyoos: 1♂, 15.VIII.1923, C.B. Garrett (CNC). Penticton: 1♀, 6.VI.1976, 1♂, 6♀♀, 8.VI. 1976, 1♂, 7.VII.1976, 1♂, 13.VII.1976, J.A. Garland (LEM); at 1t, 1♂, 1♀, 15.VII.1976, 1♂, 1♀, 19.VII.1976, 1♂, 1♀, 20.VII.1976, 1♂, 22.VII.1976, 1♀, 31.VII.1976, 1♀, 12.VIII. 1976, 2♂♂, 3♀♀, 28.VIII.1976, 1♂, 6♀♀, 30.VIII.1976, 2♀♀, 31.VIII.1976, 1♀, 3.IX.1976, 1♂, 4.IX.1976, 1♂, 6.IX.1976, 1♀, 10.IX.1976, 1♀, 13.IX.1976, 1♂, 2♀♀, 14.IX.1976, 2♀♀, 16.IX.1976, 1♂, 22.IX.1976, 2♀♀, 30.IX.1976, 1♂, 1♀, 9.X. 1976, J.A. Garland (LEM). Pitt Meadow(s): 2♂♂, 1♀, 1ex●, VII.1923, 2♀♀, 2ex●, VIII.1923, W.A. Salter (UG). Quesnel: 1♀, 28.VII.1945, G.J. Spencer (SEM). Revelstoke: at 1t, 1♂, 27.VII.1978, J.A. Garland (LEM). Sullivan: 1♀Δ©, 18.VII. 1939, R.G. Atkinson (SEM). Summerland: 1♂Δ©, 10.VIII.1956, K. Taylor (SEM). Terrace: 1♀Δ, Mrs. Hippisley (MCZ). Univ(ersity of British Columbia): 1♀, 12.X.1928, J. Waterfield (MCZ). Vancouver: 1ex●, 30.VI.1914, R.H. Chrystal (CNC); 1♀, VIII.1923 (UG); 1♀, 25.VII.1929, G.H. Larnder (BCPM); 1♀Δ©, 20.VIII.1929, G.J. Spencer (MCZ); 1♀, 12.VIII.

1934, G.H. Larnder (BCPM); 1♀, 9.IX.1935, J.L. McHugh (MCZ); 1ex♦, 25.VIII.1939, Wellington (SEM); 1ex♦, 10. IX.1953, K. Racey (SEM); 1♂, 2.VIII.1965, Mrs. Bramhall (SEM); at 1t, 1♀, 24.VI.1969, J.L. Gordon (SEM). Vernon: 1♀, 3.VII.1924, E.A. Rendell (CNC). Victoria: HT♀©, VII, Crotch (MCZ 22975); 1♀, 18.VII.1909, J.B. Wallis (MCZ Banks Collection); 1♀▲, 25.IX.1917, W.B. Anderson (CNC); 1♀, 9.V.1921, W.R. Carter (CNC); 1♀, 18.VII.1929, 1♂, 19.VII. 1929, W.A. Newcombe (BCPM). Westwick L(ake), Cariboo: 6♂♂, 13.VI.1961, 1♂Δ© Δ®, 13.VI.1961, G.G.E. Scudder (SEM).

ALBERTA Elk Island N(ational) P(ark): 1♂★, 11.VII.1949, FIS 1949 A-52B, on Alder (CNC). Lethbridge: 1♀, _8.VIII. 1915, E.H. Strickland (CNC); 2♀♀, 18.VI.1929, J.H. Pepper (CNC).

SASKATCHEWAN Prairie River: 1♂★ Δ, 10.VI.1946, FIS W-439 (CNC). Sutherland: 1♂★, 9.VII.1956, FIS W-1325 (CNC).

MANITOBA Brandon: 1♀, 18.VII.1978, Jim Broatch (UMW). Fort Garry: at 1t, 1♀, 18.VIII (UMW). Glenlea Res(earch) St(atio)n: at 1t, 4♂♂, 1♀, 21.V.1980, 2♂♂, 23.V.1980, 1♀, 20.VI.1980, 1♂, 23.VI.1980, P.W. Arntfield (LEM). Husavick: 1♀Δ, 18.VIII.1910, J.B. Wallis (MCZ Banks Collection). Otto: 1♀+ ★, em 30.VII.1947, FIS W-369A, on Spruce (CNC). St James: 1ex♦, 10.VI.1961, J.A. Garland (UMW). Stockton,

2 mi W: 1♂★, 30.VI.1958, R.L. Hurley, spruce-sand community (CNC). University of Manitoba: at 1t, 1♀, 20.V.1980, 2♂♂, 1♀, 26.V.1980, P.W. Arntfield (LEM). Winnipeg: 1♀, 8.VII.1966, K.A. Hamilton (UMW); 2♀♀, 4.VIII.1978, J.A. Garland (LEM).

ONTARIO Biscotasing: 1♂▲, 12.IX.1931, Karl E. Schedl (CNC). Black Rapids, Rideau R(iver): 1♀, 18.VIII.1922, F.P. Ide (CNC). Brantford: 1♀, 1943 (MCMU). Burlington: 1♂△®, 6.VI. 1947, R.J. Alton (MCMU). Chaffeys Locks: uvl, 1♂, 24.VI. 1963, 1♂, 27.VI.1963, 1♂, 28.VI.1963, 1♀, 29.VII.1963, J.C.E. Riotte & I. Smith (ROM); uvl, 1♀, 23.VIII.1964, J.C.E. Riotte & P. Hebert (ROM); uvl, 1♀, 21.VII.1970, 1♀, 14.VIII.1970, 1♀, 20.VI.1972, J.C.E. Riotte (ROM). Chatham: 1♀, 14.VI.1930, 1♂, 19.VII.1930, Geof. Beall (UWO). De Grassi P(oin)t: 1♀★, 24.VIII.1914, E.M. Walker (ROM). Fennala: 1♀, 27.V.1979, V.I. Burachynsky (UG). Hamilton: 1♂, 1ex●, 4.VIII.1947 (MCMU). Horning's Mills: 1♂★, 19.VI. 1928, W.E. Ricker (ROM). L(ake) Couchiching: 1♂★, 6.VIII. 1914, W. Brodie (ROM). McIntyre: 1♀, 9.VII.1930, F.P. Ide (ROM). Niagara-on-Lake: 1♂, 5.VIII.1931, W.L. Putman (UG). Norval: 1♂, 30.V.1969, R.W. Cameron (UG). P(oin)t Pelee: 1♂★, 4.VIII.1920, N.K.B. (ROM); 1♂, 3.VI.1929, L.J. Milne (CNC); 1♀★, 16.VI.1954, G.B. Wiggins (ROM). Port Arthur: 1♂△, 25.VIII.1949, R. Neill, light forest (MCMU). Port Credit: 1♀, 13.VII.1965, Ian Smith (ROM); 1♀, 25.VII.1965,

Ian Smith, uvl (ROM); at lt, 1♂, 20.VIII.1968, I.M. Smith (ROM). Orillia: 1♀, 2.VIII.1924, H.L. Viereck (CNC). Ottawa: 1♀, 6.X.1902, 1♀, 15.VII.1907, Arthur Gibson (CNC); C(entral) E(xperimental) F(arm), 1♀+, 2ex♂+, em 20.VIII.1911 (CNC); 1♀, 4.VIII.1917, C.B. Hutchings (CNC); 1♀, 7.IX.1917 (CNC); 1♀, 28.VIII.1919, J. McDunnough (CNC); 1♀▲, 13.VI.1920, C.B. Hutchings (CNC); 1♂, 5.VII.1967, Brian Rolseth (UAE). Rondeau Prov Pk, Kent Co: uvl, 1♂, 25.V.1965, J.C.E. Riotte (ROM); uvl, 1♂, 5.VI.1965, 1♂, 6.VI.1965, J.C.E. Riotte & I.M. Smith (ROM); uvl, 1♂, 20.VI.1965, 1♀, 21.VI.1965, J.C.E. Riotte (ROM); 1♀, 30.VII.1967, I. & S. Smith, sweeping grass (ROM). St. Davids: 1♀△, 20.VIII.1931, W.L. Putman (UG). Severn Bridge: 1♀, 23.V.1964, G.E. Scott (ROM). Stittsville: 1♂, 5.VIII.1975, M. Sanborne (MCMU). Tillsonburg: 1♀, 9.VI.1931, G.S. Walley (CNC). Toronto: 1♀★, C.E. Corfe (ROM); 3♂♂★, 1ex♂★, 6.VIII.1914, E.M. Walker (ROM); uvl, 2♂♂, 16.VI.1961, 1♂, 18.V.1962, 1♂, 23.VI.1962, J.C.E. Riotte (ROM). Vineland: 1♀, 26.VIII. 19_0, W.L. Putman (CNC). Zion: 1ex♂△, 8.VIII.1935, W.C. McGuffin (UWO).

QUEBEC Berthierville: 1♀△, 23.VI.1949, 1♂△, 8.VIII.1949, A. Robert (UdeM). Duchesnay: 1♀, 4.VIII.1947, R. Lambert (CSQ). Kirks Ferry: at lt, 1♂, 21.VII-6.VIII.1950, 1♂, 7.IX.1950, B.P. Beirne (CNC). Knowlton: 1♀, 7.VII.1928,

G.H. Fisk (CNC); 1♂, 10-11.VIII.1929, L.J. Milne (CNC). Lachine: 1♀, 6.VIII.1924, G.S. Walley (CNC). Lac Mercier: 1♂, 1♂★, 16.VIII.1937, 1♂, 17.VIII.1937, G.S. Walley (CNC). Lac Mondor, Ste Flore: 1♂, 13.VI.1951, 1♂, 18.VI.1951, E.G. Munroe (CNC). L(ac) Victor: 1♀★, 8.VIII.1950, J. Mackenzie (CNC). Lanoraie: 1♂, 5.IX.1932, A.F. Winn (LEM). Laval: 1♂, 13.VI.1975, 1♂, 14.VI.1975, 1♂, 20.IX.1978, 1♂, 23.VI.1980, 1♀, 10.VIII.1980, A.C. Sheppard (LEM). Montreal: 1♂, H.H. Lyman (LEM); 1♂, 21.VI.1875 [1], H.H. Lyman (LEM); 1♂, 24.X.1951, 1♂, 17.VII.1954, G.A. Moore (LEM). Mont St Hilaire: malaise trap, 1♀, 29.VII-2.VIII.1977, 2♂♂, 2-5. VIII.1977, 1♂, 16-19.VIII.1977, A.T. Finnamore (LEM). Parc du Mont Tremblant: 1♀△, IX.1957, A. Robert (UdeM). (Quebec): 1♀△, 1ex♦△ (UL Provancher Collection). Ste Anne de Bellevue: 1♀, 10.VII.1939 (LEM); 1ex♦, 23.VII.1940 (LEM); 1♂, 31.VII.1940 (LEM); 1♂, 10.VI.1964, A. Campbell (LEM); 1♀, 4.IX.1978, J.A. Garland, Spruce-Pine association (LEM). Ste Clotilde: 1♂, 10.VII.1968, J. Lafrance (SJRS). Ste Foy: 1♂, 26.VIII.1967, L. Huot (UL). St Felix de Kinsey: 1♂, 6.VI.1968, (FIS) 3-68-562-C, Fraxinus americanus (CRFL). St Johns Co: 1ex♦, 23.VIII.1917, W. Chagnon (LEM). Shawbridge: 1♂, 23.VIII.192_, A.F. Winn (LEM); 1♂, 14.VI. 1975, A.C. Sheppard (LEM).

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[1] This was the oldest definitely dated specimen from any Canadian (or Alaskan) locality in this study.

NEW BRUNSWICK Gagetown, Fredericton: 1♀★, 12.VII.1932, F.P. Ide (ROM).

NOVA SCOTIA Armdale: 1♀★, 29.VIII.1952, D.C. Ferguson (USNM). Willowdale: at 1t, 1♀★, 9.VII.1947, O.R. Redmond (CNC); 1♀★, 9.VII.1947, H. MacGillivray (CNC).

Chrysopa quadripunctata

BRITISH COLUMBIA Vancouver Island: 1♂▲, 2.VI.1888, 1ex♦, 4.VI.1888, G.W. Taylor (CNC).

SASKATCHEWAN Fort Qu'appelle: 1♀, 21.VI.1977, R. Hooper (SMNH).

ONTARIO Biscotasing: 1♀★, 14.VII.1931, 1♀▲, 16.VII.1931, Karl Schedl (CNC). Bobcaygeon: 1♀, 15.VII.1931, G.S. Walley (CNC). Chaffeys Locks: uvl, 1♀, 30.VI.1963, 1♂, 2.VII.1963, J.C.E. Riotte & I. Smith (ROM); 1♂, 5.VII. 1963, J.C.E. Riotte & I. Smith (ROM); uvl, 1♀, 2.VII. 1970 (ROM). Dundas Marsh, Hamilton: 1♀, 10.VII.1947, W. Judd (MCMU). Georgian Bay Island 421: 1♀, 22.VII.1963, J.P. Bogart (UG). Marmora: 1♀, 26.VI.1952, J.R. Vockeroth (CNC); 1♂, 20.VI.1957, 1♂, 8.VII.1957, K.D. Southern (UG).

Niag(ara) Falls: 1♀, VI.1956, H.W.H. Zavitz (UG). Niagara-on-Lake: 1♂, 5.VIII.1931, W.L. Putman (UG). Port Credit: 1♀, 13.VII.1965, 1♂, 20.VIII.1968, Ian M. Smith (ROM). P(or)t Dover: 1ex♦, 11.VI.1959, R.J. Pilfrey (UG). Rondeau Prov Pk: uvl, 1♀, 26.V.1965, J.C.E. Riotte (ROM); uvl, 1♂, 2♀♀, 6.VI.1965, 2♂♂, 7.VI.1965, 1♀, 8.VI. 1965, J.C.E. Riotte & I.M. Smith (ROM). St Davids: 1♀△, 2.IX.1931, W.L. Putman (UG). Toronto: uvl, 1♀, 29.VI.1961, 1♀, 2.VII.1961, 1♀, 23.VI.1962, J.C.E. Riotte (ROM); at lt, 1♂, 19.VI.1963, J.C.E. Riotte (ROM).

QUEBEC Covey Hill: 1♀★, 29.VI.1927, G.S. Walley (CNC). Ile Perrot: 1♂, 19.VIII.1978, J.A. Garland (LEM). Laval: 1♂, 24.VI.1976, 1♀, 13.VIII.1979, A.C. Sheppard (LEM). Masham Mills: 1♂★, 25.VI.1935, F.P. Ide (ROM). Mont St Hilaire: malaise trap, 1♂, 29.VII-2.VIII.1977, 3♂♂, 5-9. VIII.1977, 1♂, 12-16.VIII.1977, A.T. Finnamore (LEM). Parc du Mont Tremblant: 10ex 1st instar larvae, A. Robert (UdeM in litt. Tauber 11.VII.1980). Ste Anne de Bellevue: 1♀, 22. IX.1961, V.R. Vickery (LEM). Shawbridge: 1ex♦, 24.VII.1926, A.F. Winn (LEM).

PRINCE EDWARD ISLAND Dalvay House, (P.E.I.) Nat'l Pk: 1♀, 20.VII.1940, G.S. Walley (CNC).

NOVA SCOTIA Green Bay: 1♂, 5.IX.1956 (NSM).

Chrysopa coloradensis

BRITISH COLUMBIA Cache Creek: 6 mi E, 1♂, 17.VIII.1966, V.R. Vickery (LEM). Creston: 1♂★, 12.VI.1924, C.S. Lallamand (CNC). Departure Bay: 1ex♂★, 17.VII (ROM). Kamloops: 1♀, 6.VIII.1941, G.J. Spencer (SEM). Kaslo: 1ex♂, 17.VII.(1903), 1♀△, 6.VIII.(1903), R.P. Currie (USNM). Keremeos: 1♀★, 27.VII.1923, C.B. Garrett (CNC). Lytton: nr Lytton, 1♂△, 1♀, 27.V.1962, G.G.E. Scudder (SEM); 1♀, 26.VI.1971, D.H. Pengelly (UG). Oliver: 2♂♂★, 16.V.1923, 1♂★, 26.V.1923, 1♂★, 30.V.1923, C.B. Garrett (CNC); 1♀★, 14.V.1959, R. Madge (CNC); 1♂★, 15.V.1959, E.E. MacDougall (CNC); 2♂♂★, 25.V.1959, R. Madge, swept from Pine (CNC); 1♂★, 29.V.1959, E.E. MacDougall (CNC). Peachland: 1♀△, 18.VIII.1909, J.B. Wallis (MCZ Banks Collection). Penticton: 1♂, 21.V.1976, 9♂♂, 3♀♀, 6.VI.1976, 1♂, 1♀, 7.VI.1976, 7♂♂, 3♀♀, 8.VI.1976, 3♀♀, 10.VI.1976, 1♂, 16.VII.1976, J.A. Garland (LEM); at lt, 1♀, 17.VII. 1976, 2♀♀, 19.VII.1976, 1♀, 20.VII.1976, J.A. Garland (LEM); 2800-3000 ft, 3♂♂, 1♀, 22.VII.1976, 1♀, 23.VII.1976, J.A. Garland (LEM); at lt, 1♀, 24.VII.1976, 1♂, 25.VII.1976, J.A. Garland (LEM); 2800-3000 ft, 1♂, 26.VII.1976, 1♂, 27. VII.1976, 2♂♂, 1♀, 28.VII.1976, 1♂, 1♀, 29.VII.1976, J.A. Garland (LEM); at lt, 1♀, 1.VIII.1976, J.A. Garland (LEM); 2800-3000 ft, 1♂, 2♀♀, 2.VIII.1976, 3♂♂, 5♀♀, 4.VIII.1976, 3♀♀, 10.VIII.1976, 1♂, 17.VIII.1976, 1♀, 18.VIII.1976, J.A.

Garland (LEM); 1♀, 21.VIII.1976, J.A. Garland (LEM); at 1t, 3♀♀, 30.VIII.1976, 1♂, 4.IX.1976, 1♀, 11.IX. 1976, 1♀, 14.IX.1976, 1♀, 18.IX.1976, J.A. Garland (LEM); 2800-3000 ft, 1ex●, 10.VI.1977, 1♂, 1♀, 11.VI.1977, 1♂, 13.VI.1977, 1♂, 15.VI.1977, J.A. Garland (LEM); West Bench, 1♂, 12.VII.1980, R.A. Cannings (BCPM). Richter Pass, Osoyoos: 1♀★, 6.VI.1959, R. Madge (CNC). Salmon Arm: 1♀★▲, 13.VII.1925, 1♀★, 29.VII.1925, 1♂★, 31.VII.1925, A.A. Dennys (CNC). Seton Lake, Lillooet: 1ex●▲★, 27.V.1926, 1♂▲★, 1♂★, 2♀♀★, 28.V.1926, 1♀★, 31.V.1926, J. McDunnough (CNC). Sum(me)rland, W: 1♀, 26.VII.1963, G.J. Spencer (SEM). Vaseaux Lake, Oliver: 1♂★, 13.V.1959, 1♀★, 15.V.1959, R.E. Leech (CNC); 1♂★, 19.V.1959, 1♀★, 29.V.1959, L.A. Kelton (CNC). Westbank: 1♂★, 1♀★, 25.VI.1954, W.G. Wilson (CNC). White Lake, Oliver: 1♀★, 23.V.1959, E.E. MacDougall (CNC). Winslow: 1♀, 14.IX.1925, G.J. Spencer.

Chrysopa excepta

BRITISH COLUMBIA Nicola: 1♀▲★, 24.V.1922, P.N. Vroom (CNC). Penticton: 1♀★, 7.VI.1919, W.B. Anderson (CNC).

ALBERTA Lethbridge: 1♂★, 7.VI.1922, H.E. Gray (CNC). Manyberries: 1♂★, 25.VII.1952, A.R. Brooks (CNC).

SASKATCHEWAN Elbow: 1♂★, 4♀♀★, 1.VIII.1951, A.R. Brooks (CNC). Lumsden: 1♂★, 12.VII.1958, A. & J. Brooks (CNC).

Chrysopa oculata

ALASKA Fairbanks: malaise trap, 3♀♀, 26.VI-1.VII.1979, B. Wright (NSM). Richardson Hwy, mi 315: 1♀★, 8.VI.1951, J.R. McGillis (CNC).

YUKON TERRITORY Dawson: 1♂, 10.VI.1980, R.A. Cannings (SEM). Kluane N(ational) P(ark): Sheep Mt, 1♀, 21.VII. 1979, G.G.E. Scudder (SEM); Slims R(iver) flats, 1♀, 21.VII. 1979, G.G.E. Scudder (SEM). Pelly Crossing: 1♂, 26.VII.1980, R.A. Cannings (SEM). Whitehorse: 1♂★, 14.VI.1949, J.K. Horie (CNC); 1♂★, 24.VI.1949, D.L. Watson (CNC); 1♂★, 27. VI.1949, J.K. Horie (CNC); 2♂♂, 27.VI.1949, 1♀, 30.VI.1949, J.K. Horie (SEM).

NORTHWEST TERRITORY Fort Simpson: 5♂♂★, 2♀♀★, 1ex★, 15. VII.1950, 1♀★, 19.VIII.1950, D.P. Whillans (CNC). Fort Smith: 1♀★, 16.VI.1950, J.B. Wallis (CNC); 1♂★, 27.VI. 1950, W.G. Helps (CNC); 1♀★, 1.VII.1950, 1♂★, 25.VII.1950, J.B. Wallis (CNC).

BRITISH COLUMBIA unspecified locality: 1ex♂, 1922, J. Marshall (UG). Adams Lake: 1♀★, 16.VI.1923, W.B. Anderson (CNC); 1♀★, 19.VI.1950, F. Cameron (CNC). Agassiz: 1♀▲©★, 18.V.1926, R. Glendenning (CNC); 1♀, 27.V.1926, R. Glendenning (SEM). Alert Bay: 1♀, 28.VIII. 1929, D. Beall (UWO); 1♂, 30.VIII.1929, D.B. (SEM). Aspen Grove: 1♂, 20.VI.1973, H.J. Teskey (CNC). Barriere: 1♀Δ®★, 24.VII.1950, FIS 1950-1649, Salix sp.(CNC). Bevan: 1♀★, 18.VI.1955, R. Coyles (CNC). Chilcotin: 1ex♂Δ, 26.V. 1929, 2♂♂, 16.VI.1929, 1♂Δ©, 12.VII.1930, G.J. Spencer (SEM). Chilliwack: 1♀★, 7.VI.1953, H.G. Fulton (CNC). Christina L(ake): 1♀★, 26.VI.1928, E.B.S. Logier (ROM). Clinton: 4♂♂★, 1♀★, 12.VI.1938, G.S. Walley (CNC); 1♀★, 13.VI.1938, 1♂★, 14.VI.1938, J.K. Jacob (CNC); Fish Hatchery on Loon L(ake) R(oa)d, 1♀, 11.VII.1969, xeric forest (ROM 690197). Comox: 1♂★, 29.VII.1926, W. Downes (CNC). Courtenay: 1♀, VI.1965, N.L.H. Krauss (USNM). Cowichan Bay: 1ex♂★, 2.VI.1959, E.E. MacDougall (CNC). Cowichan L(ake): 1♀, 21.X.1937, Idyll (SEM). Cranbrook: 1♂★, 12.V.1926, A.A. Dennys (CNC); HT♀▲©★, 6.VI.1926, A.A. Dennys (CNC 3308). Creston: PT♂▲©★, 28.V.1926, A.A. Dennys (CNC 3308); 1♀★, 27.VI.1926, A.A. Dennys (CNC); 1♂, VII.1949, W. Wilde (SEM); 5 mi W, 1♀, 7.VI.1967, J. Shepard (SEM). Cultus L(ake) Prov Pk, Entrance Bay campground, 1♀, 19.VI.1969 (ROM 690111). Cummings Lake: 1♂, 6.VI.1960, J. Lanko (SEM). Dawson Creek: 1♀★, 17.VI.1940,

C.L. Neilson (CNC). Departure Bay: 1ex♂★ (ROM); 1♀★, 22.VI (ROM Walker Collection); 1♂★, 6.VII (ROM); 1♀★, 25.VII, 1♂★, 3.VIII (ROM Walker Collection); 1♂△®, 10.VI.1925, 1♂, 10.VI.1925, G.J. Spencer (SEM). Downie Creek, Selkirk Mts, 1ex, 9.VIII.1905, J.C. Bradley (CU Pechuman in litt. 1980). Fort Nelson: 1♀, 12.VII. 1949, 1ex♂, 13.VII.1949, J.K. Horie (SEM). Fort St John: 1ex♂★, i8.VI.1940, C.L. Neilson (CNC). Gagnon Road, 6 mi W Terrace: 1♀★, 23.VI.1960, J.G. Chilcott (CNC). Diamond Head Trail, Garibaldi Pk nr Squamish, 3200 ft: 6♂♂★, 3♀♀★, 6.VIII.1953, S.D. Hicks (CNC). Goldstream: 1♂, 2.IX.1926, W. Downes (SEM). Grand Forks: 1♂★, 8.VI.1959, E.E. MacDougall (CNC); 9 mi E, 1♀★, 8.VI.1959, L.A. Kelton (CNC). Green Lake, Okanagan Falls: 1♀★, 5.VI.1959, E.E. MacDougall (CNC); 1♀★, 5.VI.1959, L.A. Kelton (CNC). Green Timbers For(estry) Sta(tion): 1♀★, 16.VII.1938, R. Longmore (CNC). Hagensborg: 1♀, 17.VII.1978, G.G.E. Scudder (SEM). Haney, Univ(ersity) of B(ritish) C(olumbia) Res(earch) Forest: 3♂♂, 6♀♀, 8.VII.1969 (ROM 690183). Harrison Mills: 1♀★, 16.VII.1953, G.J. Spencer (CNC). Hat Creek, 2900 ft: 2♂♂, 1♀, 26.VIII.1932, G.J. Spencer (SEM). Hatzic Lake: 3♂♂★, 8♀♀★, 1ex♂★, 10.VII.1953, G.J. Spencer (CNC). Hope, 15 mi E: 1♂, 12.VII.1973, H.J. Teskey (CNC). Jesmond: 1♀, 27.VI.1943, G.J. Spencer (SEM). Kamloops: 1♀, 19.VII.1936, 1♂, 10.VII. 1938, 1♂, 13.VII.1941, 6♂♂, 4♀♀, 13.VI.1943, 1♀, 9.VII.1944, 1ex♂, 24.VI.1945, 1♂, 8.VII.1945, 2♂♂, 26-29.VI.1954, 1♂,

24.VI.1965, G.J. Spencer (SEM); 1♀, 24.VI.1973, H.J. Teskey (CNC). Kaslo: 1♀, 29.V.(1903), 1♂, 9.VI.(1903), 1♂, 1♀, 1ex●, 11.VI.(1903), 2ex●, 13.VI.(1903), 1♂, 1♀, 15.VI.(1903), 1♂, 1♀, 16.VI.(1903), 1♂, 20.VI.(1903), 1ex●, 21.VI.(1903), 7♀♀, 1ex●, 23.VI.(1903), 1ex●, 24.VI.(1903), 1♂, 2♀♀, 25.VI.(1903), 3♂♂, 5♀♀, 29.VI.(1903), 1ex●, 3.VII.(1903), 2♂♂, 2♀♀, 8.VII.(1903), 3♂♂, 3♀♀, 13.VII.(1903), 1♀, 15.VII.(1903), 1♂, 2♀♀, 16.VII.(1903), 3♀♀, 17.VII.(1903), 2♀♀, 1ex●, 18.VII.(1903), R.P. Currie (USNM); 1♂, 18.VII.(1903), H.G. Dyar, Ceratopogon sp.(USNM); 1♀, 20.VII.(1903), R.P. Currie (USNM). Kersley: 1♂, 5.VI.1949, G.J. Spencer (SEM). Kitwanga, 5 mi W: 1♀, 31.VII.1979, G.G.E. Scudder (SEM). Ladysmith: 1♀Δ©, 7.VI.1938, A.N. Ferguson (SEM). Lakelse L(ake): 1♂, 24-25.VI.1974, G.G.E. Scudder (SEM). Lillooet: 1♀★, 8.VII.1916 (CNC); 1♀★, 30.V.1919, A.W.A. Phair (CNC). Lytton: 1♂, 23.VIII.1931, G.J. Spencer (SEM); 1♀, 1.IX.1962, G.G.E. Scudder (SEM). MacGillivray Creek Game Reserve nr Chilliwack: 1♂★, 3♀♀★, 15.VI.1953, G.J. Spencer (CNC). Miracle Beach nr Oyster River: 1♂★, 13.VI.1955, R. Coyles (CNC). Mission City: 2♂♂★, 1♀★, 8.VI.1953, 1♂★, 11.VI.1953, Edith Mason (CNC); 1♀★, 21.VI.1953, 1♂★, 1♀★, 28.VI.1953, G.J. Spencer (CNC); 1♀★, 1.VII.1953, Edith Mason (CNC); 1♂★, 5.VII.1953, G.J. Spencer (CNC); 1♂★, 7.VII.1953, 1♂★, 9.VII.1953, W.R.M. Mason (CNC); 2♀♀★, 9.VII.1953, 1♂★, 1♀★, 10.VII.1953, 1♀★, 15.VII.1953, 1♂★, 22.VII.1953, 1♂★, 24.VII.1953, G.J.

Spencer (CNC); Nicomen Slough, 1♂, 11.VII.1969 (ROM 690194). Nanaimo: 1♀★, 25.VI.1920, E.C. van Dyke (CAS); 1♀, 18.VIII.1932, W. Downes (SEM). Nelson: 1♀▲©, 17.VII. 1910 (JEC); 1♂★, 31.V.1927, 1♀★, 21.VII.1927, A.A. Dennys (CNC); 2♀♀, 24.V.1938, G.S. Walley (CNC). N(ew)West(minster): 1♂, 18.VII.1929, G. Beall (UWO); Forestry Station, 1♀★, 7.VI.1939, R.H. Longmore (CNC). Nicola: 2♂♂★, 31.V.1922, P.N. Vroom (CNC). North Vancouver: 1♂, 1.VII.1928, G.H. L(arnder) (BCPM). O(kanagan) F(alls), 5 mi W, White L(ake): 1♀★, 11.V.1959, R.E. Leech (CNC). Oliver: 1♂★, 3.V.1923, 1♂★, 1♀▲© ★, 4.V.1923, 1♂★, 6.V.1923, 1♂★, 1♀★, 7.V.1923, 1♀★, 12.V.1923, 2♂♂★, 15.V.1923, 5♂♂★, 6♀♀★, 16.V.1923, 1♂▲© ★, 3♂♂★, 23.V.1923, 1♂★, 26.V.1923, 1♀★, 3.VI.1923, 1♀★, 4.VI.1923, 2♀♀★, 7.VIII.1923, 2♀♀★, 13.IX.1923, C.B. Garrett (CNC); 1000 ft, 1♀★, 9.V.1953, J.R. McGillis (CNC); 1ex●, 25.V.1957, J. Boone (SEM); 7 mi N, 1♀★, 2.VI.1958, H. & A. Howden (CNC); 1♀★, 13.V.1959, L.A. Kelton, Greasewood (CNC); 1♂★, 2♀♀★, 14.V.1959, E.E. MacDougall (CNC); 1♂★, 15.V.1959, L.A. Kelton (CNC); 1♂★, 1♀★, 15.V.1959, R. Madge, swept from Rose (CNC); 2♂♂★, 1♀★, 16.V.1959, L.A. Kelton, on Alder (CNC); 1♀★, 16.V.1959, E.E. MacDougall, on Salix (CNC); 1ex●, 16.V,1959, L.A. Kelton, on Alder (CNC); 1♂★, 17.V.1959, L.A. Kelton (CNC); 3♀♀★, 21.V.1959, 1♂★, 2♀♀★, 2ex●, 24.V.1959, 3♀♀★, 29.V.1959, E.E. MacDougall (CNC). 100 Mile House: 1♂★, 28.VI.1938, 4♀♀★, 4.VII.1938, G.S. Walley (CNC); 1♀, 20.VII.1978, G.G.E. Scudder (SEM).

Osoyoos: 1♂, 1♀, 17.VIII.1925, G.J. Spencer (SEM); road 22, 1♂, 4♀♀, 17.V.1980, R.A. Cannings (BCPM). Osoyoos L(ake): N, 1♀, 8.VII.1979, R.A. Cannings (BCPM); 1♂, 2♀♀, 19.V.1980, S.G. Cannings (SEM). Paul L(ake) road, 2¼ mi W cut-off to Lolo Mt: 1♂, 18-20.VII.1969 (ROM 690212). Pavilion Lake: 1♀★, 28.VII.1938, J.K. Jacob (CNC); Mt, 1♂, 27.VI.1943, G.J. Spencer (SEM). Penticton: 5♂♂, 3♀♀, 16.V.1976, 10♂♂, 4♀♀, 6.VI.1976, 4♂♂, 1♀, 7.VI.1976, 8♂♂, 2♀♀, 8.VI.1976, 4♂♂, 1♀, 10.VI.1976, 14♂♂, 5♀♀, 7.VII.1976, 1♂, 1♀, 8.VII.1976, 1♀, 10.VII.1976, 2♂♂, 12.VII.1976, 10♂♂, 5♀♀, 13.VII.1976, 1♀, 15.VII.1976, 1♀, 16.VII.1976, 6♂♂, 7♀♀, 17.VII.1976, 4♂♂, 2♀♀, 19.VII.1976, 7♂♂, 1♀, 23.VII.1976, 3♂♂, 6♀♀, 24.VII.1976, 1♀, 26.VII.1976, 2♀♀, 27.VII.1976, 1♀, 29.VII.1976, 1♂, 2.VIII.1976, 2♀♀, 4.VIII.1976, 4♀♀, 9.VIII.1976, 1♀, 10.VIII.1976, 2♀♀, 12.VIII.1976, 1♂, 1♀, 17.VIII.1976, 1♂, 2♀♀, 18.VIII.1976, 1♀, 21.VIII.1976, 1♂, 1♀, 26.VIII.1976, 2♂♂, 10♀♀, 30.VIII.1976, 1♂, 8♀♀, 31.VIII.1976, 1♂, 3.IX.1976, 2♀♀, 4.IX.1976, 4♀♀, 10.IX.1976, 1♀, 11.IX.1976, 1♀, 13.IX.1976, 1♀, 17.IX.1976, 1♀, 18.IX.1976, 1♀, 29.IX.1976, 1♂, 9.V.1977, 1♀, 16.V.1977, 1♀, 10.VI.1977, 1♂, 1♀, 11.VI.1977, 1♂, 3♀♀, 13.VI.1977, 5♂♂, 7♀♀, 14.VI.1977, 2♂♂, 15.VI.1977, 2♂♂, 17.VI.1977, 6♂♂, 5♀♀, 19.VI.1977, 1♂, 1♀, 20.VI.1977, 1♂, 21.VI.1977, J.A. Garland (LEM); West Bench, 1♂, 20.V.1980, R.A. Cannings (BCPM). Pitt Meadows, peat bog: 1♂★, 9.VII.1953, Edith Mason (CNC); 1♂★, 9.VII.1953, G.J. Spencer (CNC). P(oin)t Holmes, Comox: 1♂★, 5.VII.1933, J. McDunnough (CNC). Pouce

Coupe: PT♂▲© ★, 30.VI.1927, P.N. Vroom (CNC 3308); 1♂★, 4.VIII.1961, A.R. Brooks (CNC). Prince George: 1♂, 1♀, 10.VII.1947, G.J. Spencer (SEM); 2♀♀, 14.VII.1949, R. Stace-Smith (SEM). Qualicum: 1♂★, 21.VI.1955, G.E. Shewell (CNC). Quesnel: 1♂, 31.VII.1947, 3♂♂, 2♀♀, 7.VI.1948, 1♀, 23.VII.1948, G.J. Spencer (SEM); 1♀, 23.VII.1948, 1♀, 26.VII.1948, H.R. MacCarthy (SEM); 1♂, 28.VII.1948, 1♀, 31.VII.1948, 1♀, 4.VIII.1948, 1♂, 19.VI.1949, 1♀, 2.VII. 1949, G.J. Spencer (SEM); 1♂, 7.VII.1949, R. Stace-Smith (SEM). Soda Creek: 1ex♁, 8.VII.1949, 1♂, 1♀, 27.VIII.1950, G.J. Spencer (SEM). Radium: 1♂, 8.VI.1961, G.G.E. Scudder (SEM). Revelstoke: 1ex, 1.VII.1905, J.C. Bradley (CU Pechuman in litt. 1980); 1♀★, 17.VII.1931, A.N. Gartrell (CNC); 1♂, 27.VII.1978, J.A. Garland (LEM). Rolla: 1♀★, 11.VII.1927, 1♂★, 2♀♀★, 1PTex♁▲© ★, 17.VII.1927, 1♂★, 1♀★, 21.VII.1927, P.N. Vroom (CNC). Rossland, 8 mi W: 1♂★, 20.VII.1959, L.A. Kelton (CNC). Ruskin: 1♂★, 26.VI.1953, G.J. Spencer (CNC). Saanich: 1ex♁, 10.VIII.1916, W. Downes (SEM). Salmon Arm: 1♂★, 2♀♀★, 1ex♁▲© ★, 15.VI.1925, 1♀▲ ★, 8.VII.1925, 1♀★, 30.VII.1925, A.A. Dennys (CNC). Saratoga B(ea)ch, Oyster R(iver), Vanc(ouver) Is(land): 2♂♂★, 2♀♀★, 7.VII.1933, J. McDunnough (CNC). Seton Lake, Lillooet: 1♀★, 28.V.1926, 1♂★, 31.V.1926, J. McDunnough (CNC). Shawnigan Lake, 10 mi W: 2♀♀, 28.VI.1969 (ROM 690140). Smithers: 2♂♂, 4♀♀, 1ex♁, 15.VII.1951, A. Unrau (SEM). South Okanagan (unspecified locality): 1♂★, VI.1961, W.H. Wilde (CNC); 8♂♂, 1♀★, 5♀♀, VI.1962, W.H. Wilde (SDARS).

Spanish Hills, Galiano Is(land): 1♀, 13.IX.1975, G.G.E. Scudder (SEM). Spring Creek, Terrace: 1♀★, 11.VI.1960, B.S. Heming (CNC). Sproat Lake: 1♀★, 22.VI.1955, G.E. Shewell (CNC). Squamish, Diamond Head Trail: 3200 ft, 2♂♂★, 1♀★, 1.VIII.1953, Edith Mason (CNC); 3200 ft, 2♂♂★, 4♀♀★, 1.VIII.1953, G.J. Spencer (CNC); 3200 ft, 1♂★, 1♀★, 2.VIII.1953, Edith Mason (CNC); 3200 ft, 3♂♂★, 4♀♀★, 3.VIII.1953, G.J. Spencer (CNC); 3200 ft, 2♂♂★, 1♀★, 1ex♂, 5.VIII.1953, 1♀★, 7.VIII.1953, G.J. Spencer (CNC); 3200 ft, 1♂★, 7.VIII.1953, W.R.M. Mason (CNC); 3200 ft, 1♀★, 10.VIII.1953, 3300 ft, 1♂★, 12.VIII.1953, Edith Mason (CNC); 3200 ft, 2♂♂★, 15.VIII.1953, 1♂★, 1♀★, 16.VIII.1953, 3700 ft, 2♀♀★, 17.VIII.1953, 3_00 ft, 1♀★, 23.VIII.1953, G.J. Spencer (CNC); 3200 ft, 1♀★, 29.VIII. 1953, Edith Mason (CNC). Strathnaver: 1♀, 10.VII.1974, G.G.E. Scudder (SEM). Summerland: 1♀★, 18.IX.1931, A.N. Gartrell (CNC); 1♀, 2.VIII.1937, M.F. Welsh (SEM); 1♂★, 31.VIII.1948, on Peach (CNC); Research Station, trapped on sticky boards in vineyards, 1♀△, 7.VII.1972, B.J. Madsen (SDARS). Taylor: 2♂♂★, 3.VII.1948, Mason & Hughes (CNC). Terrace: 1♂, Mrs. M.E. Hippisley (USNM); 1♂★, 2♀♀★, 5.VI. 1960, C.H. Mann (CNC); 1♀★, 7.VI.1960, R. Pilfrey, swept from grass, clover and buttercups (CNC); 220 ft, 4♂♂★, 4♀♀★, 1ex♂★, 8.VI.1960, B. Heming (CNC); 220 ft, 3♂♂★, 8.VI.1960, W.W. Moss (CNC); 220 ft, 1♂★, 8.VI.1960, R. Pilfrey (CNC); 10 mi W, 1♂★, 9.VI.1960, B.S. Heming (CNC); 2♂♂★, 2♀♀★,

10.VI.1960, C.H. Mann (CNC); 1♀★, 16.VI.1960, R.J. Pilfrey (CNC); 1♂★, 16.VI.1960, J.G. Chillcott (CNC); 220 ft, 1♂★, 2♀♀★, 2ex♁★, 16.VI.1960, W.W. Moss (CNC); 220 ft, 1♂★, 17.VI.1960, B. Heming (CNC); 220 ft, at lt, 1♂★, 18.VI.1960, W.W. Moss (CNC); 220 ft, 1♂★, 18.VI. 1960, B. Heming (CNC); 220 ft, 2♂♂★, 23.VI.1960, R. Pilfrey (CNC); 2♂♂★, 23.VI.1960, C.H. Mann (CNC); 220 ft, at lt, 1♂★, 25.VI.1960, W.W. Moss (CNC); 220 ft, at lt, 9♂♂★, 3♀♀★, 27.VI.1960, 5♂♂★, 28.VI.1960, 1♂★, 29.VI. 1960, W.W. Moss (CNC); 220 ft. at lt, 2♀♀★, 2.VII.1960, 1♂★, 3.VII.1960, B. Heming (CNC); 1♂★, 1♀★, 6.VII.1960, 2♂♂★, 2♀♀★, 7.VII.1960, W.R. Richards (CNC); 220 ft, at lt, 3♂♂★, 2♀♀★, 1ex♁★, 7.VII.1960, 1♀★, 13.VII.1960, 2♂♂★, 16.VII.1960, 1♂★, 1♀★, 17.VII.1960, 1♀★, 19.VII. 1960, 1♂★, 22.VII.1960, B. Heming (CNC); 1♀★, 1.VIII. 1960, W.R. Richards (CNC); 1♂★, 2♀♀★, 12.VIII.1960, 220 ft, at lt, 1ex♁★, 15.VIII.1960, B. Heming (CNC). Tofino, nr on Hwy 4: 1♀, 21.VI.1969 (ROM 690118). Tranquille: 1♀★, 20.VI.1931 (CNC). U(niversity of) B(ritish) C(olumbia): 1♀, 1929, D. Sutherland (SEM); 1♀△®, 8.VII.1937, R.H. Longmore (MCZ); campus, 1♀, 16.VII.1960, J. Lanko (SEM); 1♂, 5.VI.1974, 1♂, 10.VI.1974, 1ex♁, 18.VI.1974, 3♂♂, 5.VII.1974, 1♀, 7.VII.1974, 1♂, 1♀, 12.VII.1974, from oats, M. Isman (SEM). Vancouver: 1♂, 19.V.1931, H.B. Leech (SEM); 1♂, 15.IX.1951, G.J. Spencer (SEM); 1♀, VIII.1959, G. Scudder (SEM); at lt, 1♀△, 28.VI.1969, J.L. Gordon (SEM);

1♂, 3.VIII.1977, J.A. van Reenen (SEM). Vanderhoof, 45 km E: 1♂, 1♀, 28.VI.1979, R.J. Cannings (SEM). Vaseaux L(ake), Oliver: 3♂♂★, 3♀♀★, 13.V.1959, R.E. Leech (CNC); 3♂♂★, 19.V.1959, L.A. Kelton (CNC); 2♂♂★, 2♀♀★, 23.V. 1959, 1♀★, 29.V.1959, R.E. Leech (CNC); 3♂♂★, 2♀♀★, 29.V. 1959, L.A. Kelton (CNC). Vernon: 1♂▲©★, 24.V.1918, W. Downes (CNC); 1♀★, 24.V.1923, E.P. Venables & D.G. (CNC); 1♀★, 8.VIII.1923, 1♂★, 1ex♂★, 11.VIII.1923, 1♀★, 21.VIII. 1923, 1♂★, 2♀♀★, 24.VIII.1923, D.G. Gillespie (CNC); 1♂★, 4.VI.1924, 1ex♂★, 19.VI.1924, 2♂♂★, 17.VII.1924, 1♂★, 18. VII.1924, E.A. Rendell (CNC); 1♂★, 11.VIII.1926, I.J. Ward (CNC); 1♂, 16.VII.1929, H.B. Leech (SEM); 1♀, 1931, C. Debora (SEM); 1♀, 6.VI.1948, D. Evans (SEM); 2000 ft, 1♂, 4.VII.1979, R.A. Cannings (SEM); 1♂, 1♀, 14.VI.1955, D.K. Campbell (BCPM); Goose Lake, 1♀, 10.V.1980, R.A. Cannings (BCPM); Irish Creek Road, 1♂, 23.V.1980, R.A. Cannings (BCPM). Victoria: 1♂, 10.VI.1923, K.F. Auden (SEM); 1♂★, 12.VI.1926, W. Downes (CNC); 1♂, 14.VII.1959, L.A. Kelton (CNC). Wellington: 1♂Δ© (MCZ Banks Collection); 1♀, 6.VIII. 1897 (MCZ Banks Collection); 1♀Δ©, 21.VIII.1897 (MCZ); 1♀★, 2.VI.1908, 1♀★, 20.VI.1908 (CNC). W(est) Crescent Valley, 49°24' 117°39', 3000 ft: 1♂12.VI.1967, J. Shepard (SEM). White Lake, Oliver: 1♀★, 23.V.1959, E.E. MacDougall (CNC). Winslow: 2♂♂, 5♀♀, 1♀Δ©, 14.IX.1925, G.J. Spencer (SEM).

ALBERTA Banff: 1ex, 17.VII.1925, Owen Bryant (CU Pechuman in litt. 1980); 1♀★, 13.VI.1928, Owen Bryant (CAS); Eisenhower Junction Banff-Jasper Highway, 4700 ft, 1♀★, 19.VII.1955, J.R. McGillis (CNC). Beaverlodge: 1♂Δ©, 20.VI.1931, 1♂Δ© Δ©, 21.VI.1931, 1♂Δ© Δ©, 19.VII.1931, E.H. Strickland (UAE); 1♂, 22.VI.1960, K.C.S. Tuckey (UG); 1♀★, 1.VIII.1961, A.R. Brooks (CNC). Bilby: 1ex, 1.VI.1924, O. Bryant (CU Pechuman in litt. 1980); 1♂★, 15.VII.1924, O. Bryant (CAS). Brk L(ake): 1♂, 1.VII.1945, O.S. Hillerud (UAE). Calgary: 1♀Δ (UAE); 1ex, 30.V.1924 (CU Pechuman in litt. 1980). Cypress Hills: 1♂, 29.VI.1939, W.S. McLeod (UMW); 1♀, 10.VII.1950, E.H. Strickland (UAE); 1♀★, 25.VI.1951, FIS A-678, W(hite) Spruce (CNC). Drumheller: 1♀, 14.VI.1946, E.H. Strickland (UAE); 5♂♂★, 2♀♀★, 18.VI.1957, Brooks, MacNay (CNC). Edmonton: 1♂Δ©, 22.VII.1930, O. Peck (UAE); 1♂, 7.VI.1937, E.H. Strickland (UAE); 1♂, 13.VI.1937 (UAE); 1♂, 8.VII.1945, E.H. Strickland (UAE); 1♀, 30.V.1967, G. Walker (PlDAA); 1♂, 1♀, 4.VII.1975, 1♀, 5.VII.1976, D. Shpeley (UAE). Elkwater: 1♂★, 6.VI.1952, A.R. Brooks (CNC); Elkwater Park, 1♂★, 15.VIII.1952, A.R. Brooks (CNC). Empress: 2♂♂★, 3♀♀★, 7.VI.1957, Brooks & MacNay (CNC). F(or)t Chipewyan: 1♀, 5.VII.1945 (USS). Grande Prairie: 2♂♂★, 2♀♀★, 26.VII.1961, 1♀★, 26.VIII.1961, A.R. Brooks (CNC). High Prairie: 1♂★, 2♀♀★, 1ex♂★, 16.VII.1961, 1♂★, 22.VII.1961, 1♂★, 1♀★, 25.VII.1961, A.R. Brooks (CNC). High River: 1♀★, 1906, T. Baird (CNC). Iron Springs:

1♂▲© ★, 4♂♂★, 2♀♀★, 16.VI.1925, H.L. Seamans (CNC). Johnston Canyon Road, Banff Nat'l Pk: 1♂, 22.VII.1970 (ROM 700424). Lac la Biche: 1♂★, 25.VI.1961, A.R. Brooks (CNC). Lethbridge: 1♀★, 1ex♂ ★, 16.VI.1915 (CNC); 1PTex♂ ▲© ★, 23.VII.1920, E.H. Strickland (CNC 3308); 1♀★, 4.VII.1922, 1♀▲© ★, 1♀★, 29.VII.1922, 1♀★, 8.VI. 1923, 3♀♀★, 1ex♂ ★, 12.VI.1923, H.L. Seamans (CNC); 1♀, 11.VII.1923, 1♀▲©, 2.VIII.1923, H.E. Gray (UAE); 1♀▲©, 10.VI.1925, G. Allen Mail (UAE); 2♀♀★, 8.VI.1929, 1♂★, 1♀★, 18.VI.1929, J.H. Pepper (CNC); 1♂▲©, 12.VI.1933, E.H. Strickland (UAE); 1♂, 7.VI.1941, R.W. Salt (UAE); 1♀, VII.1949, 1♀, 4.VIII.1949, R.H. Ross (UMW); 1♂▲©, 17.VIII.1949, Bernadette Fortin (UdeM); 1♀, 18.VIII.1957, A.R. & J.E. Brooks (USS); 1♀★, 18.VIII.1957, A.R. & J.E. Brooks (CNC). Manyberries: 1♂★, 4.VI.1952, L.A. Konotopetz (CNC); 1♂★, 4.VI.1952, A.R. Brooks (CNC). Medicine Hat: 1♂★, 12.VI.1929, 2♂♂★, 14.VI.1929, J.H. Pepper (CNC); 1♀, 7.VIII.1938, 1♀, 16.VIII.1941, E.H. Strickland (UAE); 1♂, 11.VIII.1949, B. Hocking (UAE). Okotoks: 1♂★, 11.VII. 1938, E.C. van Dyke (CAS). Onefour: 1♂★, 1.VI.1956, O. Peck (CNC). Oyen: 1♂, 2♀♀, 22.VII.1979, D.H. Pengelly (UG). Peace River: 1♂★, 1♀★, 18.VI.1961, 1♀, 10.VII.1961, A.R. Brooks (CNC); Peace River District, 1ex♂ ★, 30.VI.1957, Iain Y.A. Barr (CNC). Pincher Creek: 1♀★, 20.VI.1961, H.E. Milliron (CNC). Red Deer: 1♀★, 25.VI.1957, Brooks & MacNay (CNC). Rycroft: 4♂♂★, 1♀★, 21.VI.1961, 2♂♂★, 1♀★, 7.VIII.

1961, A.R. Brooks (CNC). Seebe: 1♂★, 28.V.1949, J.A. Cook (CNC). Stettler: 1♂, 3.VIII.1957, A.R. & J.E. Brooks (USS). Steveville: 2♂♂, 21.VIII.1957, A.R. & J.E. Brooks (USS). Sturgeon Lake: 1♂★, 3.VII.1940, C.L. Neilson (CNC). Tofield: 1♂Δ©, em 29.V.1924, E.H. Strickland, cocoons in sandy soil (UAE). Valleyview: 1♂★, 4.VI.1961, 1♂★, 5♀♀★, 1ex♂★, 6.VI.1961, A.R. Brooks (CNC). Wabamun: 1 3rd instar larva, 6.VIII.1936, E.H. Strickland (UAE identification by C.A. Tauber in litt. 1981). Waterton: 1♂★, 10.VII.1923, 1♂Δ© Δ©, 1♀Δ©, 1ex♂, 14.VII.1923, E.H. Strickland (UAE); 3♀♀★, 14.VII.1923, E.H. Strickland (CNC). Waterton Lakes Nat'l Pk: Lineham L(a)k(e)s Trail, 5500 ft, 1♂, 2.VII.1967, Dardanelles, 4200, 1♂, David J. & M.A. Larson (WLNP). Wetaskiwin: 1♂, 6.VIII.1933 (LEM); 1♀, 6.VI.1937, F.O. Morrison (UAE). White Mud Creek, Edmonton: 1♂, 9.VII.1975, G.C.D. Griffiths, died after spraying (UAE). White Mud R(iver), Peace River District: 1♀★, 22.VII.1932, L.S. Russell (CNC).

SASKATCHEWAN Assiniboia: 1♂★, 25.VI.1955, J.R. Vockeroth (CNC). Attons Lake, Cut Knife: 3♂♂★, 17.VI.1940, A.R. Brooks (CNC). Avonlea: 1♂Δ©, 1♀Δ©, 31.V.1977, M.G. Maw, beat from Convolvulus sepium (RARS); 1♂Δ©, 1♀Δ©, 16.VI. 1977, M.G. Maw, swept from Polygonum coccineum (RARS); 1♂, 12.VIII.1977, R. Hooper (SMNH); 1♀Δ©, 27.VI.1978, S. Byblow, hand picked from Urtica gracilis (RARS); 1♂Δ©,

27.VI.1978, D. Ward, swept from Cirsium arvense (RARS); 1♂Δ©, 1♀Δ©, 14.VII.1978, G. Volk, swept from Sonchus arvensis (RARS); 1♀Δ©, 14.VII.1978, S. Byblow, aspirated from Convolvulus (RARS). Bagley: 2♀♀★, 17.VII.1925, Kenneth M. King (CNC). Beaver Creek: 1♂★, 11.VI.1951, A.R. Brooks (CNC). Big River: 1♀★, 3.VII.1959, A. & J. Brooks (CNC); 1♂, 8.VI.1973, B.A. Hannigan (UG). Blaine L(a)k(e): 1♀Δ©, 27.VI.1978, G.A. Thomas, swept from Crepis tectorum (RARS). Broadview: 1♀★, 10.VIII.1925, Kenneth M. King (CNC). Burnham: 1♂Δ©, 26.VI.1979, M. Molloy, swept from Kochia sp (RARS). Christopher Lake: 1♀★, 15.VII.1959, A. & J. Brooks (CNC). Corinne: 1♂Δ©, 1♀Δ©, 14.VII.1978, C. Harris, aspirated from Sonchus arvensis (RARS). Cypress Hills: Prov Pk, 1♂, 28.VII.1963, G.B. Wiggins (ROM); 1♀, 11.VIII.1977, R. Hooper (SMNH). Davin: 1♂Δ©, 1♀Δ©, 23.VI. 1977, C. Kofoe, swept from Artemesia absinthium (RARS); 1♂Δ©, 29.VI.1978, S. Byblow, aspirated from Artemesia absinthium (RARS). Delmas: 1ex♂, VII.1912, Claude Morley (BMNH). Dilke: 1♂Δ©, 1♀Δ©, 16.VI.1978, S. Byblow, aspirated from Artemisia absinthium (RARS); 1♀Δ©, 16.VI.1978, C. Harris, aspirated from Artemesia absinthium (RARS); 1♂Δ©, 1♀Δ©, 22.VI.1978, M. Maw, swept from Artemesia absinthium (RARS). Duck Lake: 1♂★, 15.VII.1925, Kenneth M. King (CNC). Elbow: 1♀★, 1.VIII.1951, A.R. Brooks (CNC). Esterhazy: 1♂★, 1♀★, 27.VII.1954, Brooks & Wallis (CNC). Estevan: 1♂★, 29.VII.1929, 1♂★, 2.VIII.1929, P.C. Brown (CNC); 1ex♂★,

23.VII.1958, A. & J. Brooks (CNC); 1♂[Δ©], 16.VII.1979, M.G. Maw, swept from Artemesia absinthium (RARS). Estuary: 2♀♀, 16.VI.1977, R. Hooper (SMNH). Fort a la Corne: 1♀[★], 17.VII.1925, Kenneth M. King (CNC). Gainsborough: 1♂, 1♀, 3.VI.1976, R. Hooper (SMNH). Glenewen: 1♂, 3.VI.1976, R. Hooper (SMNH). Grey: 1♂[Δ©], 21.VII.1977, M.G. Maw, swept from wheat (RARS). Indian Head: 1ex[♦★], 12.VI.1924, J.J. de Gryse (CNC); 1♂, 3.IX.1928, Kenneth Stewart (IHTN); 1♀, 3.IX.1936, C. Douglas (IHTN); 1♂, 22.VI.1950, A.F. Hedlin (UMW); 1♂[Δ©], 28.VI.1979, 1♀[Δ©], 13.VII.1979, M.G. Maw, swept from Thlaspi arvense (RARS). Jameson: 1♂[Δ©], 1.VI.1976, 1♂[Δ©], 29.VI.1976, 1♂[Δ©], 30.V.1977, G. Thomas, from Euphorbia esula (RARS); 1♀[Δ©], 20.VI.1977, 1♀[Δ©]12.VI.1978, 2♂♂[Δ©], 20.VI.1978, R. Wise, swept from Euphorbia esula (RARS). Jan Lake: 1♂, 21.VII.1976, R. Hooper (SMNH). Kenosee: 1♀[★], 30.V.1958, A.R. Brooks (CNC); 1♀, 7.VI.1958, A.R. Brooks (USS); 2♂♂[★], 7.VI.1958, 1♂[★], 4♀♀[★], 15.VI.1958, A.R. Brooks (CNC); 2♂♂[★], 2♀♀[★], 19.VII.1958, A. & J. Brooks (CNC). Lebret: 1♀[★], 15.VII.1958, A. & J. Brooks (CNC). Liebenthal, 10 mi S: 1♀, 27.VII.1970 (ROM 700449). Lumsden: 1♂[★], 1♀[★], 12.VII.1958, A. & J. Brooks (CNC). Macdowal: 1♂, 10.VI.1977, R. Hooper (SMNH). Macklin: 1♀, 18.VI.1940 (USS). Maple Creek, 1 mi NW: 1♂, 12.VIII.1969 (ROM 690319). Melfort: 1♂[Δ©], 26.VII.1978, R. Vanstone, swept from Melilotus officinalis (RARS). Moose Mt Prov Pk: at lt, 1♂, 23.VII.1963, G.B. Wiggins (ROM);

1♀, 31.V.1976, R. Hooper (SMNH). Nipawin: 1♂, 29.VII. 1968, 1♂, 19.VII.1969, 1♀, 12.VII.1970, Tom C. Taylor (UG). Outlook: 1♂, 2.VIII.1973, D.H. Pengelly (UG). Oxbow: 1♂, 15.VI.1907, Fredk. Knab (USNM). Oyama: 1♂$^{\Delta ©}$, 26.VI.1978, D. Ward, swept from Taraxacum officinale (RARS); 1♂$^{\Delta ©}$, 29.VI.1978, R. Vanstone, swept from Artemesia absinthium (RARS); 1♀$^{\Delta ©}$, 13.VII.1978, R. Vanstone, aspirated from Sonchus arvensis (RARS). Pike L(ake) Prov Pk, Saskatoon: 1♀, 17-18.VIII.1970 (ROM 700555); 1♀, 8.VI. 1977, R. Hooper (SMNH). Prince Albert: 1♀$^{\bigstar}$, 6.VIII.1954, Brooks & Wallis (CNC). Qu'Appelle Valley: 1♀$^{\Delta ©}$, 24.VI.1977, G. Kelley, aspirated from Convolvulus arvensis (RARS). Regina: 1♂, 18.VI.1943, I♀, 23.VI.1943, P. Larkin (SEM); 1♀$^{\Delta ©}$, 24.VI.1977, G. Kelley, swept from Rumex sp (RARS); 1♀$^{\Delta ©}$, 24.VI.1977, L. Hustak, swept from Rumex sp (RARS); 1♀, 27.VI.1978, K. Sunley (UMW). Roche Percee: 1♂, 4.VI. 1976, R. Hooper (SMNH). Rowatt: 1♂$^{\Delta ©}$, 1♀$^{\Delta ©}$, 16.VI.1977, M.G. Maw, swept from Rumex sp (RARS). St Victor: 6♂♂$^{\bigstar}$, 2♀♀$^{\bigstar}$, 25.VI.1955, A.R. Brooks (CNC); 4♀♀$^{\bigstar}$, 27.VI.1955, J.R. Vockeroth (CNC). Saskatoon: 1♀$^{\bigstar}$, 6.VI.1923, 1♂$^{\bigstar}$, 9. VI.1923, N.J. Atkinson (CNC); 1♀$^{\bigstar}$, 18.VII.1924, 2♀♀$^{\bigstar}$, 21. VII.1924, 1♀$^{\blacktriangle\ \bigstar}$, 20.VI.1925, 1♀$^{\bigstar}$, 19.VIII.1925, 1♀$^{\bigstar}$, 14. VII.1927, Kenneth M. King (CNC); 1♂$^{\bigstar}$, 1♀$^{\bigstar}$, 12.VIII.1929, Robert Glen (CNC); 1♂, 27.VII.1938, E.J. Britten (USS); 2♀♀, 1ex$^{\bullet}$, 28.VI.1946, E. Cumming (USS); 1♀, 2.VI.1949, J.E. McFarlane (USS); 4♂♂$^{\bigstar}$, 1♀$^{\bigstar}$, 11.VI.1950, 3♂♂$^{\bigstar}$, 3♀♀$^{\bigstar}$,

21.VI.1951, 1♀★, 22.VI.1951, A.R. Brooks (CNC). Scout Lake: 8♂♂★, 4♀♀★, 2ex♦ ★, 17.VI.1955, J.R. Vockeroth (CNC). Snowdon: 1♀★, 13.VII.1944, 1♀★, 14.VII.1944, O. Peck (CNC). Somme: 1♀★, 7.VII.1954, Brooks & Wallis (CNC). Stenen: 1♂Δ©, 25.VII.1978, D. Ward, aspirated from Chenopodium album (RARS). Tantallon: 1♂, 15.VI.1971, R. Hooper (SMNH). Val Marie: 1♂★, 14.VI.1955, J.R. Vockeroth (CNC). Wakaw: 1♀★, 18.VII.1925, Kenneth M. King (CNC). Weyburn: 1♂, 12.VIII.1967, C. & W. Boyle (LEM). Whitefox: 1♀★, 11.VII.1944, O. Peck (CNC); 1♀★, 22.VIII.1959, A. & J. Brooks (CNC).

MANITOBA Aweme: 1♀★, 3.VIII.1913, 1♂★, 24.VII.1914, 1♀★, 27.VI.1915, 1♀★, 15.VIII.1920, N. Criddle (CNC); 1♀★, 16.VI.1924, R.D. Bird (CNC). Bald Head Hills, 13 mi N Glenboro: 1♂★, 9.VIII.1958, R.L. Hurley (CNC). Beaconia: 1♂, 7.VI.1978, E.E. Adams (UMW). Brandon: 1♂, 9.VI.1948, 1♂, 10.VI.1948, A.G. Robinson (UMW); 2♂♂, 15.VIII.1949, D.F. McLean (UMW); 1♂★, 6.VII.1950, C.F. Barrett (CNC); 5♂♂Δ® ★, 2♀♀Δ® ★, 1ex♦ Δ® ★, 21.VIII.1951, 6♀♀Δ® ★, 23.VIII.1951, A.G. Robinson (CNC); 1♀, 23.VIII.1951, 1♂, 31.VIII.1951, A.G. Robinson (UMW); 2♀♀Δ® ★, 31.VIII.1951, A.G. Robinson (CNC); 6 mi N, 2♀♀★, 1.VII.1958, R.B. Madge (CNC); 1♂★, 10.VII.1958, R.L. Hurley (CNC); 1♂★, 20.VII.1958, R.B. Madge (CNC); 1♀★, 3.VIII.1958, R.L. Hurley (CNC); 1♂★, 17.VIII.1958, J.G. Chillcott (CNC); 1♀, 24.VIII.1966, V.R. Vickery (LEM). Carberry: 1♂★, 1♀★, 14.VI.1953, 2♂♂★, 15.VI.

1953, 1♂★, 16.VI.1953, 2♂♂★, 19.VI.1953, 1♂★, 2♀♀★, 11.VIII.1953, Brooks & Kelton (CNC); 5 mi W, 1♀★, 9. VIII.1958, N.B. Chillcott (CNC); 5 mi W, 1♀★, 11.VIII. 1958, J.G. Chillcott (CNC). Dauphin: 1♂★, Mrs. Hippisley (CNC). Elma: 1♀, 23.IX.1978, J.L. Buth (UMW). Flin Flon: 1♀, 1947, D.B. Atkins (UMW). Forrest: 2 mi N, 1♂★, 19. VII.1958, R.L. Hurley (CNC); 9 mi N, 1♀★, 29.VII.1958, N.B. Chillcott (CNC). F(or)t Garry: 1♂★, 6.VII.1945, FIS (NFRC). Gillam: 1♂★, 5.VII.1950, 1♂★, 8.VII.1950, 1♂★, 15.VII.1950, 1♂★, 1ex♁★, 25.VII.1950, 1♀★, 27.VII.1950, J.F. McAlpine (CNC). Glenlea Res(earch) Sta(tion): at 1t, 13♀♀, 20.VI.1980, 1♀, 23.VI.1980, P.W. Arntfield (LEM); at 1t, 5♂♂, 16.VII.1980, P.W. Arntfield (UMW); 1♀, 7.VIII. 1980, A.G. Robinson (UMW); 1♀, 7.VIII.1980, B.A. Batulla (UMW); 3ex in cocoon parasitised by chalcids as larvae, 7.VIII.1980, A.G. Robinson & B.A. Batulla (UMW); at 1t, 13♂♂, 20.VIII.1980, P.W. Arntfield (LEM); at 1t, 1♂, 20. VIII.1980, 1♂, 29.VIII.1980, 1♀, 8.IX.1980, P.W. Arntfield (UMW). Katherine L(ake), Riding Mt Nat'l Pk: uvl, 1♂, 11. VII.1970 (ROM 700384). Le Pas: 1♀★, 17.VIII.1949, J.B. Wallis (CNC). Lockport: 1♂, 5.VI.1976, 1♂, 26.VI.1976, J.S. Lee (UMW). Minitonas: 1♀, 18.VII.1974, D.C. Turnock (MMMN). Minnedosa, 5 mi N: 2♀♀★, 8.VII.1958, R.L. Hurley (CNC). Morden: 1♂Δ®, 1♀Δ®, 1♀, 29.VIII.1951, A.G. Robinson (UMW); 1♂Δ®★, 2♀♀Δ®★, 29.VIII.1951, A.G. Robinson (CNC). Ninette: 2♂♂★, 2♀♀★, 1ex♁★, 6.VI.1958, 1♂★, 1♀★, 14.VI. 1958, R.B. Madge (CNC). Norgate, 5 mi W: 1♂★, 16.VIII.1958,

J.G. Chillcott (CNC). Pilot Mound: 2♂♂★, 3♀♀★, 31.VII. 1958, A. & J. Brooks (CNC). Portage: 2♂♂, 12.VI.1978, Jim Broatch (UMW). R(iding) M(ountain) N(ational) P(ark): 1♀★, 21.VIII.1949, H. McKinnon (CNC). Sandilands: 1♀★, 28.VII.1938, FIS (NFRC); 1♂, 27.VII.1974, D.J. Madder (UMW); 1♀, 9.VIII.1977, B. McKillop (MMMN). Shilo: 5 mi SW, 1♂★, 1♀★, 10.VI.1958, R.L. Hurley (CNC); 5 mi SW, 1♂★, 2♀♀★, 16.VI.1958, J.F. McAlpine (CNC); 5 mi SW, 1♂★, 16.VI.1958, 3 mi SW, 1♂★, 30.VI.1958, R.B. Madge (CNC); 3 mi S, 1♂★, 30.VI.1958, from Leafy Spurge, 5 mi SW, 1♀★, 7.VII.1958, R.L. Hurley (CNC); 5 mi SW, 1♂★, 7.VIII.1958, R.B. Madge (CNC); 5 mi SW, 1♀★, 13.VIII.1958, R.L. Hurley (CNC). Sprague: 1♀★, 23.VI.1950, D.F. McLean (CNC). Stockton, 2 mi W: 1♂★, 22.V.1958, J.F. McAlpine (CNC); 1♀★, 3.VI.1958, R.B. Madge (CNC); 1♂★, 16.VII.1958, R.L. Hurley (CNC); 1♂★, 28.VII.1958, J.G. Chillcott (CNC); 4♂♂★, 2♀♀★, 6.VIII.1958, R.B. Madge (CNC). Transcona: 1♀, 29.VII.1924, G.S. Brooks (MMMN). Treesbank: 1♂Δ© ★, 24.VII.1910, J.B. Wallis (CNC); 1♀★, 17.VIII.1958, J.G. Chillcott (CNC). University of Manitoba: at lt, 1♀, 26.V.1980, 1♂, 1♀, 20.VIII.1980, P.W. Arntfield (UMW). Wanless: 1♀★, 28.VI.1961, H.E. Milliron (CNC). Whitewater L(ake), 4 mi N Whitewater: 1♀★, 22.VI. 1958, J.F. McAlpine (CNC). Winnipeg: 1♂★, 21.VI (ROM Walker Collection); 1♂, 28.V.1926, J.J. Neilson (UMW); 1♂★, 16.VI. 1944, FIS (NFRC); 2♀♀, 24.VIII.1953, A.G. Robinson (UMW); 1♀, 9.VIII.1958, A. & J. Brooks (USS), 2♀♀★, 9.VIII.1958,

A. & J. Brooks (CNC); 1♀, 7.VII.1979, P. Arntfield (UMW).

ONTARIO Aberfoyle: 1♂, 25.VI.1956, D.H. Pengelly (UG). Agincourt: 1♀, 7.VI.1959, R.J. Pilfrey (UG). Algonquin Pk: 1♂★, 1♀★, 18.VI.1922, J. McDunnough (CNC). Ancaster: 1♀, 29.VI.1936, J.M. Smith (UG); 1♀Δ®, 11.VII.1948, D.J. Peers (MCMU); 1♂, IX.1953, E. Wolfe (MCMU). Appin: 1♂★, 19.VI.1962, Kelton & BRumpton (CNC). Apple Hill: 1♂, 10.VI.1979, D.N. Duffy (LEM). Arkell: 1♀, 11.VI.1958, D.H. Pengelly (UG); 1♀, 27.V.1959, R.D. Crawford (UG); 1♂, 1♀, VIII.1964, I. Kukovica (UG); 1♂, 6.V.1978, Nancy Pierce (UG); 1♀, 6.VI.1978, Gayle Sevean (UG); 1♀, 6.VI.1978, Dael Morris (UG). Aylmer: 1♀Δ®, 15.VII.1948, W. Helps (MCMU). Bala: 1♀★, 19.VII.1932, G.S. Walley (CNC). Bancroft: 3♀♀★, 11.VIII.1955, John C. Martin (CNC); 1♀, 31.VII.1966, S.J. Wilcox (ROM). Batchawana Bay, L(ake) Superior: 2♀♀★, 1ex♂★, 1.VIII.1958, G.B. Wiggins (ROM). Baxter: 1♂, 24.VI.1978, P. Jursevskis (UG). Beachburg: 1♀, 9.VII.1978, E. Fuller & R. Jaagumagi (ROM). Belleville: 1♀★, 24.VI.1929, F.P. Ide (ROM); 1♀, 25.VII.1969, Ikram, from cage with Convolvulvus (RARS); 5♂♂, 1♀, 27.VI.1977, D.N. Duffy (LEM). Bell's Corners: 1♀★, 13.VI.1952 (CNC); 1♀, 7.VIII.1970, 2♂♂, 4♀♀, 8.VIII.1970, E.G. Munroe (CNC). Belwood: 1♂, 10.VI.1968, 1♂, 23.VI.1968, D.H. Pengelly (UG). Bertram Tp, French R(iver): 1♀★, 12.VII.1929, E.M. W(alker) (ROM). Blackburn: 1♂, 1♀, 7.VII.1939, E.G. Lester (UG). Black Lake, N Burgess Tp: 1ex 3rd instar larva☆, J.A. Downes (LEM). Black Rapids,

Rideau R(iver): 1♂▲© ★, 1♀▲© ★, 1ex● ★, 20.VII.1922, F.P. Ide (CNC). Black Sturg(eon) Lake: 1♀, 1-15.VIII. 1956, Lindberg (ZMUH). Blenheim: 2♀♀, 24.VIII.1960, 1♀, 30.VIII.1961, 1♂, 31.VIII.1961, Tran Van Quynh (UG). Bradford: 1♀, 2.VII.1975, V.I. Burachynsky (UG). Brantford: 1♀ , 30.VIII.1947, R.H. Hannah (MCMU). Brighton: 1♂★, 6.VII.1951, L.H. Bruneau (CNC). Brooklin: 4♀♀, 6.VII.1979, David Lewis (UG). Bruce Co: N Boat L(ake), 1♀, 22.VII.1977, B. Marshall, trees & shrubs (ROM); 3.5 km E Sauble Falls Prov Pk, 3♀♀, 24.VII.1977, D. Maddison, dry roadside field (ROM 770172a). Byron Bog, London: 1♀, 8.IX.1965, D.M. Davies (MCMU). Caistor Center: 1♂, 4.VI.1968, 1♀, 2.VII. 1968, D.A. Lymburner (UG). Calabogie: uvl, 1♀, 24.VI.1978, 1♀, 25.VI.1978, E. Fuller & M. Gunderman (ROM 780318 & 780321); 1♀, 26.VI.1978, E. Fuller, roadside plants (ROM 780322d). Cambridge: 1♂, 14.VI.1975, W.J. Moolenbeek (UG); 1♀, 15.VI.1975, Leon A. Barlow (UG); 1♀, 21.VIII.1975, W.J. Moolenbeek (UG). Cawaja Beach, Tiny Tp, Simcoe Co: 3♀♀, 3. VIII.1968, J.C.E. Riotte (ROM). Cayuga: 1♀, 12.VIII.1949, J.C.F. (UG); 1♀, 14.VII.1963, 1ex●, 16.VIII.1963, D.J. Pree (UG). Cedar Lake: 20 mi S; 1♀★, 15.VII.1961, H.E. Milliron, on Epilobium sp (CNC); F(ie)ld Sta(tion), Vermillion Bay, 1♀, 6.VIII.1959, 2♀♀, 9.VIII.1959, E.A. Cameron (UG). Chaffeys Locks: uvl, 1♂, 24.VI.1963, uvl, 1♀, 27.VI.1963, uvl, 1♀, 30.VI.1963, uvl, 1♀, 1.VII.1963, uvl, 1♀, 4.VII.1963, uvl, 2♀♀, 9.VII.1963, uvl, 1♀, 10.VII.

1963, 1♀, 10.VII.1963, 1♂, 11.VII.1963, uvl, 2♀♀, 18. VII.1963, uvl, 1♀, 26.VII.1963, J.C.E. Riotte & I. Smith (ROM); uvl, 1♀, 17.VIII.1969, 1♀, 23.VII.1970, J.C.E. Riotte (ROM). Chalk River: 1♂, 10.VII.1937, J.M. Cameron (LEM). Chatham: 1♂★, 20.V.1925, G.S. Walley (CNC); 1♂, 20.VI.1930, 1♂, 9.VII.1930, 2♀♀, 13.VII.1930, 1♂, 25.VII. 1930, Geof. Beall (UWO); at lt, 1♂, 1♀, 1931 (CNC); 1♀, 11.VIII.1951, D.M. Mann (CNC); 1♀, VI.1953, Baker Red Clover, 1♀, 10.VIII.1954, Alfalfa, 1♀, 18.VIII.1954, Alfalfa, 1♀, 24.VIII.1954, Alfalfa, K.G. Davey (CNC); 1♀, 27.VIII.1960, Tran Van Quynh (UG). Chatterton: 3♀♀★, 5.VIII.1948, 1♀★, 31.VIII.1948, John C. Martin (CNC); 1♀, 17.VI.1968, 1♂, 7.VIII.1968, 1♂, 22.VIII.1968, R.H. Parry (UG). Clinton: 1♂, 11.VII.1963, J.D. Van Loon (UG). Cochrane: 1♀, 25.VII.1973, Susan Bower (UG). Coldstream: 1♂, 9.VI. 1922, A.A. Wood (CNC). Constance Bay: 2♂♂★, 1♀★, 24.VIII. 1932, L.J. Milne (CNC). Cooksville: 1♀, 6.VI.1958, David Barr (ROM). Cornwall: 1♂★, 26.VI.1925, 1♂★, 1♀★, 27.VI.1925, F. Ide (CNC). Credit Forks: 1♀★, 30.VIII.1928, W.E. Ricker (ROM). Cumberland: lex♂, 14.VII.1969, P.W. Arntfield (UG). Dalrymple: 1♀, 17.VIII.1968, L.L. Tibbles (UG). De Grassi P(oin)t: lex♂ ★, 16.VIII.1914, 1♂★, 24.VIII.1914, 1♂★, 28. VIII.1914, 1♀★, 5.VIII.1934, E.M. Walker (ROM). Dover Tp: 1♂, 28.VI.1938, A.A. Wood, Tobacco (CNC). Dryden: 1♂★, 12-13.VI.1960, Kelton & Whitney (CNC). Dundas: 1♂, 4.VI.1975, J.M. Cumming (UG); 1♂, 19.VI.1978, M. Lichtenberg (UG);

1♂, 19.VI.1978, Nancy Pierce (UG); 1♂, 20.VI.1979, Barb Merchant (UG). Dunnville: uvl, 3♂♂, 1♀, 10.VI.1961, J.C.E. Riotte (ROM); 2♂♂, 2♀♀, 26.V.1962, W.R. Plath & J. Riotte (ROM); uvl, 1♀, 8.VI.1963, J.C.E. Riotte (ROM). Dyers Bay: 1♀, 19.VII.1955, D.H. Pengelly (UG). Elora: 1♂, 27.VI.1975, 1♂, 29.VI.1975, Sandra Allan (UG). Elmira: 1♂, 17.V.1962, A.F. Johnson (UG). Fisher Glen: 1♀★, 11.VI. 1931, 1♀★, 15.VI.1931, G.S. walley (CNC). F(or)t William, Mt McKay, 1000 ft: 1♂★, 18.VII.1961, H.E. Milliron, on Solidago sp (CNC). Frontenac Co, 2 mi W Elphin: 1♀, 18.VIII. 1978, E. Fuller & M. Gunderman, plants by roadside (ROM 780401b). Galt: 1♀Δ®, 17.VIII.1948, L. Smillie (MCMU). Gananoque: 1♀, 6.VII.1963, C.J. Edwards (UG); 2 mi W, 3♀♀, 9.VII.1963, D.K. Kevan (LEM). Garvel River: 1♀, 8.VIII.1956, Lindberg (ZMUH). Georgian Bay Island 421: 1♀, 1.VII.1963, 1♀, 5.VIII.1963, J.P. Bogart (UG). Go Home Bay: 1♀★, 28.VI. 1932, 1♂★, 22.VII.1932, G.S. Walley (CNC). Gold Lake: 2♀♀, 5.VIII.1973, S. Hill (UG). Golden Lake: 1♀, 15.VII.1963, D.K. Kevan (LEM). Grassie: 1♂, 31.V.1979, Barb Merchant (UG). Grav(en)h(ear)st: 1♀, 3.VIII.1977, Lola Turcotte (UG). Grimsby: 1♂, 1♀Δ, 1♀, J. Pettit (UG); 1♀, 16.VII.1955, D.H. Pengelly (UG); 1♀, 25.V.195_ (CNC); 1♂, 20.VI.1978, Susan M. Ball (UG); 1♂, 21.VI.1978, M. Lichtenberg (UG); 1♂, 1♀, 19.VI.1979, Laura Templin (UG). Guelph: at lt, 3♂♂, 4♀♀, 1ex●, 12.VIII.1904 (UG); 1ex●, 15.VIII.1951 (LEM); 1♀, 20. VI.1956, 1♀, 23.VI.1957, D.H. Pengelly (UG); 1♀, 10.VII.

1957, Chas. A. Small (UG); 1ex♂, 27.VI.1960, D.H. Pengelly (UG); 1♂, 4♀♀, 27.VI.1961, C.S. Henry (UG); 1♂, 1969, M.H. McCleary (UG); 1♂, 26.VI.1972, B.L. Cadogan (UG); 1♀, 1.IX.1972, Brian K. Akey (UG), 1ex♂, 11.IX.1973, R.J. Hellewell (UG); 1♀, 15.IX.1973, Susan Bower (UG); 1♀, 25.VII.1975, Nancy Wilcox (UG); 1♀, 27.IX.1975, Sandra Allan (UG); 1♂, 23.V.1976, John F. Fortin (UG); 1♂, 8.VII. 1976, E.A. Innes (UG); 1♂, 20.V.1977, Kevin Barber (UG); 1♂, 6.VI.1978, Susan M. Ball (UG); 1♀, 8.VI.1978, Nancy Pierce (UG); 1♀, 28.VI.1978, Susan M. Ball (UG); 1♂, 17. VII.1978, M. Lichtenberg (UG); 1♀, 21.VIII.1978, Dael Morris (UG); 1♂, 31.V.1979, K.L. Bailey (UG); 1♂, 1♀, 6. VI.1979, 1♀, 13.VI.1979, David Lewis (UG); 1♀, 14.VI. 1979, K.L. Bailey (UG); 1♂, 14.VI.1979, Barb Merchant (UG); 1♀, 9.VII.1979, Susan Beierl (UG); 2♀♀, 9.VIII.1979, Barb Merchant (UG). Hamilton: 1♀, VII.1942 (MCMU); 1♀, VIII. 1942, F.T. Knapp (MCMU); 1♀△, VI.1950, W.I. Campbell (MCMU); 1♀, 13.VIII.1950, J. Reid (MCMU); 1ex♂△, IX.1951, R.C. Howell (MCMU); 1♀, IX.1970, S. Leung, trees (MCMU); 1♂, 1♂△, 19.VI.1979, Susan Beierl (UG); 1♂, 1♀, 19.VI.1979, K.L. Bailey (UG). Harrow: 1♀, 29.VI.1958, A.E. Hildebrand (CNC); 1♀, VIII.1961, 1♂, 8.VI.1962, R.S. Dickhout (UG); 1♀, 20.V.1972, K. Roughley (UG); 1♂, 20.VII.1976, E.A. Innes (UG). Hastings: 1♀, 28.VI.1977, J.W. McCreadie (UG). Havlock: 1♀, 4.VII.1977, J.W. McCreadie (UG). Hawkesbury: 1♀, 5.VI.1962, V.R. Vickery (LEM). Hepworth: 1♀, 15.VII.

1974, D.H. Pengelly (UG); 1♀, 26.VI.1975, Nancy Wilcox (UG); 3♂♂, 8.VI.1976, E.A. Innes (UG); 1♂, 1♀, 30.V. 1978, Nancy Pierce (UG); 1♀, 30.V.1978, Susan M. Ball (UG). Hespeler: 1♀, 22.V.1975, Nancy Wilcox (UG). Highland P(a)rk: 1♀★, 6.VI.1914, E.M. W(alker) (ROM). Iron Bridge: at 1t, 3♀♀★, 1ex♂★, 29.VIII.1959, R.E. Leech (CNC). Jordan: 1♂Δ®★, 10.VIII.1914, W.A. Ross (CNC). Kearney: 1♀★, 8.VII.1926, F.P. Ide (CNC). Kendal: 2♀♀, 29.VI.1958, G.B. Wiggins (ROM); 2♀♀, 15.VI.1964, G.B. Wiggins (ROM); 1♀, 17.VIII.1967, I.M. Smith, sweeping in dry field at dusk (ROM); at Squires temporary pond #1, 1♀, 19.VI.1972 (ROM 720225). Keswick: 1♂, 3.VI.1975, 1♀, 28.VI.1975, T.A. Sawinski (UG). Killarney (Prov) Pk: 1♂, 1♀, 18.VIII.1978, W.A. Attwater (UG). Kingsville: 1ex♂★, 19.VI.1954, G.B. Wiggins (ROM); 1♂★, 3♀♀★, 17.VII.1955. L.A. Kelton (CNC). Lake Nipissing: 1♂★, 1♀★, 10.VII.1929, 52nd Creek, 1♀★, 15.VI.1929, 1♂★, 16.VI.1929, F.P. Ide (ROM). L(ake) Opeongo, Algonquin Pk: 1♀, 27.IX.1940, 1♀, 13.VII.1941, D.M. Davies (MCMU). Lavant Station, Lanark Co: uvl, 1♀, 6.VII.1978, R. Jaagumagi & E. Fuller (ROM). Leamington: 8♂♂★, 3♀♀★, 7.VI.1929, 1♀★, 18.VI.1929, 2♂♂★, 8.VI.1937, G.S. Walley (CNC). Leaside: 1♂, 12.IX.1961, G.K. Morris (UG). Leskard: 1ex♂★, 20.VI.1952, G.B. Wiggins (ROM). Limogies, Russell Co: uvl, 1♀, 15.VII.1978, E. Fuller & R. Jaagumagi (ROM 780361). London: 22 mi E, 1♂, 1♀, 19.VII. 1967, C. & W. Boyle (LEM). Lyn: 1♀★, 10.VIII.1926, F.P. Ide

(CNC); 1♂, 6.VI.1978, field by sewage pit (ROM 780255b). Maberly: 4♀♀, 17.VII.1980, M.J. Sharkey (LEM). Mallorytown: 1♂, 10.VI.1978, M. Gunderman, on Alder leaves (ROM 780268c). Marmora: 1♂★, 27.V.1952, J.C. Mitchell (CNC); 3♂♂★, 1♀★, 3.VI.1952, 1♀★, 7.VI.1952, J.R. Vockeroth (CNC); 2♀♀★, 11.VI.1952, J.C. Mitchell (CNC); 1♀★, 17.VI.1952, J.R. Vockeroth (CNC); 1♀★, 4.VII.1952, C. Boyle (CNC); 1♀★, 7.VII.1952, J.R. McGillis (CNC); 1♀★, 8.VII.1952, J.R. Vockeroth (CNC); 2♂♂★, 3♀♀★, 8.VII.1952, 1♂★, 7♀♀★, 14.VII.1952, 5♀♀★, 15.VII.1952, 1♂★, 5♀♀★, 18.VII.1952, 1♀★, 5.VIII.1952, 4♂♂★, 5♀♀★, 1ex♂★, 12.VIII.1952, 1♀★, 15.VIII.1952, 1♂★, 1♀★, 20.VIII.1952, C. Boyle (CNC). Merivale: 1♂★, 30.V.1952, R. Lambert (CNC); 1♂, 18.VI.1958, Merrill H. Prime (UG). Mer Bleue: 1♂★, 8.VI.1927, G.S. Walley (CNC); 1♂, 1♀, 21.VIII.1968, O. Peck (CNC). Midland: 1♀, 13.VII.1955, Ethel Lyle (UG). Miller Lake: 3♀♀, 1.VII.1963, D.H. Pengelly (UG). Mississauga: 1♀, 5.VIII.1974, D. Antonnuci, dry field (ROM). Morpeth: 1♀, 22.VIII.1961, G.K. Morris (UG). Nepean Tp: 1♀★, 20.VIII.1949, R.G. Ballmoug (CNC). Newmarket: 1♀, 17.IX.1970, G.A. Surgeoner (UG). Niag(ara) Falls: 1♀, VII.1956, H.W.H. Zavitz (UG). Nichol Tp: 3♂♂, 2♀♀, 27.VI.1975, Sandra Allan (UG). Nipigon: 1♀, 8.VIII.1978, J.A. Garland (LEM). Noelville: 1♀, 28.VI.1975, R.E. Roughley (UG). Nogies Cr(eek) Res(earch) St(atio)n, 6 mi NE Bobcaygeon: 1♀, 12.VI.1975, F. Quan (ROM 750002B). North Gower: 1♀, 27.VIII.1970, H.

Salkeld (CNC). Norval: 1♀, 9.VI.1970, 1♂, 8.X.1970, R.W. Cameron (UG). Norway P(oin)t, L(ake) of Bays: 1♀★, 9.VIII. 1934, F.P. Ide (ROM). One Sided Lake: 1♀★, 27.VI.1960, Kelton & Whitney (CNC). Ormand Beach: 2♂♂▲©, 1ex♂ ▲©, 1. VIII.1936, W.C. McGuffin (UWO). Orono: 1♀, 14.VII.1963, 1♀, 14.VIII.1963, J.D. Van Loon (UG). Orwell: 1♂, 15.VI. 197_, Dael Morris (UG). Ottawa: 6♂♂★, 4♀♀★, 1ex♂ ★, 17. VIII.1906, 1♀★, VI.1907, 1♀★, 16.VIII.1907, sweeping Asters, 1♀★, 31.VIII.1908, James Fletcher (CNC); 1ex♂ ★, 1.IX.1915, T. Rankin, on Asparagus (CNC); 1♂★, 1♂▲© ★, 27.V.1921, 1♀★, 10.VI.1923, A. Richardson (CNC); 1♂, 14.VIII.1939, Ed. G. Lester (UG); 1ex♂ ★, 24.VI.1947, 1ex♂ ★, 21.VIII.1947, 1♀★, 29.VIII.1947, Mona Ray (CNC); 1♂★, 29.V.1952, R.S. Bigelow (CNC); 1♂, 22.VI.1958, 1ex♂, 29.VI.1958, Merrill H. Prime (UG); 1♀, 26.VIII.1961, B.S. Heming (UG); 1♂, 16.VI.1963, J.E. Macklin (UG). Parry Sound: 1♀★, 15.VII.1932, G.S. Walley (CNC). Pelee Is(land): 2♀♀★, 30.VI.1950, 1♂★, 1♀★, 5.VII.1950, 2♀♀★, 10.VII.1950, 1♂★, 22.VII.1950, 1♂★, 2. VIII.1950, 1♀★, 12.VIII.1950, 1♂★, 17.VIII.1950, 1♀★, 1ex♂ ★, 18.VIII.1950, V. Kohler (ROM). Peterborough: 1♀, 18.VI.1973, Robert S. Hill (UG); 1♀, 7.IX.1977, Peggy Morton (UG). Pickering: 2♀♀, 15.VII.1968, G.H. Wilson (UG); conc(ession) #5 E of sideroad 10 and 11, 3♂♂, 2♀♀, 26.VIII. 1967, sweeping nr pond, Smith & Odum (ROM); uvl, 2♀♀, 26. VIII.1967, I. Smith & A. Odum (ROM). Pinery Prov Pk, Lambton Co: uvl, 1♀, 24.VI.1977, D. Maddison, oak forest (ROM 770089);

Burley campground, 1♀, 24.VI.1977, D. Maddison, wet interdune meadow (ROM 770086c); Ausable R(iver) nr Riverside campground, 1♀, 3.VII.1977, E. Oleksuik, sweeping understorey shrubs (ROM 770108); Riverside campground, 1♂, 4.VII.1977, W. Maddison, unshaded low plants in oak woodland (ROM 770110); Nat(ure) Display Cent(er), uvl, 1♀, 15.VII.1977. B. Marshall & D. Maddison (ROM 770145); 3♂♂, 3♀♀, 6.VI.1979 (WLUM). Point Pelee: 1♀★, 1.VI.1913, P.A. Taverner (CNC); 1♂★, 19.VI.1920, N.K. Bigelow (ROM); 1♂★, 2♀♀★, 27.V.1925, 1♂★, 3.VI.1925, 1♂★, 2.VI.1929, 2♂♂★, 1♀★, 8.IX.1954, G.S. Walley (CNC); 1♀★, 9.IX.1954, R. Lambert (CNC); 1ex♦★, 4-6.VI.1961, Kelton & Brumpton (CNC); 1ex♦, 13.VI.1979, Bert Wit (UG); 1♂, 13. VI.1979, 1♀, 14.VI.1979, Laura Templin (UG); 1♀, 10.VII. 1979, K.L. Runciman (UG). Port Arthur: 1♀, 21.VII.1969, K.J.G. Deacon (UG). Port Colborne: 1♂, 29.V.1934, David Gray (UG). Port Credit: uvl, 1♂, 1♀, 12.IX.1968, I.M. Smith (ROM). Port Elgin: 1ex♦, VII.1928, E.G.G. (UWO). Port Hope: 1♀, 25.VIII.1963, J.D. Van Loon (UG). Powassan: 1ex♦, 14.VII.1978, Susan M. Ball (UG). Preston: 1♀, 4.VII. 1970, R.D. Fairbairn (UG); 1♂, 6.VI.1971, K.J.G. Deacon (UG). Primrose: 1ex♦, 7.VII.1960, D.H. Pengelly (UG). Rainy River: 2♂♂★, 19.VI.1960, Kelton & Whitney (CNC). Renfrew Co at junction of Ottawa and Madawaska Rivers, Arnprior: 1♂, 25.VIII.1971 (ROM 710498). Rondeau Prov Pk, Kent Co: uvl, 1♀, 4.VI.1965, 1♂, 6.VI.1965, 1♂, 8.VI.1965, 1♀, 9.VI.

1965, 1♂, 2♀♀, 20.VI.1965, J.C.E. Riotte & I.M. Smith (ROM); uvl, 1♂, 29.VII.1967, I. & S. Smith (ROM); 1♀, 3.VIII.1968, I. & S. Smith, sweeping (ROM); nr Dillon and Harrison Trails, 1♀, 14.VI.1977, D. Maddison, understorey of deciduous forest (ROM 770055). St Catherines: 2♂♂★, 30.V.1961, Kelton & Brumpton (CNC). St Davids: 1♀, 20.VIII.1931, W.L. Putman (UG). St Thomas: 1♂★, 27.VII. 1924, H.G.D. (CNC). Sand Lake: 1♀★, 1.VII.1926, F.P. Ide (CNC). S(ault) S(te) Marie: 1♀★, 10.VI.1951, L. Nairn (CNC); 1♀, 15.VII.1952, H.J. Smith (LEM). Severn Bridge: 1♀, 5.VI.1964, G.E. Scott (ROM). Shirley's Bay: 1♀★, 18. VII.1922, F.P. Ide (CNC). Silver Lake (Frontenac Co): 1♂, 1♀, 8.VIII.1979, D.N. Duffy (LEM). Singhampton: 1♀★, 5. VIII.1930, F.P. Ide (ROM). Smithville: 1♀, 19.VI.1979, Susan Beierl (UG). Smoke Lake, Algonquin Pk: 1♀★, 20.VIII. 1938, J.R. Dymond (ROM). Smoky Falls: Mattagami R(iver), 1♂★, 1ex♂★, 30.VI.1934, 1ex♂★, 4.VII.1934, G.S. Walley (CNC); Kapuskasing, 1♀★, 7.VII.1935, 1♀★, 10.VII.1935, R.V. Whelan (ROM). S(outh) Neebing Tp: 1♀, 29.VI.1962, J.C.E. Riotte (ROM). Spanish: 1♀, 30.VII.1957, Merrill H. Prime (UG). Spenceville: 1♀★, 31.VIII.1939, 1♀★, 7.IX. 19_9, G.H. Hammond (CNC). Stirling: 1♀, 25.VIII.1963, A.F. Johnson (UG). Stoney Creek: 1♀, 10.VII.1968, Paul Budd (UG). Strathroy: 1♂★, 2.VII.1924, 1♂, 30.VII.1924, H.F. Hudson (CNC); 1PT♀▲©★, 28.VI.1928, H.F. Hudson (CNC 3308). Sudbury: 1♂, 1♀, 22.VI.1961, J.C.E. Riotte (ROM); uvl, 1♀,

22.VI.1961, J.C.E. Riotte (ROM); 1♀, 6.VII.1961, 1♂, 9.VII.1961, 1♂, 11.VII.1961, J.C.E. Riotte (ROM); uvl, 1♂, 13.VII.1961, 1♀, 14.VII.1961, 1♀, 20.VII.1961, 1♀, 23.VII.1961, 1♀, 24.VII.1961, 1♀, 25.VII.1961, J.C.E. Riotte (ROM); 1♀, 28.VI.1975, Leon A. Barlow (UG). Tews Falls: 1♂, 30.X.1956 (MCMU). Thedford: 1♀, 3.VI.1957, D.H. Pengelly (UG). Thessalon, Algoma District: 1♂, 1♀, 19.VI. 1965, K.P. Butler (LEM). Thunder Bay: 1♀, 8.VII.1970, 1♂, 26.VII.1970, K.J.G. Deacon (UG). Thunder Bay District, 7.2 mi S Beardmore on Rt 11: 1♀, 21.VI.1971 (ROM 710444). Toronto: 1ex♂ ★, 3.VI.1904 (ROM); 1♀★, 5.VII.1914, E.M. Walker (ROM); 1♀★, 2ex♂ ★, 2.VII.1933, F.A.U. (ROM); 1♀, 10.IX.1957, P.W. McMullen (UG); uvl, 1♀, 18.VI.1961, 1♂, 29.VI.1961, 1♂, 20.V.1962, 1♂, 7.VI.1962, 1♂, 15.VI.1962, 3♂♂, 23.VI.1962, J.C.E. Riotte (ROM); at 1t, 1♂, 14.VIII. 1962, 2♂♂, 17.VI.1963, J.C.E. Riotte (ROM); S end of Church S(treet), 1ex♂, 13.VII.1977 (ROM). Trenton: at 1t, 1♂★, 1.VI.1901, Evans (ROM). Vineland: 1♀, 10.IX.1930, W.L. Putman (UG); 1♀, IX.1956, H.W.H. Zavitz (UG); 1♂, 17.V. 1958, 1♀, 5.VI.1958, 1♀, 17.VI.1958, 1♂, 1♀, 10.VIII.1958, Chas. A. Small (UG); 1♂, 20.VI.1978, M. Lichtenberg (UG); 2♂♂, 7.VI.1979, Barb Merchant (UG). Wagerville: 1ex, 13. VII.1967, 1ex, 11.VIII.1967, L.L. Pechuman (CU Pechuman <u>in litt</u>. 1980). Waterford: 1♂★, 17.VI.1962, Kelton & Thorpe (CNC). Waterloo: 2♂♂, 3♀♀, 15.IX.1975 (WLUM). Westport: uvl, 1♀, 23.VIII.1978, M. Gunderman & E. Fuller (ROM 780408).

Wilkesport: 1♂, 3.VI.1957, D.H. Pengelly (UG). Windsor: 1♀, 8.VI.1976, 1♀, 3.VIII.1976, John F. Fortin (UG); 1♀, 2.VIII.1977, R.G. Bennett (UG). Zion (nr London): 1♀Δ®, 1♀Δ©, 10.VII.1936, 1ex♂Δ©, 21.VII.1936, 1♀Δ©, 24.VII.1936, 2♂♂Δ©, 31.VII.1936, 3♂♂Δ©, 1♀Δ©, 3.VIII.1936, 1♀Δ©, 13.VIII. 1936, W.C. McGuffin (UWO).

QUEBEC Anc(ienne) Lorette: 1♀, 27.VI.1953, J.P. Laplante (UL). Anticosti, Havre du Brick: 2♀♀, 27.VII.1977, J.M. Perron & L.J. Jobin (UL). S(t) L(ouis) Blandford, Arthabaska: 1♂, 15.VIII.1970, J.L. Laliberté (CSQ). Avoca: 1♀, 2.VII. 1963, 4♀♀, 25-26.VII.1963, D.K. Kevan (LEM). Aylmer: 1♀★, 10.VI.1969 (CNC). Baie Comeau: 1♂★, 1ex♂★, 1.VII.1948, E.G. Munroe (CNC). Beauharnois: 1♂, 14.VI.1979, 1♂, 26.VI. 1979, B. Bendell (LEM). Beech Grove: 1♂★, 26.VI.1951, J.F. McAlpine (CNC); 1♂, 22.VI.1967, Brian Rolseth (UAE). Berthier: 1♀★, 12.VII.1949 (CNC); 1♀Δ©, 10.VIII.1949, R.B. (UdeM); 1♂★, 24.VIII.1949 (CNC). Berthierville: 1♂, 28.VI. 1930, 1♀, 25.VII.1930, 1♂, 26.VIII.1930, 1♂, 1♀, 5.VIII. 1931, 1♂, 1♀, 6.VIII.1931, L. Daviault (CSQ); 1♂Δ®, 4.VII. 1932, L. Daviault (CRFL); 1♂Δ©, 29.VI.1938, J. Ouellet (UdeM); 1♀, 25.VII.1940, 1♂Δ®Δ©, 11.VI.1948, sur orme, 1♂Δ©, 8.VII. 1948, 1♂Δ©, 16.VI.1949, 1♂, 19.VI.1949, 1♂Δ©, 8.VIII.1949, 1♂Δ©, 11.VI.1950, 1♂Δ©, 1.VII.1950, 1♀Δ©, 8.VII.1950, 1♀Δ©, 9.VII.1950, A. Robert (UdeM); 2♀♀★, 3.VIII.1950, 2♀♀★, 11. VIII.1950, L. Daviault (CNC); 1♂Δ©, 3♀♀Δ©, 15.VIII.1950,

sur orme, A. Robert (UdeM); 1ex♂ ★, 14.VII.1951, 1♀★, 31.VII.1951, L. Daviault (CNC). Brossard: 1♀▲©, 18.VII. 1975, P.P. Harper (UdeM). Cap Rouge: 1♀★, 10.VII.1953, O. Peck (CNC). Chambly Canton: 1ex♂, 1.VII.1917, in grass (LEM). Chelsea: 1♀★, 30.V.1908, J.A. Letourneau (CNC); 1ex, 25.VI.1916, W.T.M. Forbes (CU Pechuman in litt. 1980). Clova: at lt, 1♀★, 27.VII.1959 (CNC). Covey Hill: 1♂★, 4.VII.1913, C.E. Petch (CNC); 1♂★, 18.VI.1927, 1♂★, 29.VI. 1927, 1♂▲© ★, 1♀★, 2.VII.1927, G.S. Walley (CNC). Duchesnay: 1♀, 11.VIII.1947, 1♀, 10.VII.1949, R. Lambert (CSQ). Gaspé: 1♂★, 26.VI.1954, W.J. Brown (CNC). Godbout: 1♂★, 1♀★, 15.VII.1918, 1♂★, 30.VII.1918, 1♀★, 31.VII.1918, E.M. Walker (ROM). Gracefield: 1♀★, 29.VI.1937, O. Peck (CNC). Hauterive, Rivière a la Chasse: 2♀♀▲©, 8.VII.1974, P.P. Harper (UdeM). Hemmingford: 1♂★, 1.VI.1922, 2♂♂★, 5. VI.1922, 1♀★, 29.VIII.1922, 4♂♂★, 30.VIII.1922, C.E. Petch (CNC); (at lt), 1♂, 12.VI.1978, 1♀, 30.VIII.1978, R. Loiselle (UQC). Hudson H(eigh)ts: 1♀, 1.VII.1941 (LEM); 2♂♂, 2♀♀, 24-30.VII.1956, 1♀, 25-31.VIII.1956, 1♀, 1-4. IX.1956, Lindberg (ZMUH). Hull: 1♂★, 26.VI.1920, Miss Cramp (CNC); 1♂★, 8.VIII.1921, F.P. Ide (CNC). Ile Jésus: 1ex♂ ▲©, VII.1935, G. Chagnon (UdeM). Ile Perrot: 1♀, 19. X.1963, J.E. Lovrity (LEM); 2♀♀, 9.VIII.1975, J.A. Garland (LEM); 1♂, 1♀, 31.V.1977, D.N. Duffy (LEM); 1♀, 1978, J.A. Garland, rearing White Pine association (LEM); 1♂, 6♀♀, 19.VIII.1978, 11♂♂, 8♀♀, 20.VIII.1978, 1♂, 23.VIII.

1978, J.A. Garland (LEM); 1♀, 6.VI.1979, D.N. Duffy (LEM). Kazabazua: 1♂★, 8.VI.1927, F.P. Ide (CNC); 1♀★, 18.VIII.1931, G.S. Walley (CNC). Kirks Ferry: at lt, 4♂♂★, 9.VIII.1950, 4♀♀★, 21.VII-6.VIII.1950, B.P. Beirne (CNC). Knowlton: 1♂★, 24.VI.1929, 1♀★, 10.VI. 1930, 1♀★, 9.VII.1930, L.J. Milne (CNC); 1♀★, 4.VII.1932, F.P. Ide (ROM). Lac Cameron, Labelle Co, 1 km N: 1♀, 10. VI.1977, D.N. Duffy (LEM). Lac Carre, Terrebonne Co, Lot 31, Range 8: 1♂, 2♀♀, 19-23.VIII.1968, W. Boyle & R. Lalonde (LEM). Lac Mercier: 1♂★, 2♀♀★, 10.VIII.1937, 1♂★, 5♀♀★, 16.VIII.1937, 1♀★, 17.VIII.1937, G.S. Walley (CNC). Lac Mondor, Ste Flore: 1♂★, 26.V.1951, 2♂♂★, 13.VI.1951, 2♂♂★, 16.VI.1951, 3♂♂★, 1♀★, 18.VI.1951, 1♂★, 20.VI.1951, 1♀★, 25.VI.1951, 1♂★, 2♀♀★, 8.VII.1951, 1♀★, 18.VII.1951, 1♀★, 22.VII.1951, 1♀★, 25.VII.1951, 1♀★, 27.VII.1951, 1♀★, 31. VII.1951, 1♀★, 25.VIII.1951, 1♂★, 27.VIII.1951, 2♀♀★, 21. IX.1951, E.G. Munroe (CNC). Lac St Louis, Station 7: 1♂$^{\Delta ©}$, 15.VI.1972, 3♂♂$^{\Delta ©}$, 1♀$^{\Delta ©}$, 16.VI.1972, 5♂♂$^{\Delta ©}$, 20.VI.1972, 1♂$^{\Delta ©}$, 1♀$^{\Delta ©}$, 21.VI.1972, 1♂$^{\Delta ©}$, 27.VI.1972, 1♂$^{\Delta ©}$, 28.VI.1972, F.M. Pépin (UdeM). Lac Serpent (Notre Dame du Laus): 1♀, 25.VIII. 1969, W. Boyle & R. Lalonde (LEM). Laniel: 1♀, 12.VI.1949, J.B. Thomas (LEM). Lanoraie: 1♀, 12.VIII.1931, 2♂♂, 11.VI. 1933, A.F. Winn (LEM); 1♀★, 7.VII.1950, R. Beique (CNC); 2♂♂, 26.V.1977, D.N. Duffy (LEM); 1♂, 26.V.1977, 1♂, 19.VI. 1977, A.T. Finnamore (LEM); 2♀♀, 7.VII.1977, 1♂, 1♀, 25.VI. 1980, D.N. Duffy (LEM); 1♂, 25.VI.1980, A.T. Finnamore (LEM).

La Trappe: 1♀$^{\Delta}$, 9.VIII.1932, 1♀$^{\Delta}$, 16.VIII.1932, 1♂, 31. VII.1943, 1♂, 1♀, 19.VIII.1943, 1ex$^{\blacklozenge}$, 21.VIII.1943, 1♀, 4.VI.1944, 1♀, 20.VII.1947, 1♀$^{\Delta\copyright}$, 15.VIII.1950, J. Ouellet (UdeM). Laval: 1ex$^{\blacklozenge}$, 13.VIII.1972, 1♂, 31.V.1975, 1♂, 10. VI.1975, 2♂♂, 14.VI.1975, 1♂, 29.VI.1975, 1♂, 19.V.1977, 1♂, 1♀, 20.VIII.1979, A.C. Sheppard (LEM). Louiseville: 1♂, 1♀, 1.VIII.1975, L. LeSage (UdeM). Magog: 1♂, 19.IX.1965, J. Gustafson (LEM). Matapedia, 3.2 mi E: 1♂, 4.VII.1971, B.V. Peterson (CNC). Mistassini: 1♀$^{\Delta\copyright}$, 14.VII.1944, 1♀$^{\Delta\copyright}$, 15.VII.1944, A. Robert (UdeM). Mont Albert: base, 1♂, 2♀♀, 15.VIII.1972, Boyle & Fontana (LEM). Montcalm Co: 1♀, 12. VI.1965, W. Boyle (LEM). Montreal: 1ex$^{\blacklozenge}$, 11.VI.1901, A.F. Winn (LEM); 1ex, 28.VI.1916, W.T.M. Forbes (CU Pechuman <u>in litt</u>. 1980); 1♂, 14.VI.1932, 1♀, 2ex$^{\blacklozenge}$, 16.VI.1932, A.F. Winn (LEM); 1ex$^{\blacklozenge}$, 15.VI.1933, E. Munroe (LEM); 1♀, 15.VII. 1933, A.F. Winn (LEM); 1♀, 22.VII.1933, E. Munroe (LEM); 1♀$^{\Delta\copyright}$, 28.VIII.1934 (UdeM); 1♂, 1ex$^{\blacklozenge}$, 14.VI.1938, A.F. Winn (LEM); 1♀$^{\Delta\copyright}$, 17.IX.1940, J. Ouellet (UdeM); 1♂, 12.VI.1944, 2♂♂, 1ex$^{\blacklozenge}$, 17.VIII.1944, Léo Raynault (CSQ); 1♂, 22.VIII. 1947 (LEM); 1♀$^{\Delta\copyright}$, 1.IX.1950 (UdeM); 1♀, 23.___, 1ex$^{\blacklozenge}$, 3.VII. 1954, G.A. Moore (LEM); 1♀, 24.VIII.1954, A.C. Sheppard (LEM); 1♀, 20.VIII.1956, R.I. Sailer (USNM); 1♀, 2ex$^{\blacklozenge}$, 14. VI.1977, J. Conn (LCCU); 1♂, 14.VI.1977, C. Pallen (LCCU). Monts: 1♂$^{\bigstar}$, 18.VI.1954, G.P. Holland (CNC). MOnt St Hilaire: 1♂, 1♀, 10.VI.1977, malaise trap, 3♂♂, 12-16.VIII.1977, A.T. Finnamore (LEM). Nominingue: 1♀$^{\Delta\copyright}$, 22.VI.1936, A. Robert

(UdeM); 1♂[Δ©], 21.VI.1975, P.P. Harper (UdeM). Oka: 1♀, 29.VII.1937, Paul Morisset (CSQ). O(ttawa) Golf Club (Hull): 1♀[★], 21.VII.1924, F.P. Ide (CNC). Parc du Mont Tremblant, collection sites: 1♀[Δ©], 14.VIII.1952, 3♀♀[Δ©], 2.IX.1952, 1♂[Δ©], 12.VI.1953, 1♀[Δ©], 24.VI.1954, 1♀[Δ©], 1ex♂[Δ©], 17.VII.1954, 1♀[Δ©], 8.VIII.1954, 1♀[Δ©], 18.VII. 1957, 1♂[Δ©], 17.VIII.1957, 1♀[Δ©], 26.VIII.1957, 1♀[Δ©], 14. VII.1958, 6♀♀[Δ©], 1ex♂[Δ©], 15.VII.1958, 1♀[Δ©], 23.VII.1958, 1♀[Δ©], 9.VIII.1958, 1♀[Δ©], 7.VIII.1959, 3♂♂[Δ©], 4♀♀[Δ©], 29.VI. 1961, 1♂[Δ©], 2♀♀[Δ©], 4.VIII.1962, 2♀♀[Δ©], 6.VIII.1962, 1♀[Δ©], 25.VIII.1962, 1♀[Δ©], 26.VIII.1962, 3♀♀[Δ©], 27.VIII.1962, A. Robert (UdeM). Perkins: 1♀, 25.VIII.1975, J.M. Cumming (UG). Piopolis, Frontenac: 1♀, 31.VII.1956, Noel Comeau (UL). Pointe Claire (Montreal): 1♂, 23.VI.1963, V.R. Vickery (LEM). Pointe des Cascades: 1♂, 2♀♀, 25.VIII.1977, D.N. Duffy (LEM). (Quebec): 3♂♂, 2♂♂[Δ©], 2♂♂[Δ®], 3♀♀, 2♀♀[Δ], 7♀♀[Δ©], 2♀♀[Δ®] (UL Provancher 1st and 2nd Collections). Queen's Pk, Aylmer: 1♀[★], 27.VII.1922, 1♀[★], 1.VIII.1922, 1♂[★], 9.VIII. 1922, 1♂[★], 2♀♀[★], 10.VIII.1922, 1♀[★], 14.VIII.1922, 1♂[★], 2. VII.1924, C.B. Hutchings (CNC); 1♀[★], 31.VII.1924, 1♂[★], 26. VIII.1924, A.R. Graham (CNC). Rawdon: 1ex♂, 3.VII.1931, F.L. McCarvell (LEM). Rigaud: 1♂[Δ], 10.VI.1938, A. Robert (UdeM); 1♀, 9.VIII.1977, D.N. Duffy (LEM). Rougemont: 1♂[Δ®], 7.VI.1967 (CNC). Ste Anne de Bellevue: 1ex♂, 28.V.1931, 1ex♂, 29.V.1931, 1♂, 1♀, 2ex♂, 4.VI.1931, 1♀, 7.VII.1931 (LEM); 1♂, 21.V.1938, F.O. Morrison (LEM); 2♂♂, 1♀, 14.VI.

1938, 1♀, 15.VI.1938, 1ex♂, 31.VIII.1938, 1♂, 2.IX.1938, 1ex♂, 5.VIII.1939, 1♂, 14.VIII.1947, 1♂, 31.V.1948, 1♂, 2.VI.1948, 1♂, 1♀, 15.VI.1949, 1♂, 11.VI.1953 (LEM); 1ex♂, 29.VI.1952, G.A. Moore (LEM); 1♂, 30.VII.1952 (LEM); 1♂, 9.VIII.1952, 1♀, 8.VIII.1953, G.A. Moore (LEM); 1♀, 7.VIII. 1962, 1♂, 1♀, 30.VIII.1962, 1♀, 24.VI.1963, 1♀, 25.VI.1963, 1♀, 23.VII.1963, V.R. Vickery (LEM); 1♂, 31.V.1964, 1♂, 2.VI.1964, G. Jamieson (LEM); 1♀, 11.VI.1964, A. Campbell (LEM); 2♂♂, 11.VI.1964, 1♂, 14.V.1964, 1♂, 27.V.1965, 1♂, 30.V.1965, 1♂, 3.VI.1965, 2♀♀, 15.VI.1965, G. Jamieson (LEM); 1♂, 25.VI.1965, D.E. Johnstone (LEM); 1♂, 1.VI. 1966, W. Boyle (LEM); 1ex♂, 6.VI.1966, R. Lalonde (LEM); 1♂, 12.VI.1966, Wayne Boyle (LEM); 2♂♂, 2♀♀, 16.VII.1967, R. Lalonde (LEM); 1♀, 22.VII.1967, W. Boyle (LEM); 2♂♂, 1♀, 25.VIII.1967, R. Lalonde (LEM); 2♀♀, 8.VI.1973, C. Boyle & G. Ladd (LEM); 2♂♂, 1♀, 11.VI.1973, C. Boyle, G. Ladd & J. Hodsman (LEM); 2♀♀, 9.VII.1975, A.C. Sheppard (LEM); 1♂, 5.IX.1975, J.A. Garland (LEM); 1♀, 6.VI.1977, A.T. Finnamore (LEM); 2♂♂, 1♀, 23.VIII.1977, 1♀, 26.VIII.1977, D.N. Duffy (LEM); 1♀, 10.VIII.1978, B. Bendell, corn field (LEM); 1♂, 16.VIII.1979, D.N. Duffy (LEM); at lt, 1♀, 25.VIII. 1979, J.A. Garland (LEM). St Aubert, L'Islet: 1♀, em 17. VII.1961, J.P. Laplante (CRFL). St Barthelemy: 1♀Δ©, 8.VII. 1974, P.P. Harper (UdeM). Ste Catherine, Portneuf: 1ex♂★, 6.VIII.1957, J.P. Laplante (CNC). Ste Clotilde: 1♂, 26.VII. 1965, 1♀, 6.VI.1968, 1♀, 12.VI.1968, 1♀, 14.VII.1968, J.

Lafrance (SJRS). Ste Foy: 1♀, 22.VIII.1961, J.P. Laplante, Tilia americana dead (CRFL); 1♀, 20.VI.1963, L.J. Jobin (CSQ); 1♀, 12.VIII.1967, G. Gagné (UL); 1♂, 19.VII.1974, J.P. Laplante (CRFL). St Eugène: 1♀Δ©, 4.VII.1944, A. Robert (UdeM). St Henri, Lévis: 1♀, 17.IX.1971, J.P. Laplante (CRFL). St Hilaire: 1ex, 27.VI.1916 (CU Pechuman in litt. 1980). St Martin, Cté Beauce: 1♀, 21.VI.1976, orme (CSQ). St Martin J(unctio)n: 3♂♂, 24.VI.1933, A.F. Winn (LEM); 1♂, 4.IX.1926 (LEM). St Martin de Laval: 1♀, 18.VII.19__, Jos. Duncan (CSQ). St Pie, Bagot: 1♂, 10.VI. 1975, R. Loiselle (UQC). St Thomas de Joliette: 1♀, 2.VIII. 1944, 1♀, 17.VI.1946, 1♀, 30.VI.1946, 1♀, 1.VII.1946, G. Rioux (CSQ). Seven Isles: 1♀★, 20.VII.1924, F.W. Waugh (CNC). Shawbridge: 1♀, 9.VII.1927, 1♀, 14.VII.1929, 1♀, 3.VIII.1929, A.F. Winn (LEM); 1♂, 4♀♀, 14.VI.1975, 1♀, 22.VI.1980, A.C. Sheppard (LEM). Shawinigan Falls, 4 mi S: 1ex●, 15.VI.1963, F. Drinkwater (LEM). Tadoussac: 1♂, 1♀, 1ex●, 9.VIII.1919, 1♂, 2_.VIII.1931, 1♂, 1♀, 20.VII.1932, 1♀, 2_.VII.1932, 1♀, 1.VIII.1932, 1♂, 1♀, 18.VIII.1932, A.F. Winn (LEM). Vaudreuil: 1♂, 23.VI.1964, D. Johnstone (LEM).

NEW BRUNSWICK Ashton: at 1t, 1♂, 2.VII.1968 (NDFRC). Bathurst: 1♂★, 1♀★, 26.VI.1948 (CNC). Canterbury: 1♀★, 3.VI.1948, A.W. Dow (CNC). Chipman: at 1t, 1♀, 2.VIII. 1968 (NDFRC). Fredericton: 1♂★, 192_ (CNC); 1♂★, VI.1931,

R.P. Gorham (CNC); 1♀★, 3.VII.1934, 1♀★, 4.VII.1934, C.E. Atwood (ROM); 2♂♂★, 3♀♀★, 10.VII.1948, 1♂★, 12.VII. 1948, N.R. Brown (CNC); 1ex♂★, 12.VI.1949, F.V. Royer (CNC); 1♂★, 15.VII.1949, R. Clark (CNC); 1♀★, 16.VIII. 1951, T(rembling) Aspen, J.M. McLeod (CNC); 1♀★, 25.VII. 1957, N.R. Brown (CNC); 1♂★, 16.VIII.1959, 1♂★, 17.VIII. 1959, N.R. Brown (MFRC); at 1t, 1♂★, 29.VIII.1959, R.C. Clark (MFRC); at 1t, 1♂★, 29.VIII.1959, R.C. Clark (CNC). Fundy: at 1t, 1♂, 26.VIII.1968 (NDFRC). Green River: 1♀★, 24.VI.1947, C.S. Miller (CNC); 2♂♂★, 28.VI.1948, W. Kelly (CNC); 1♀★, 2.VII.1948, R.H. Leech (CNC); at 1t, 1♂★, 28.VII. 1949, D.O. Greenbank (CNC). Jaquet Head, Restigouche: Field Station, 1ex♂, 17.VIII.1956, R.D.G. (LEM); 1♀★®, 1.IX. 1956, B. Hodgson (CNC). Kouchibougouac N(at'l) P(k): 1♂, 1♀, 4.VII.1978, D.B. Lyons (CNC). Nictau: 1♂★, 27.VI.1956, D.G. Bryant (CNC). Oak Bay: at 1t, 1♀, 16.VII.1968 (NDFRC). Petitcodiac: 1♀, 25.VI.1966, David R. Smith (USNM). St Andrews: 1ex♂★, 14.VIII.1947, N.R. Brown (CNC); 1♀★, 3. VIII.1957, G.E. Shewell (CNC). St John: 1♀, 1ex♂, 1932, F. Lord (UG). St Quentin: at 1t, 2♂♂, 25.VII.1968 (NDFRC). Sussex: at 1t, 1♂, 1♀, 25.VIII.1968 (NDFRC).

PRINCE EDWARD ISLAND Brackley Beach, Can(adian) Nat(ional) Park: 1♂★, 28.VII.1940, G.S. Walley (CNC). Charlottetown: 1♀, VII.1949, E.L.D. (LEM); 1♂, 6.VII.1957, A.W. Douglas (LEM); 2♀♀, VII.1957, 1♀, 21.VII.1959, F.M. Cannon (CARS);

2♂♂, 23.VI.1978, 1♂, 25.VI.1978, 1♀, 28.VI.1978, L.S. Thompson (CARS); 1♀, 1979, F. Huston (CARS). Dalvay House, Can(adian) Nat(ional) Park: 1♂★, 19.VII.1940, 2♀♀★, 21.VII.1940, G.S. Walley (CNC). Green Gables, Cavendish Beach: 1♀, 22.VII.1967, D.M. Wood (CNC). Hunter River: 1♂★, 1♀★, 14.VII.1947, R. Hazen Wigmore (CNC). Stanhope: 1♀★, 3.VII.1947, R. Hazen Wigmore (CNC); 1♀, 18.VII.1964, G. Jamieson (LEM). York: 1♀, 9.VIII.1956, D.C. Read (CARS).

NOVA SCOTIA Armdale: 1♂★, 21.VI.1961, D.C. Ferguson (USNM); 1♂, 23.VI.1961, 2♂♂, 24.VI.1961, 1♂, 1♀, 28.VI.1961, 2♂♂, 1♀, 1ex●, 2.VII.1961, D.C. Ferguson (NSM). Argyle, Yarmouth Co: 1♀★, 5.VIII.1957, D.C. Ferguson (USNM). Aylesford, Kings Co: 1♀, 18.VI.1963, 1♀, 20.VI.1963, P.M. Taschereau (NSM). Baddeck: 1♂★, 2.VII.1936, T.N. Freeman (CNC). Boulderwood, Halifax: 1♂★, 11.VIII.1959, D.C. Ferguson (USNM). Bridgewater, Lunenburg Co: 1♂, 30.V.1979, Barry Wright (NSM). Centreville, Shelburne Co: 1♀, 19.IX.1977, Barry Wright (NSM). Chester: 1♂, 26.VI.1968, 1♂, 16.VII.1969, Barry Wright (NSM). Cheticamp, C(ape) B(reton) I(sland): 1♀, VI-VII.1917, F. Johansen (CNC). Dean: in car, 1♂★, 27.VI.1948, D.R. Redmond (CNC). Durham: 3♂♂, 1♀, 17.VI.1975, A.T. Finnamore (LEM). Economy P(oin)t, Colchester Co: 1♂★, 26.VI.1957, D.C. Ferguson (USNM). Fairmont R(oa)d, Antigo(nish) Co: 1♂, 3.VII.1950, Ralph J. Day (NSM); 1♀, 26.VI.1952, D.C.

Ferguson (NSM). Gaspero R(oa)d, Kings Co: 1♂, 1♀, 9.VII. 1948, Ralph J. Day (NSM). Halifax: 1♀, 28.VI.1962, P.M. Taschereau (NSM). Isle Haute, Bay of Fundy: 1♂★, 5.VI.1953, D.C. Ferguson (USNM). Kentville: 1♂★, 1♀★, 24.VI.1923, 1♂★, 1♀★, 8.VII.1923, R.P. Gorham (CNC); 1PT♀▲© ★, 8.VII. 1923, R.P. Gorham (CNC 3308); 1♂★, 1♀★, 18.VII.1924, N.A. Patterson (CNC); 1♀, 30.VI.1947, V.R. V(ickery) (LEM); 1ex♦, 20.VII.1950, R.L.H. (LEM). Kings Co: (unspecified locality), 1♂, 1♀, 9.VII.1948, 1♂, 1♀, 10.VII.1948, 1♀, 3.VIII.1948, Ralph J. Day (NSM); nr Aylesford, 1♀★, 20.VI. 1963, D.C. Ferguson, cat-tail swamp (USNM). Lake Kejimukujik, Queen's Co: 1♀★, 21.VII.1957, 1♂★, 22.VIII.1957, D.C. Ferguson (USNM). Liverpool: 1♂★, 22.VI.1957, D. Dwyer (CNC). Lockeport: 1♀★, 25.VII.1958, J.R. Vockeroth (CNC). Pictou: 1ex♦ ★, 22.VII.1914, E.M. W(alker) (ROM). Portapique: 2♂♂, 1♀, 16.VI.1975, A.T. Finnamore (LEM). Porter's P(oin)t, Kings Co: 1♂, 1ex♦, 19.VI.1948, 2♂♂, 2♀♀, 15.VII.1948, 1♂, 1.VIII.1948, K.D. Archibald (NSM). Sable Island, Met Station: 1♀, 11-14.VIII.1978, B. Wright & D.C. Ferguson (NSM). S(outh) Ohio, Yarmouth Co: 1♀, 22.VIII.1963, V.R. Vickery (LEM). Springhill: 1♀, 30.VII.1962, V.R. Vickery (LEM). Truro: 1ex, 1.VII.1913, 1ex, 2.VII.1913, 1ex, 13.VII.1913, 1ex, 4.VIII.1913, R. Matheson (CU Pechuman in litt. 1980). Wh(i)t(e) R(oc)k, Kings Co: 1♀, 19.VII.1948, K.D. Archibald (NSM). Willowdale: at 1t, 1♀★, 26.VIII.1947, D.R. Redmond (CNC); 1♂★, 26.VIII.1947, H.G. MacGillivray (CNC); 1♂★, 27. VIII.1947, A.G. Davidson (CNC); 1♀★, 3.VII.1949, H.G. Mac-

Gillivray (CNC). Wolfville: 1ex♂, 31.VIII.1938, A.M.P. (LEM); at 1t, 1♂★, 31.VII.1957, 1♂★, 1.VIII.1957, 2♂♂★, 25.VIII.1957, 1♀★, 26.VIII.1957, H. Stultz (KARS). Woodville: 1ex♂, 4.VII.1954, R.L. Horsburgh (LEM). Wundham: 1♀, 3.VIII.1962, V.R. Vickery (LEM).

NEWFOUNDLAND Bishops Falls: 1♀, 11.VI.1979, 1♂, 19.VI. 1979, 1♀, 27.VII.1979, E. John (SJARS). Codroy Pond: 1♂, 30.VI.1966, David R. Smith (USNM). Co(r)ner Brook: 1♂, 5.VII.1967, field (NDFRC); 1♀, 10.VII.1969, J. Phipps (MU). Cow Head: 1♀, 7.VIII.1949, H. Krogerus (ZMUH). Doyles, Codroy Valley: 1♀★, 9.VII.1959, 1♀★, 12.VII.1959, D.C. Ferguson (USNM). Gros Morne Pk: nr Interpretive Centre, 1♂, 19.VI.1979, Larson & Swales (MU). Hwy 430, junction with Upper Humber River: 2♂♂, 12.VI.1979, Larson & Swales (MU). North Branch: 1♀, 27.VI.1966, David R. Smith (USNM). Terra Nova N(a)t'l Pk, Salton B(roo)k: 1♂, 21.VI.1978 (MU). Tompkins: 1♂, 22.VI.1975, 1♂, 29.VI.1977, 1♀, 14.VIII.1977, Ray F. Morris (SJARS). St Georges: 1♀, 29.VI.1973, Ray F. Morris (SJARS).

Chrysopa pleuralis

BRITISH COLUMBIA Ainsworth: 1♀, 11.VII.1903, R.P. Currie (USNM). Bootahnie Valley: 1♀★®, 1.VIII.1925, A.P. Macdougall (ROM). Clinton: 1♀★, 14.VI.1938, G.S. Walley (CNC). Hedley: 1♂, 20.VII.1923, 1♂, 24.VII.1923, C.B. Garrett (CNC). Lillooet: 4♀♀★, 1♀★®, 1.VII.1925, A.P. Macdougall (ROM). Midday Val(ley), Merritt: 1♀, 2.VII.1925, W. Mathers, Pinus ponderosa (CNC). Nicola: 1♀, 1ex♂△, 10.VII.1932, 1♀, 13. VII.1932, G.J. Spencer (SEM).

ALBERTA Banff: 1♀△®★, Sanson (CNC); 1ex♂△, 5.VII.1922, C.B.D. Garrett (USNM); 1♂, 1ex♂, 5.VII.1922, 1♂★, 1♀★®, 23.VII.1922, 6-7000 ft, 1♀★®, 14.VIII.1922, C.B.D. Garrett (CNC). Waterton: 1♀▲, 1ex♂, 24.VI.1923, H.L. Seamans (CNC); Waterton Lakes, 1♀, 25.VI.1923, J. McDunnough (CNC).

Chrysopa chi

ALASKA Big Delta: 1♂★®, 24.VI.1951, W.R.M. Mason (CNC). Fairbanks: malaise trap, 1♂, 26.VI-1.VII.1979, B. Wright, powerline cut (NSM). Richardson Hwy, mi 290: 1♂★®, 1♀★®, 19.VI.1951, Mason & McGillis (CNC).

YUKON TERRITORY Dawson: 1♂★®, 21.VI.1949, 1♂★®, 22.VI. 1949, 11♂♂★®, 9♀♀★®, 6.VII.1949, 1♂★®, 1♀★®, 13.VII.1949, W.W. Judd (CNC).

NORTHWEST TERRITORY Fort Smith: 1♀★®, 16.VI.1950, J.B. Wallis (CNC); 1♂★®, 1♀★®, 27.VI.1950, W.G. Helps (CNC); 2♀♀★®, 28.VI.1950, J.B. Wallis (CNC). Norman Wells: 1♂★®, 1♀★®, 23.VII.1949, W.R.M. Mason (CNC).

BRITISH COLUMBIA Agassiz: 1♂★®, 1♀★®, 14.V.1926, R. Glendenning (CNC). Barriere: 1♀+ ★, em 4.IV.1947, FIS 1946 46-823D, Pseudotsuga taxifolia (CNC). Bear Lake: 1♂, 20. VII.1903, A.N. Caudell (USNM); 4♀♀, 2ex♦, 20.VII.1903, R.P. Currie (USNM). Burnaby: 2♂♂, 1♀, 1.VII.1963, D.J. Farish (SEM). Carbonate, Columbia River: 2600 ft, 1ex, 7-12.VII. 1908, J.C. Bradley (CU Pechuman in litt. 1980). Clinton: 1 , 15.VI.1938, G.S. Walley (CNC). Coquitlam: 1 , 8.VI. 1974, D. Wood (SEM). Downie Cr(eek), 10 mi N: 1 , 10.VI. 1961, G.G.E. Scudder (SEM). Gagnon R(oa)d, 6 mi W Terrace: 220 ft, 1♂★, 2♀♀★, 8.VI.1960, B. Heming, in clearing nr river (CNC); 220 ft, 1♂★, 1♀★, 20.VI.1960, B. Heming, on Thimbleberry (CNC); 220 ft, 1♀★® ★, 20.VI.1960, B. Heming (CNC). Haney, Univ(ersity) of B(ritish) C(olumbia) Forest: 1♀, 8.VII.1969 (ROM 690183). Hazelton: 1♀★®, 26.VII.1960, C.M. Barbeau (CNC); 1♀+ ★® ★, em 4.IV.1947, FIS 1946 46-809D, Tsuga heterophylla (CNC); 1♂+ ★, em 4.IV.1947, FIS

1946 46-662B, Pinus contorta (CNC). Kaslo: 1♀, 9.VI.(1903), 1♀, 18.VI.(1903), R.P. Currie (USNM); 1♂, 29.VI.(1903) (USNM). Kamloops: 1♂, 1♀[Δ©], 1.VI.1937, 1♂, 8.VI.1941, 1♂, 2♀♀, 13.VI.1943, G.J. Spencer (SEM). Kleanza Creek, 14 mi E Terrace: 250 ft, 1♀[★®], 17.VI.1960, R. Pilfrey (CNC). Lakelse L(ake) Bog, nr Terrace: 1♀[★®], 14.VI.1960, J.G. Chillcott, wet grassy marsh (CNC). Liard Hot Spring, mi 496 Alaska Hwy: 1500 ft, 2♂♂[★®], 2♀♀[★®], 9-10.VII.1959, R.E. Leech (CNC). MacGillivray Creek Game Reserve, nr Chilliwack: 1♂[★®], 14.VII.1953, G.J. Spencer (CNC). Milner: 1♀, 25.V.1930, K. Graham (MCZ). Mission City: 1♂[★®], 28. VI.1953, W.R.M. Mason (CNC). N(ew)West(minster): 1♀, 23. V.1929, G. Beall (UWO). Nicola: 1♂[★®], 31.V.1922, P.N. Vroom (CNC). Pouce Coupe: 1♀[★], 14.VI.1961, A.R. Brooks (CNC). Quesnel: 1♀, 29.VI.1948, 1♀[Δ©], 11.VII.1948, H.R. MacCarthy (SEM); 1♀, 25.VII.1948, G.J. Spencer, creek bottom (SEM). Rolla: 1♂[▲ ★®], 11.VII.1927, P.N. Vroom (CNC). Sicamous: 1ex♂[★®], 25.V.1918, W. Downes (CNC). Slocan Park: 117°39' 49°32', 1♂, 6.VI.1967, J. Shepard (SEM). Soda Creek: 1♀, 29.VII.1948, G.J. Spencer (SEM). Terrace: 220 ft, 1♀[★], 8.VI.1960, B. Heming (CNC); 10 mi W, 1♂[★], 9.VI.1960, B.S. Heming (CNC); 1♀[★], 27.VII.1960, W.R. Richards (CNC). Trinity Valley: 1♂, 11.VI.1947, D. Evans (SEM). U(niversity of) B(ritish) C(olumbia): 1♂, 13.VII.1974, M. Isman (SEM). Vancouver: 1♂[Δ], 1♀[Δ], 1ex♂[Δ©], Russell (MCZ Banks Collection); 1♂[Δ], 25.V.1930, N. Geech (SEM). Vancouver Island: (unspecified locality), 1♂[★®], 2.VI.1888, G.W. Taylor (CNC).

Vernon: 1♂★®, 5.VI.1923, D.G. Gillespie (CNC); 1♀, 4.VI. 1948, D. Evans (SEM). W(est) Crescent Valley, 49°24' 117°39', 3000 ft: 1♀, 5.VI.1967, 1♂, 1♀, 12.VI.1967, J. Shepard (SEM).

ALBERTA Banff: 1ex, 18.VI.1925, O. Bryant (CU Pechuman in litt. 1980). Beaverlodge: 1♂△, 21.VI.1931, E.H. Strickland (UAE). Bellevue: 1♀, 14.VI.1980, J.G. Fisher (BCPM). Calgary: 1♂, 24.V.1923, G. Salt (UAE). C(lares)holm: 1♀, VIII.1945, O.S. Hillerud (UAE). Cooking L(ake): 1ex♦ △©, 13.VI.1937, F.O. Morrison (UAE). Delburne: 1♂, 11.VII.1959, D.H. Pengelly (UG). Demmitt: 1♂★, 23.VI.1961, A.R. Brooks (CNC). Edmonton: 1♂★®, 1♀▲ ★®, 30.VI.1923, E.H. Strickland (CNC); 2♂♂△©, 1ex♦ △©, 25.IX.1923, 1♂△©, 13.VII.1929, 1♂, 22.VI.1936, 1♀, 22.VIII.1945, E.H. Strickland (UAE). Fawcett: 1♀, 10.VI.1934, E.H. Strickland (UAE). Grande Prairie: 1♀★, 11.VI.1961, A.R. Brooks (CNC). Gull Lake: 1♀△©, 4.VII.1932, E.H. Strickland (UAE). High Prairie: 2♀★®, 16.VII.1961, 1♂★, 25.VII.1961, A.R. Brooks (CNC). Hines Creek: 1ex♦ ★, 16.VI.1961, A.R. Brooks (CNC). Kananaskis: 1♂★, 8.VI.1949, FIS 1949, Pine pl(antation) (CNC). Lac la Biche: 1♀★, 25.VI.1961, A.R. Brooks (CNC). Lethbridge: 1♂★®, 25.V.1921, E.H. Strickland (CNC). Rycroft: 2♀♀★, 21.VI.1961, A.R. Brooks (CNC). Seebe: 1♂△® ★, 28.VI.1948, FIS (CNC); 1♂★, 28.V.1949, J.A. Cook (CNC). Wabamun: 1♀△, 10.VI.1931, 1♀, 13.VI.1936, 1♂, 2♀♀, (27).VI.1936, E.H. Strickland (UAE); 1♂△, 1♀, 1ex♦, 8.VII.1936, F.O. Morrison (UAE). Waterton

Lakes Nat'l Pk: 4200 ft at park gate, 1♀, 8.VII.1967, David J. & M.A. Larson (WLNP); 1♀, 7-12.VII.1980, H.J. Teskey (CNC). Wetaskiwin: 2♀♀, 21.VI.1936, F.O. Morrison (UAE).

SASKATCHEWAN Big River: 1♀, 8.VIII.1973, B.A. Hannigan (UG). Indian Head: 1♂, 12.VI.1929, Kenneth Stewart (IHTN). Kenosee: 2♂♂★®, 7.VI.1958, 2♂♂★®, 2♀♀★®, 15.VI.1958, A.R. Brooks (CNC); 1♂★®, 19.VII.1958, A. & J. Brooks (CNC). La Ronge: 1♂, 5.VII.1973, R. Hooper (SMNH). Love: 1ex♁, 7.VI.1949, 1♂, 8.VI.1949, M.E. Taylor (USS). Milliken Lake, NW cor(ner): 1ex♁, 5.VII.1978, 1♀, 7.VII.1978, R. Hooper (SMNH). Nesslin L(ake): 1♂, 1ex♁, 15.VII.1950, R.W. (USS). Prince Albert: 1♀★®, 23.VI.1913, E.M. W(alker) (ROM); 1♀★®, 23.VII.1959, A. & J. Brooks (CNC). Saskatoon: 1♂★®, 24.V. 1923, N.J. Atkinson (CNC).

MANITOBA Aweme: 1♀★®, 30.VII.1913, E. Criddle (CNC); 1♀★®, 24.VII.1914, N. Criddle (CNC); 1ex♁ ★®, 27.VII.1920, H.A. Robertson (CNC). Carberry: 1♂★®, 15.VI.1953, Brooks & Kelton (CNC). Cedar Lake: 2♂♂Δ©, 1♀Δ©, 20-30.VI.1936, 1♂Δ©, 1♀Δ©, 1-15.VII.1936, F.M. Carpenter & C.T. Parsons (MCZ). Dauphin: 2♂♂Δ©, 22.VI, Walker (MCZ Banks Collection); 1♂★®, 22.VI, 1ex♁ ★®, 23.VI, Walker (ROM). D(uck) M(ountain) F(orest) R(eserve): 1♀★, 7.VII.1950, FIS W-1687, W(hite) Poplar (CNC). Falcon Lake Campground, Whiteshell Prov Pk:

uvl, 1♂, 10.VII.1970 (ROM 700382). Forrest, 2 mi N: 1♀★®, 19.VII.1958, R.L. Hurley (CNC). Glenlea Res(earch) St(atio)n: at lt, 6♂♂, 2♀♀, 21.V.1980, 1♀, 20.VI.1980, 1♀, 23.VI.1980, 1♂, 1♀, 7.VII.1980, P.W. Arntfield (LEM). Lockport: 1♀, 12.VII.1976, J.S. Lee (UMW). Ninette: 1♂★®, 30.V.1953, 1♀★®, 7.VI.1958, R.B. Madge (CNC). Red Rock: 1ex♂★, 20.VII.1948, A.W. Askey (CNC). Rennie: 1ex♂★, 14.VI.1965, life-table plot (CNC). R(iding) M(ountain) N(ational) P(ark): 1ex♂★, 22.VII.1950, FIS W-2249, White Spruce (CNC). Shilo, 5 mi SW: 1♀★®, 28.VI.1958, R.L. Hurley (CNC); 1♀★®, 11.VII.1958, J.G. Chillcott (CNC); 1♀★, 11.VII.1958, R.L. Hurley, floodplain community nr Tamarack bog (CNC). Treesbank: 1♀Δ©, 19.VII.1910, J.B. Wallis (MCZ Banks Collection). University of Manitoba: at lt, 1♀, 21-22.V.1980, 5♂♂, 4♀♀, 26.V.1980, 3♂♂, 2♀♀, 28.V.1980, P.W. Arntfield (LEM). Winnipeg: 1♀Δ©, 10.VI. 1910, J.B. Wallis (MCZ Banks Collection); 1♂Δ©★®, 10.VI. 1910, J.B. Wallis (CNC); 1ex♂Δ★, 16.VI.1944, FIS 84, Oak (CNC).

ONTARIO Algoma: 2♀♀★, 9.VII.1950, J. Bushell (CNC). Algonquin Park: Head L(ake), 1♀★®, 8.VII.1935, F.P. Ide (ROM); 2♂♂, 17.VI.1958, T.H. Scholten (UG); N Carson L(ake), 1♀, 13.VI.1963, D. Barr (ROM); 1♀, 1ex♂, 4.VII.1978, D. McCorquodale (APM). Bainsville: 1ex♂, 9.VI.1946, R.W. Fisher (LEM). Belwood: 1♂, 1♀, 14.VII.1972, D.H. Pengelly (UG). Biscotasing: 1♀▲★®, 27.VI.1931, Karl Schedl (CNC).

Blackburn: 1♀, 7.VII.1939, E.G. Lester (UG). Britannia: 1♂★®, 22.V.1927, G.S. Walley (CNC). Brooklin: 1♂, 6.VII. 1979, David Lewis (UG). Burke Falls: 2♀♀★®, 13.VII.1926, 1♀★®, 15.VII.1926, F.P. Ide (CNC). Calabogie, 2 mi SE: Cedar Point Lodge, uv1, 1♀, 5.VII.1968, E. Fuller & R. Jaagumagi (ROM 780330). Cochrane: 1♀★, 5.VII.1951, FIS 1951 1794-01-3, Spruce (CNC). Cumberland: 1♀, 14.VII.1969, P.W. Arntfield (UG). Favourable L(ake): 1♂★®, 1♀★®, 20.VI. 1938, 1♀★®, 21.VI.1938, G.M. Neal (ROM). Finland: 1♀★, 4. VII.1960, S.M. Clark (CNC). Go Home Bay: 1♀★®, 24.VI.1932, G.S. Walley (CNC). Guelph: 1♂, 22.VI.1956, D.H. Pengelly (UG); 1♂, 25.V.1975, J.M. Cumming (UG). Harris Hill: 1♂△, 24.VI.1960, S.M. Clark (CNC). Hornings Mills: 1♀★®, 15.VI. 1928, W.E. Ricker (ROM); 1♂★®, 2.VII.1928, F.P. Ide (ROM). Islington: 1ex●, 7.VI (MCZ Parish Collection). Kendal: 1♂★®, 21.VI.1955, 1♂, 29.VI.1955, G.B. Wiggins (ROM); 1♀, 5.VI.1962, D. Barr, hardwood forest (ROM); 1♂, 6.VII.1967, Riotte & Kohalmi (ROM). Kenora: 1♀★, 13.VI.1960, Kelton & Whitney (CNC). Lake Nipissing: 1♀★®, 11.VI.1929, F.P. Ide (ROM). L(ake) Opeongo, Algonquin Pk: 1ex●, 12.VI.1940, 1♀, 17.VI.1940, D.M. Davies (MCMU). Leskard: 2♀♀★®, 20.VI.1955, G.B. Wiggins (ROM). Marmora: 1♂, 9.VI.1957, 1♂, 10.VI.1957, 1♀, 20.VI.1957, 1♀, 29.VI.1957, K.D. Southern (UG). Merivale: 1♂★®, 30.V.1952, R.S. Bigelow (CNC). Miner's Bay: 1♂★®, 26. V.1931, G.S. Walley (CNC). Minnitaki: 1♂★, 13.VI.1960, Kelton & Whitney (CNC). Nepigon: 2♂♂★®, 18.VI, 1 , 19.VI (ROM

Walker Collection). Nestor Falls: 1ex♣ ★, 7-8.VIII.1960, Kelton & Whitney (CNC). Ogoki: 1♂★®, 7.VI.1952, 1♀★®, 20.VI.1952, J.B. Wallis (CNC). One Sided Lake: 1♂★® ★, 27.VI.1960, Kelton & Whitney (CNC); 1♀△, 3.VII.1960, S.M. Clark (CNC); Larsson's Camp, uv1, 1♂, 19.VII.1962, Larsson's Camp, 1♀, 23.VII.1962, J.C.E. Riotte (ROM). Orono: 1♀, 20. VI.1952, G.B. Wiggins (ROM). Ottawa: 1♀★®, 4.VI.1908, J.A. Letourneau (CNC); 1♀★®, 22.V.1920, J. McDunnough (CNC); 1♀★®, 27.V.1921, A.W. Richardson (CNC); 1♂★®, 2.VI.1955, G.G. Lewis (CNC); 1♀, 21.V.1962, B.S. Heming (UG). Prescott Co, Plantagenet: 1♂, 15.VII.1978, E. Fuller & R. Jaagumagi, roadside plants (ROM 780360a). Quetico Prov Pk, Rainy R(iver) District: 5 mi E campground on Rt 11, 1♂, 10.VI.1971, grassy road edge (ROM 710382). Rushing R(iver) Prov Pk, Kenora District: 1♀, 14.VI.1971, wood edge (ROM 710407). Sand Lake: 1♂★®, 30.VI.1926, F.P. Ide (CNC). Smoky Falls, Mattagami R(iver): 1♂★®, 13.VI.1934, 1♂★®, 20.VI.1934, 1♀★®, 4.VII. 1934, 1♂★®, 1♀★®, 6.VII.1934, 1♀★®, 7.VII.1934, 1♂★®, 12. VII.1934, G.S. Walley (CNC). S(outh) Neebing Tp: 1♀, 29.VI. 1962, J.C.E. Riotte (ROM); at lt, 1♂, 1.VII.1962, W. Hartley & J.C.E. Riotte (ROM). Thunder Bay: 1♀, 14.VII.1970, K.J.G. Deacon (UG). Timagami: 1♀★®, 3.VI.1932, A.W.A. Brown (ROM). Toronto: at lt, 1♂, 23.VI.1962, J.C.E. Riotte (ROM). Vermilion Bay: 1♀★, 10-11.VI.1960, Kelton & Whitney (CNC). Waubamic: 1ex, 24.VI.1915, H.S. Parish (CU Pechuman *in litt.* 1980).

QUEBEC Avoca, Rouge River: 1♀, 14.VI.1966, V.R. Vickery (LEM). Aylmer: 1♀★®, 15.VI.1924, C.H. Curran (CNC). Baie James: 1♀, 3.VII.1974, J.L. Frechette (UdeM). Berthierville: 1♀, 30.VII.1940, 1♀Δ©, 3.VII.1948, 1♀Δ©, 26.V.1949, 1♀Δ©, 23.VI.1949, 1♀Δ, 2.VII.1950, 1♂Δ, 16.VII.1950, 1♀Δ, 2.VIII. 1950, A. Robert (UdeM). Bic: 1♀Δ, 9.VII.1928, J. Rousseau (UdeM). Cap Rouge: 1♂★®, 9.VII.1953, O. Peck (CNC). Cascade: 1ex♂ ★®, 13.VI.1920, J. McDunnough (CNC). Cascapedia: 1♂★®, 12.VII.1932, M.L. Prebble (CNC); 1♀★®, 4.VII.1933, C.C. Smith (CNC). Chelsea: 1♂★®, 25.VI.1912, Arthur Gibson (CNC). Chicoutimi: Nord, 1♀, 24.VI.1975, L. Choquette (UQC); 1♀, 5.VII.1976, A. Francoeur (UQC). Covey Hill: 1♀★®, 25.VI. 1924, 1♂★®, 24.VI.1927, G.S. Walley (CNC). F(or)t Coulonge: 1♀★®, 7.VII.1917, J.I. Beaulne (CNC). Foster, Brome Co: 1♀, 22.VII.1975, R. Loiselle (UQC). Gaspé Co: 1♀★®, 22.VII.1934, E.B. Watson (CNC). Georgeville: 1♂★®, 23.VI.1936, 1♂★®, 27. VI.1936, G.S. Walley (CNC). Hudson Heights: 1♀, 24-30.VII. 1956, Lindberg (ZMUH). Hull: 1ex, 23.VI.1916, W.T.M. Forbes (CU Pechuman in litt 1980). Ile Perrot: 1♂, 19.VIII.1978, J.A. Garland (LEM); 7♂♂, 1♀, 29.VI.1980, 3♂♂, 4♀♀, 6.VII. 1980, J.A. Garland, Alder thicket (LEM). Kazabazua: 1♀★®, 8.VI.1927, F.P. Ide (CNC). King Mt: 1♀, 3.VI.1970, P.W. Arntfield (CNC); at summit, 1♂, 26.V.1975, H.C.W. Walther (CNC). Kingsmere: 1♂★®, 1.VII.1919, R.N. Chrystal (CNC). Knowlton: 1♀★®, 14.VI.1928, J.A. Adams (CNC); 1♂★®, 22.VI. 1928, G.H. Fisk (CNC). Lac Cameron, Labelle Co: 1 km N, 1♀,

10.VI.1977, D.N. Duffy (LEM). Lac Mondor, Ste Flore: 1♂★®, 2♀♀★®, 10.VI.1951, 1♀★®, 14.VI.1951, 1♂★®, 18.VI. 1951, 1♂★®, 1♀★®, 25.VI.1951, 1♂★®, 1♀★®, 8.VII.1951, 1♀★®, 10.VII.1951, 1♀★®, 14.VII.1951, 1♀★®, 21.VII.1951, 1♂★®, 25.VII.1951, 1♂★®, 1♀★®, 31.VII.1951, 1♀★®, 3.VIII. 1951, 1♀★®, 21.VIII.1951, 1♀★®, 25.VIII.1951, E.G. Munroe (CNC). Lacoste: 1♀★®, 6.VI.1941, G.S. Walley (CNC). Lac St Louis: Station 7, 1♂△©, 16.VI.1972, F.M. Pépin (UdeM). Laniel: 1♀★®, 27.VI.1931, H.S. Fleming (CNC); 1♂★, 30.VI. 1948, J.B. Thomas (CNC). Lanoraie: 1♀★®, 9.VI.1915, 1♀★®, 20.VI.1915, J.I. Beaulne (CNC); 1ex♦, 3.___, A.F. Winn (LEM); 1♀, 1.VII.1952, G.A. Moore (LEM); 1♂, 1♀, 29.V.1975, 2♀♀, 2.VII.1975, J.A. Garland (LEM); 1♂, 26.V.1977, A.T. Finnamore (LEM); 1♂, 26.V.1977, 1♀, 7.VII.1977, D.N. Duffy (LEM). La Trappe: 1♂△©, 10.VI.1948, J. Ouellet (UdeM). Laval: 1♀, 17.VI.1975, A.C. Sheppard (LEM). Meach Lake: 1♂★®, 2♀♀★®, 21.VI.1916, Arthur Gibson (CNC). Megantic: 2ex, 6.VII.1916, W.T.M. Forbes (CU Pechuman in litt. 1980). Montfort, Laurentian Mts: 2ex, 30.VI.1916 (CU Pechuman in litt. 1980). Montreal: 1ex♦, 26.V.1918, 1♂, 16.VI.1932, A.F. Winn (LEM); 1♂, 15.VI.1933, E. Munroe (LEM). Montigny: 1♂ , 9.VI.1941, G.S. Walley (CNC). M(on)t Albert: 1♀★®, 20.VI.1954, G.P. Holland (CNC). M(on)t St Hilaire: malaise trap, 2♂♂, 12-16.VIII.1977, A.T. Finnamore (LEM). Morgan Woods: 1♂, 2.VI.1953, G.A. Moore (LEM). M(oun)t Royal: 1♀, 9.VI.1952, G.A. Moore (LEM). Norway Bay: 1♂, 4♀♀, 16-28.

VII.1972, O.S. Flint (USNM). Parc du Mont Tremblant: 1♂[Δ], 13.VI.1952, 1♀[Δ], 12.VII.1952, 1♀[Δ©], 27.V-9.VI.1954, 1♂[Δ©], 17.VI.1954, 1♂[Δ], 23.VI.1954, 1♂[Δ], 24.VI.1954, 1♂[Δ], 30.VI.1954, 1♀[Δ], 1.VII.1954, 1♀[Δ©], 12.VII.1954, 2♂♂[Δ©], 10. VI.1955, 1♂[Δ], 1♀[Δ], 19.VI.1955, 1♀[Δ©], 22.VI.1955, 1♂[Δ], 20. VI.1956, 1♀[Δ], 5.VI.1957, 2♂♂[Δ], 1♂[Δ©], 10.VI.1957, 1♂[Δ], 11. VI.1959, 1♂[Δ], 16.VI.1957, 1♀, 23.VI.1958, 1♂[Δ©], 1♀[Δ©], 31. V.1959, 1♂[Δ], 24.VI.1959, 1♀[Δ©], 8.VII.1959, 1♀[Δ], 11.VII.1959, 1♀[Δ], 12.VII.1959, 1♀[Δ©], 11.VII.1962, A. Robert (UdeM). Pincourt: 1♂, 24.VIII.1968, V.R. V(ickery) (LEM). Pointe du Moulin: 2♂♂, 2.VI.1977, D.N. Duffy (LEM). Port Cartier, 107 mi N: 1 , 11.VII.1974, P.P. Harper (UdeM). (Quebec): 1♀[Δ], 2♀♀[Δ©], 1ex♂[Δ], 1ex♂[Δ©] (UL Provancher 1st and 2nd Collections). Rigaud: 1♂, 29.V.1976, D.N. Duffy (LEM). Rivington: Rouge R(iver), 6 mi E, 1♀, 12.VIII.1978, A.T. Finnamore (LEM). Rougemont: 1♀[Δ®], 5.VI.1967, 1♂[Δ®], 7.VI. 1967 (CNC). Routhierville: 1♀, 2.VII.1966, David R. Smith (USNM). Ste Anne de Bellevue: 1♀, 29.V.1931 (USNM); 1♂, 17.VI.1964, G. Jamieson (LEM); 1♂, 22.VII.1967, W. Boyle (LEM); 2♂♂, 24.V.1975, J.A. Garland (LEM); 2♂♂, 3♀♀, 2.VI. 1975, R. Manuel (LEM); 1♂, 24.VI.1976, J.A. Garland (LEM); 1♂, 29.V.1978, D.N. Duffy (LEM). Ste Clotilde: 1♂, 9.VI. 1965, J. Lafrance (SJRS). Ste Foy: 1♂, 30.V.1960, J.A. Doyle (CSQ); 1♀, 9.VIII.1971, J.P. Laplante (CRFL). St Hilaire: 1ex, 27.VI.1916 (CU Pechuman in litt. 1980). St Théodore de Chertsey: 1♂, 11.VI.1975, A.C. Sheppard (LEM).

St Hippolyte: 1♂▲©, 25.VI.1974, 1♀▲©, 2.VII.1974, P.P. Harper (UdeM). Shawbridge: 1♀, 24.VII.1928, 1♀, 28.VII. 1928, 1♀, 2.VII.1929, 1♀, 8.VII.1929, 1♀, 6.VII.1930, 1♀, 9.VII.1930, A.F. Winn (LEM). Sherbrooke: 1ex, 2.VII.1916, W.T.M. Forbes (CU Pechuman in litt. 1980). Wright: 1♂★®, 20.VI.1935, G.S. Walley (CNC).

NEW BRUNSWICK Fredericton: 1♂★®, 2♀♀★®, 192__ (CNC); 1♀★®, 2.VII.1939, R.F. Morris (CNC); Killarney Lake, 1♀▲© ★®, 21.VII.1922 (CNC). Kouchibougouac N(ational) P(ark): 2♂♂, 19.VI.1978, 1♀, 20.VI.1978, D.B. Lyons (CNC). St John: 1ex●, 1932, F. Lord (UG).

PRINCE EDWARD ISLAND Alberton: 1♀★®, 16.VII.1940, G.S. Walley (CNC). Delvay House, Can(adian) Nat(ional) P(ar)k: 1♀★®, 21.VII.1940, G.S. Walley (CNC).

NOVA SCOTIA Antigo(nish) Co: Beech Hill, 1ex●, 15.VI.1950, K.D. Archibald (NSM); Fairmont R(oa)d, 1♀, 5.VII.1950, R.J. Day (NSM); 5 mi E. 1♂, 2♀♀, 26.VI.1966, David R. Smith (USNM). Armdale: 1♀★®, 20.VII.1951, 1♂★®, 21.VI.1961, D.C. Ferguson (USNM); 1♂, 24.VI.1961, D.C. Ferguson (NSM). Aylesford: 1♂★®, 20.VI.1963, D.C. Ferguson, cat-tail swamp (USNM). Blomidon: 1♂★, 17.VI.1959, MacPhee, Apple tree (CNC). Canard: 1♂★, 7. VI.1959, F.T. Lord, Apple tree (CNC). Chester: 1♀, 19.VII. 1966, Barry Wright (NSM). Durham: 1♀, 17.VI.1975, A.T. Finnamore (LEM). Inverness: 1♀, 6.VIII.1970, C. Sabrosky

(USNM). Kentville: 1♂★®, 24.VI.1923, R.P. Gorham (CNC). Meal Cove: 1♀△©, 2.VIII.1974, P.P. Harper (UdeM). Pictou: 2♂♂★®, 1ex♁ ★®, 22.VII.1914, E.M. W(alker) (ROM). Portapique: 1♂, 16.VI.1975, A.T. Finnamore (LEM). St Paul Island, Cabot Strait: 1♀★®, 21.VII.1955, D.C. Ferguson (USNM). Truro: 1ex, 7.VII.1913, R. Matheson (CU Pechuman in litt. 1980); 1♀, 1977, 1♀, 1978, Paul S. Geddes (LEM).

NEWFOUNDLAND Bell Island: 2♀♀, 30.VII.1963, Ray F. Morris (SJARS). Bishops Falls: 2♂♂, 12.VI.1979, 1♂, 15.VI.1979, 1♂, 5.VII.1979, E. John (SJARS). Bona Vista Bay, NW Arm, Bloomfield: 1♀, 3.VII.1961, C.P. Alexander (USNM). Deer L(a)k(e): 5 mi SW, 1♀, 28.VI.1966, David R. Smith (USNM); 1♀, 13.VI.1979, Larson & Swales (MU). Eastport: 1♂, 1♀, 9.VII.1961, C.P. Alexander (USNM). Exploits R(iver): nr Bishops Falls, 1ex♁, 15.VI.1961, 1♀, 15.VII.1961, C.P. Alexander (USNM); Pond Bridge, 1♀, 15.VII.1961, C.P. Alexander (USNM). Gander: 1♂★®, 19.VII.1949, R. Henniger (CNC); 1♀, 10.VII.1961, C.P. Alexander (USNM). Glenwood, 12 mi S: 2♂♂, 1♀, 22.VI.1978 (MU). Holyrood, Conception Bay: 1♀, 24.VI.1961, C.P. Alexander (USNM). Millville, Codroy River: 1♂, 1♀, 12.VII.1959, D.C. Ferguson (USNM). M(oun)t Pearl: 1♀, 25.VI.1976, Ray F. Morris (SJARS). Norris Point: 1♂, 19.VI.1979, D. Timmons (SJARS). Pasadina: 1♂, 14.VII (MU). Portugal Cove: Indian Meal Line, 1♂, 1♀, 30.VII.1974, D. Larson (MU). Rocky Harbour: 1♀, 12.VI.1979, Donna Timmons

(SJARS). Rushy P(on)d, nr Grand Falls: 2♂♂, 11.VI.1979, Larson & Swales (MU). St Georges: 3 mi SE, 1♂, 1♀, 27.VI. 1966, David R. Smith (USNM); 1♂, 1.VI.1973, Ray F. Morris (SJARS). St John's: Agric(ulture) Exp(eriment) Sta(tion), 1♀, 13.VII.1967, 1♂, 1♀, 15.VII.1967, 1♀, 29.VII.1967, 1♀, 3.VIII.1967, J.F. McAlpine (CNC); 1♀, 30.VII.1968, Ray F. Morris (SJARS); 1♂, 14.VII.1969 (MU); Oxen Pond, 1♂, 14. VI.1972, 1♂, 1ex♠, 19.VI.1972 (MU); 1♂, 10.VII.1973, 1♀, 14.VII.1974, 1♂, 15.VII.1974, Ray F. Morris (SJARS). Shoal H(arbou)r: 1♀, 19.VI.1979, 1♂, 21.VI.1979, Greg Reid (SJARS). Terra Nova Nat'l Pk: 1♀, 18.VI.1961, C.P. Alexander (USNM). Tompkins: 1♂, 7.VI.1975, Ray F. Morris (SJARS).

Chrysoperla rufilabris

ONTARIO Biscotasing: 1♀▲© ★, 16.IX.1931, Karl E. Schedl (CNC). Chatham: 1♀, 11.VI.1930, McNally (UWO); 1♀, 13.VI. 1930, 1♂, 22.VIII.1930, Geof. Beall (UWO). Guelph: 1♂, 14. IX.1959, T.H. Scholten, Robinia (UG). Harrow: 1♀, VIII. 1956, A. Hoeberlin (MCMU); 1♂, 20.VII.1976, E.A. Innes (UG). L(ake) Opeongo, Algonquin Pk: 1♀, 15.VIII.1940, D.M. Davies (MCMU). Ottawa: 1♂, 23.VIII.1919, J. McDunnough (CNC). P(oin)t Pelee: 1♂★, 1♂, 1♀, 8.IX.1954, G.S. Walley (CNC); Pt Pelee Nat'l Pk, 1♂, 4.VIII.1963, V.R. Vickery (LEM).

Port Credit: 3♀♀, 13.VII.1965, 1♀, 18.VII.1965, Ian Smith (ROM); uvl, 3♀♀, 25.VII.1965, 1♂, 26.VII.1965, Ian Smith (ROM). Rondeau Prov Pk, Kent Co: uvl, 1♂, 9.VI.1965, J.C.E. Riotte & I.M. Smith (ROM); uvl, 1♂, 19.VI.1965, J.C.E. Riotte (ROM). St Davids: 1♀, 31.VII.1931, 1♀△, 20.VIII.1931, W.L. Putman (UG). Southampton: 1 , 5.IX.1939, G.S. Walley (CNC). Toronto: 1♀★, 14.VII.1914, E.M. Walker (ROM); 1♀△ △ △, 6.VIII.1914, E.M. Walker (MCZ Banks Collection); 1ex♂ △® ★, 17.VIII.1915, E.M. Walker (ROM); 1ex♂ ★, 19___, C.E. Corfe (ROM). Vineland: 1♂▲ ★, 1♀★®, 1♀, 5.IX.1930, W.L. Putman (CNC).

QUEBEC Laval: 1 , 1.IX.1967, M.O. Guibord (LEM). Ste Anne de Bellevue: Morgan Arboretum, 1♀, 7.IX.1978, 1♂, 8.IX.1978, J.A. Garland, White Pine association (LEM).

NOVA SCOTIA Sable Island: Main Station, 1♂, 22.VII.1976, Barry Wright (NSM); Met Station, 1♂, 11-14.VIII.1978, B. Wright & D.C. Ferguson (NSM).

Chrysoperla harrisii

MANITOBA Fort Garry: 1♂+ ★, em 6.VIII.1947, FIS W-368, Jack Pine (CNC).

ONTARIO (unspecified locality): 1ex(larva)$^{+}$, IX.1930, 1♀$^{+}$ ★, IX.1930, J.M.S. (CNC). Agincourt: 1♀, 7.VI.1959, R.J. Pilfrey (UG). Ballentrae: 1♂$^{\Delta ®}$ ★, 13.VIII.1952, FIS 1952 052-1810, White Pine (CNC). Baxter: at 1t, 2♀♀, 1ex$^{\bullet}$, 28.VII.1959, J.L. Martin, Red Pine plantation (LEM). Biscotasing: 1♀$^{+}$ ▲ ★, 20.VIII.1930, K.E. Schedl (CNC). C(entral) E(xperimental) F(arm): 1♂★, em 16.VIII.1911, from Pine (CNC). Chalk River: 1♂, 9.VIII.1937, J.K. Cameron (LEM). Chatham: 1♂, 3♀♀, 2ex$^{\bullet}$, 11.VI.1930, McNally (UWO); 1♀, 13.VI.1930, G. Beall (UWO). Dunnville: 1♀, 18.V.1974, Nancy Wilcox (UG). F(or)t Frances: 1♀★, 28-29.VI.1960, Kelton & Whitney (CNC). Go Home Bay: 1♀, 24.VI.1932, 1♀★, 11.VII.1932, G.S. Walley (CNC). Grimsby: 1♀, J. Pettit (UG). Guelph: 1♂, 15.IX.1959, T.H. Scholten, Robinia (UG); 1♀, 5.VI.1974, Donna J. McComb (UG). Hamilton: 1♂$^{+}$, 1.VIII.1948, 1♂$^{+}$ ▲, 4♂♂$^{+}$, 2.VIII.1948, 7♂♂$^{+}$, 6♀♀$^{+}$, 1♀$^{+}$ ▲, 3.VIII.1948, 6♂♂$^{+}$, 2♀♀$^{+}$, 4.VIII.1948, 9♂♂$^{+}$, 1♂$^{+}$ ▲, 5.VIII.1948, 3♂♂$^{+}$, 6♀♀$^{+}$, 6.VIII.1948, 5♂♂$^{+}$, 6♀♀$^{+}$, 1♀$^{+}$ ▲, 1ex$^{\bullet}$ $^{+}$, 7.VIII.1948, 6♂♂$^{+}$, 5♀♀$^{+}$, 1ex$^{\bullet}$ $^{+}$, 8.VIII.1948, 1♂$^{+}$, 4♀♀$^{+}$, 1♀$^{+}$ ▲, 9.VIII. 1948, 4♂♂$^{+}$, 1♂$^{+}$ ▲, 3♀♀$^{+}$, 10.VIII.1948, 1♀$^{+}$, 11.VIII.1948, 1♂$^{+}$, 2♀♀$^{+}$, 1ex$^{\bullet}$ $^{+}$, 12.VIII.1948, 1♂$^{+}$, 4♀♀$^{+}$, 1♀$^{+}$ ▲, 13.VIII. 1948, 3♂♂$^{+}$, 14.VIII.1948, 1♂$^{+}$, 2♀♀$^{+}$, 16.VIII.1948, 2♂♂$^{+}$, 17.VIII.1948, 5♂♂$^{+}$, 1♀$^{+}$, 1♀$^{+}$ ▲, 18.VIII.1948, 1♂$^{+}$ ▲, 1♀$^{+}$, 19.VIII.1948, 1♂$^{+}$, 1♀$^{+}$, 20.VIII.1948, 1♀$^{+}$, 24.VIII.1948, W. Judd (MCMU all records probably represent em). Madawaska: 1♀$^{+}$ ★, 6.X.1950, FIS 1950 550-3433-01 (CNC). Meaford: 1♀,

2.VIII.1975, W.J. Moolenbeek (UG). Pontypool: 1♂+ ★, em 3.IX.1942, FIS 1942 6975, R(ed) Pine (CNC). Port Credit: 2♀♀, 13.VII.1965, Ian Smith (ROM). St Davids: 1♂, 27.VIII. 1931, 1♂Δ®, 3.IX.1931, W.L. Putman (UG). Sauble Beach: 1♂+, em 18.VIII.1969, 1♀+, em 28.VIII.1969, (FIS) 69-5-325702, Pinus resinosa (GLFRC). Sault Ste Marie: 1♀+, em 14.VIII.1974, Pinus resinosa (GLFRC). Toronto: 1♀★, 12.VII. 1914, E.M. Walker (ROM). Whitby: 1♀, 13.IX.1973, G.J. Umphrey (UG).

QUEBEC Berthierville: 1♀, 7.VII.1930, L. Daviault (CSQ); 5♂♂Δ, 1♂Δ® Δ, 1♀Δ, 1♀Δ® Δ, 15.VIII.1948, 7♂♂Δ, 10♀♀Δ, 7.IX. 1948, 3♀♀Δ, 8.VIII.1949, 1♀Δ, 10.VIII.1949, 4♂♂, 4♀♀, 10. VIII.1949, sur pin rouge, 1♂Δ, 13.VIII.1949, 1♀Δ, 15.VIII. 1949, 1♀Δ, 3.IX.1949, A. Robert (UdeM). Ste Anne de Bellevue: 1♀, 4.VI.1976, A.T. Finnamore (LEM); 1♂, 29.VIII.1978, J.A. Garland, Fir association Morgan Arboretum (LEM).

NOVA SCOTIA Sable Island, Main Station: 1♂, 21.VII.1976, 1♂, 22.VII.1976, Barry Wright (NSM); 1♂, 1♀, 22.VII.1976, Barry Wright (CNC); Sable Island Met Station, 1♂, 3♀♀, 11-14.VIII.1978, B. Wright & D.C. Ferguson (NSM).

Chrysoperla carnea

ALASKA Big Delta: 1♂★, 24.VI.1951, 1♂★, 26.VII.1951, 1♀★, 26.VII.1951, W.R.M. Mason (CNC). Chitina: 1♂, 2.VI.1953, W.C.F. (USNM), Circle: 1♀Δ©, 23.VII.1950, Richard H. Washburn (USNM). College: 1ex, 24.VII.1966, M. Greenstone (CU Pechuman in litt. 1980). Eklutna: 1♀, 1♀Δ©, 14.V.1948, F.S. Blanton (USNM). Fairbanks: 2♀♀, 2.VII.1921, J.M. Aldrich (USNM); 1♀★, 14.VI.1952, W.R. Mason (CNC); 1♀★, 16.VI.1952, J.B. Hartley (CNC); 1♀★, 25.VI.1952, W.R. Mason (CNC); 1♂, 4♀♀, VII.1970, N.L.H. Krauss (USNM); malaise trap, 1♂, 26.VI-1.VII.1979, B. Wright, powerline cut (NSM). Lower Tonsina: 1♀Δ©, 24.VII.1953, W.C.F. (USNM). Nenana: 1ex♦Δ®, 16.VI.1953, R.L. Sailer (USNM). Palmer: 1♀, 19.V.1950, R.H. Washburn (USNM). Richardson Hwy: mi 315, 1♀★, 8.VI.1951, J.R. McGillis (CNC); Shaw Creek, mi 289, 1♀★, 28.VI.1951, 1♂★, 11.VII.1951, Mason & McGillis (CNC).

YUKON TERRITORY Dawson: 14 mi E, 1300 ft, 1♀★©, 4.VIII. 1962, P.J. Stitsko (CNC); Dawson: 1♂, 1♀, 30.V.1980, 2♀♀, 10.VI.1980, 1♂, 1♀, 26.VI.1980, 1♀, 25.VII.1980, R.A. Cannings (SEM). Dempster Hwy, Eagle R(iver): 1♂, 2♀♀, 15. VI.1980, R.A. Cannings (SEM). Haines Jct: 2♂♂★, 2.VIII.1948, Mason & Hughes (CNC). Klondike Hwy, mi 30: 1♂, 9.VIII.1957, E.L. Kessel (CAS). Kluane: 1♂, 17.VIII.1979, on Picea glauca, 1♀, 19.VIII.1979, on Salix sp, S.G. Cannings (SEM).

Mayo: 2♀♀, 2.VI.1980, 5♀♀, 3.VI.1980, R.A. Cannings (SEM). Rampart House: 6♂♂★, 4.V.1951, 35♂♂★, 8♀♀★, 5.V.1951, 1♂★, 20.V.1951, J.E.H. Martin (CNC); 2♀♀★, 20.V.1951, 1♂★, 1♀★, 26.V.1951, C.C. Loan (CNC); 1♂★, 3♀♀★, 2.VI.1951, J.E.H. Martin (CNC). Whitehorse: 2♂♂★, 21.VIII.1959, 2♀♀★, 28.VIII. 1959, R.B. Madge (CNC). Willow Cr(eek), km 621 Klondike Hwy: 1♀, 5.VI.1980, R.A. Cannings (SEM).

NORTHWEST TERRITORY Aklavik: 1♀★, 30.VI.1956, E.F. Cashman (CNC); 50 mi NE, 1♀, 9.VIII.1930, Owen Bryant (CAS). Bathurst Inlet: 1♂★, 27.VI.1951, W.L. Campbell (CNC). Dempster Hwy: km 503, 67°12' 135°35', 1♀, 7.VII.1979, tundra pond (ROM 795056). F(or)t McPherson: 1♀★, 15.VII. 1957, 2♀♀★, 12.VII.1957, R.L. Hurley (CNC); 1♂★, 1♀★, 10.VII.1957, 1♀★, 27.VI.1957, 2♀♀★, 1.VII.1957, S.D. Hicks (CNC). Fort Simpson: 1ex♂★, 19.VIII.1950, D.P. Whillans (CNC); 3 mi SE on E side Mackenzie River at No Name Creek, 1♀, 7.VI.1972, B.V. Peterson (CNC). Mackenzie River: 2♂♂, 1♀, 1929, O. Bryant (CAS). Norman Wells: 1♀★, 20.V.1953, J.S. Waterhouse (CNC); 1♂★, 21.VII.1949, 2ex♂★, 7.VIII.1949, W.R.M. Mason (CNC). Yellowknife: 1♀★, 18.V. 1953, 1♂★, 2♀♀★, 5.VI.1953, J.G. Chillcott (CNC); 2♂♂, 2♀♀, VIII.1970, N.L.H. Krauss (USNM).

BRITISH COLUMBIA Arras: 1♀, 1.IX.1920, M.Y.W. (SEM); 1♂, 1.IX.1920, N.V.W. (SEM). Bald Mt: 1♀, 8.VI.1950, D. Radcliffe

(SEM). Baynes Lake: 1♂★, em 26.VII.1939, D.H. Ross, FIS 1939 BC-672 (CNC). Barriere: 1♂★, em 10.VIII.1939, G.J. Mayson, FIS 1939 BC-889D (CNC); 1♀★, em 10.VIII.1939, F. Johnson, FIS 1939 BC-887, Picea engelmanni (CNC). Birch Island: 1♂★, em 18.VII.1939, F.H. Nelson, FIS 1939 BC-568B (CNC). Bowser: 1♀★, 7.VI.1955, J.R. McGillis (CNC). Box Lake, nr Nakusp: 1♀★, em 9.VIII.1943, FIS 1943 BC-3931B, on Larix occidentalis (CNC). Chase: 1ex♦★, 8.I.1938 (CNC). Cherryville: 1♂★, em 12.VIII.1943, FIS 1943 BC-3911C, on Pseudotsuga taxifolia (CNC). Chilcotin: 1♀, 16.VI.1929, G.J. Spencer (SEM). Chu-Chua, nr Barriere: 1♀★, em 9.VIII. 1946, FIS 1946 BC-46-438C (CNC). Clinton: 1♀★, 12.VI.1938, G.S. Walley (CNC). Comox: 1♂★, 29.VII.1926, W. Downes (CNC). Cowichan Bay: 2♀♀★, 2.VI.1959, R.E. Leech (CNC); 3♀♀★, 2.VI. 1959, E.E. MacDougall (CNC). Cowichan L(a)k(e): 1♀, 30.V. 1937, Idyll (SEM); 1♀, 16.VI.1958, J.R. Hill (LEM). Cranbrook, 1♂★, em 11.VIII.1941, FIS 1941 BC-2481B, Pinus contorta latif. (CNC); 1♀★, em 18.VIII.1941, FIS 1941 BC-2519, Pinus ponderosa (CNC). Cummings L(ake): 1♀, 6.VI.1960, E. Adams (SEM). Deep Creek, Peachland: 1♂★, em 17.VII.1945, FIS 1945 BC-45-161A, larva on Pinus ponderosa (CNC). Deer Park, Lower Arrow Lakes: 1♀★, em 10.VIII.1945, FIS 1945 BC-45-267, on Douglas Fir (CNC). Departure Bay: 1♀, 30.V.1925, 1♂, 4♀♀, 2ex♦, 10.VI.1925, G.J. Spencer (SEM); 1ex♦, VIII. 1928, A.M.G. (SEM). Duncan: Indian Reserve S of Duncan: 1♀★, em 20.VIII.1942, FIS 1942 BC-3427A, Pseudotsuga taxifolia

(CNC). Edgewood: 1♀★, em 18.VIII.1942, FIS 1942 BC-3403H, Larix occidentalis (CNC). Eholt: 1♀★ Δ®, 18.VII.(1950), FIS 1950 BC-50-1206, Picea sp (CNC). F(or)t Nelson: 1♂, 1♀, 26.VIII.1948, W.R. Mason (CNC). Gibsons: 1♀, 17.VI. 1977, G.G.E. Scudder (SEM). Goldstream: 2♀♀, 28.IV.1926, W. Downes (SEM). Green Timbers: 1♂, 18.VII.1938, R. Longmore (SEM). Halfway: 1♀, 3.VII.1930, K. Graham (SEM). Haney: 1♂, 25.VIII.1948, McM. (SEM). Hazelton, nr Glenvowel I(ndian) R(eserve): 1♀★, em 30.VIII.1939, C.L. Botham, FIS 1939 BC-1027D (CNC). Huscroft: nr, 1♀★, em 29.VII. 1941, FIS 1941 BC-2306B, Pinus contorta latifolia (CNC). Kamloops: lex♂ Δ©, 4.VII.1937, G.J. Spencer (MCZ); 1♀, 13. VII.1941, G.J. Spencer (SEM); 1♀, 31.X.1942, G. Bennett (SEM); 1♀, 22.III.1949, under D(ouglas) Fir bark (SEM); 1♀, 12.V.1950, F. Cameron (SEM). Kaslo: 8♂♂★, 6♀♀★, (1903), J.W. Cockle (CNC); 1PT♂▲© ★, (1903), J.W. Cockle (CNC 3309); 1♀, 11.VI.(1903), 1♀, 20.VI.(1903), 1♀, 25.VI. (1903), 2♀♀, 27.VI.(1903), 1♀, 6.VII.(1903), 2♀♀, 7.VII. (1903), 1♀, 8.VII.(1903), 1♀, 14.VII.(1903), 4♀♀, 15.VII. (1903), 2♀♀, 1♀Δ©, 1ex♂, 16.VII.(1903), 1♀, 17.VII.(1903), 1♀, 18.VII.(1903), 1ex♂, 20.VII.(1903), 3♀♀, 25.VII.(1903), 1ex♂, 4.VIII.(1903), 3♀♀, 6.VIII.(1903), R.P. Currie (USNM); 1♀, 14.VIII. (1903), 1♀, 1ex♂, 19.VIII.(1903), 3♀♀, 20.VIII. (1903), A.N. Caudell (USNM). Kelowna: 4♂♂★, 2♀♀★, 19.I.1923, W. Downes (CNC); 1(PT)♀, 1(PT)ex♂, 19.I.1923, W. Downes (KSU); 4PT♂♂▲© ★, 1PT♀▲© ★, 19.I.1923, W. Downes (CNC 3309).

Keremeos: 1♀[△©], 19.VII.1910 (JEC); 2♀♀[★], 18.VI.1923, 1ex[♂ ▲® ★], 12.VII.1923, 1ex[♂ ★], 27.VII.1923, C.B. Garrett (CNC); 1ex[♂ ★], 22.V.1959, L.A. Kelton (CNC). Kettle Valley: 1ex[♂ △© ★], em 17.VIII.1942, FIS 1942 BC-3466, Pinus ponderosa (CNC). Kootenay Nat'l Pk, McLeod Meadows: 1ex[♂ ★], em 5.VIII.1941, FIS 1941 BC-2390, Picea sp (CNC). Kuskanax Creek, Nakusp: 1ex[♂ ★], em 27.IX.1943, FIS 1943 BC-4065B, Pinus monticola (CNC). Lac du Bois, Kamloops: 1♀, 8.VI.1947, G.J. Spencer (SEM). L(ake) Greene, Kamloops: 1♀, 10.VIII.1941, G.J. Spencer (SEM). Ladysmith: 1♀[★], 2.VI.1955, W.J. Brown (CNC). Langford: 1♂[★], em 4.VIII. 1944, FIS 1944 BC-44-364D (CNC); 1♀[▲© ★], 4.VI.1952, D. Evans (CNC); 1♀[★], 16.VII.1959, L.A. Kelton (CNC); 1♀, at 1t, 27.VII.1960, FIS 1960 60-1654-30 (PFRC); 1♂, at 1t, 7.IX.1962, FIS 1962 62-2811-12 (PFRC); 1♂, at 1t, 25.VIII. 1964, FIS 1964 64-3154-34 (PFRC); 1♀[★], 7.VI.1962, FIS 1962 62-531-04, Garry Oak (PFRC); 1♀[★©], at 1t, 2.VIII.1962, FIS 1962 62-2073-03 (CNC). Langley: 1♂, 31.V.1931, K. Graham (SEM). Lemon Creek, Slocan Valley: 1♂[★], em 29.VIII.1942, FIS 1942 BC-3384, Pinus contorta latifolia (CNC). Liard Hot Sp(rin)g: mi 496 Alaska Hwy, 1500 ft, 4♀♀[★], 2ex[♂ ★], 9-10.VII.1959, R.E. Leech (CNC); mi 496 Alaska Hwy, 1500 ft, 1♀[★], 9-10.VII.1959, E.E. MacDougall (CNC); 1♀, 24.V.1980, R.A. Cannings (SEM). Lions Bay, Vancouver: 1♀, 22.V.1961, G.J. Spencer (SEM). Louis Cr(eek) Road, Barriere: 1ex[♂ △® ★], em 9.VIII.1939, G.J. Mayson, FIS 1939 BC-888H (CNC). Lower

Post: 1♀★, 19.VIII.1948, W.R. Mason (CNC). Lytton: 1♀, 31.VIII.1929, G. Beall (UWO). Madden L(ake), Oliver: 1♀★, 22.V.1959, R. Madge (CNC). Mandarte I(sland): 1♀, 16.VII.1959, 1♀, 31.V.1960, R. Drent (SEM). McMillan Creek, Prince George: 1♀★, em 4.VIII.1939, A. Hunter, FIS 1939 BC-852A (CNC). Mission Flats: 1♂, 15.IV.1945 (SEM). M(oun)t Douglas, Victoria: 1♀, 3.VI.1959, R.E. Leech (CNC); 2♀♀★, 3.VI.1959, L.A. Kelton (CNC). M(oun)t Revelstoke: 1ex♦ ★, em 16.VII.1941, FIS 1941 BC-2138A, Picea sp (CNC). Nanaimo: 1♀, 10.VI.192___, G.J. Spencer (SEM); 1♀, 6.VI.1929, G. Beall (UWO); 1♂, 11.V.1930, G.J. Spencer (MCZ); 1♀, 2.VI. 1930, D. Beall (UWO); 1♀★, 22.VI.1920, E.C. Van Dyke (CAS); 5 mi S, 1♀★, 1.VI.1959, R.E. Leech (CNC); 5 mi S, 1ex♦ ★, 1.VI.1959, L.A. Kelton (CNC). N(ew) West(minste)r: 1♂, Autumn.1928, G. Beall (UWO). Noble Creek, nr Louis Cr(eek): 1♂★, em 28.VIII.1944, FIS 1944 BC-44-431F, Picea sp (CNC). Oak Bay, Victoria: 2♂♂★, 1♀★, 2.VI.1959, R.E. Leech (CNC). Okanagan Lake: 1♀, 15.VII.1935, J.L. McHugh (SEM). Oliver: 1♂★, 1♀★, 16.IV.1923, 1♀★, 23.IV.1923, 1♀★, 11.V.1923, C.B. Garrett (CNC); 1PTex♦ ▲© ★, 16.V.1923, C.B. Garrett (CNC 3309); 1♀★, 28.V.1923, 1♂★, 11.VI.1923, 2♀♀★, 7.VIII.1923, C.B. Garrett (CNC); 1PT♀▲© ★, 8.IX.1923, C.B. Garrett (CNC 3309); 1♂★, 1♀★, 14.V.1959, E.E. MacDougall (CNC); 1♀★, 14. V.1959, R. Madge (CNC); 1♀★, 15.V.1959, R. Madge, swept from Rose (CNC); 1♂★, 17.V.1959, L.A. Kelton (CNC); 1♀★, 21.V.1959, 3♀♀★, 24.V.1959, 1♂★, 26.V.1959, E.E. MacDougall

(CNC). Osoyoos: 5♂♂, 2♀♀, 17.VIII.1925, G.J. Spencer (SEM); 1♀, 17.VIII.1925, G.J. Spencer (MCZ); 3500 ft, 1♀★, 14.VII. 1953, J.R. McGillis (CNC). Pemberton: 1ex♦, 6.VI.1962, FIS 1962 62-607-06, D(ouglas) Fir (PFRC). Penticton: 1PT♀▲©★, 12.IV.1927, E.R. Buckell (CNC 3309); 2♂♂, 2♀♀, 16.X.1964, R.D. McMullen (SDARS); 1♀, 4.IV.1976, 2♂♂, 7.IV.1976, 1♀, 13.IV.1976, 1♀, 27.IV.1976, 10♂♂, 1.V.1976, 1♀, 4.V.1976, 1♂, 1♀, 6.VI.1976, 1♂, 2♀♀, 8.VI.1976, 1♂, 1♀, 10.VI.1976, 1♀, 12.V.1976, 1♀, 16.V.1976, 1♂, 1♀, 8.VII.1976, 1♀, 11. VII.1976, 1♂, 2♀♀, 13.VII.1976, 3♀♀, 15.VII.1976, 1♀, 16. VII.1976, 1♀, 17.VII.1976, 1♀, 19.VII.1976, 2♀♀, 21.VII. 1976, 2♂♂, 22.VII.1976, 1♀, 23.VII.1976, 8♀♀, 24.VII.1976, 2♀♀, 25.VII.1976, 1♀, 29.VII.1976, 2♀♀, 31.VII.1976, 1♀, 2.VIII.1976, 1♂, 1♀, 4.VIII.1976, 1♀, 17.VIII.1976, 2♀♀, 18.VIII.1976, 1♂, 30.VIII.1976, 2♂♂, 11.IX.1976, 1♀, 13. IX.1976, 2♀♀, 14.IX.1976, 1♀, 22.IX.1976, 1♀, 29.IX.1976, 1♀, 30.IX.1976, 1♂, 6.X.1976, 1♂, 9.X.1976, 1♂, 11.X.1976, J.A. Garland (LEM). Pioneer Mine: 2♂♂★, em 13.VIII.1940, 1ex♦★, em 14.VIII.1940, FIS 1940 BC-1657, Picea engelmanni (CNC); 1♀★, em 26.VIII.1940, FIS 1940 BC-1653H, Pseudotsuga taxifolia (CNC). Point Grey: 1♂, 22.IX.1942, H.D. Fisher (SEM). Pouce Coupe: 1♂★, 19.VI.1961, 1♀★, 4.VIII.1961, A.R. Brooks (CNC). Powell Lake: 1♂▲©★, em 11.VIII.1942, FIS 1942 BC-3229, Pseudotsuga taxifolia (CNC). Powell R(iver): 1♂, 15.IX.___ , J. Lanko (SEM); 1♀, VIII.1939, J.A. Rattenburg (SEM). Princeton: 1ex♦★, em 29.VII.1941, FIS 1941

BC-2188A, Pseudotsuga taxifolia (CNC); nr Princeton, 1♀★, em 22.VII.1941, FIS 1941 BC-2275B, Pinus ponderosa (CNC). Quadra I(sland): 1♀, 17.VII.1961, G.G.E. Scudder (SEM). Quesnel: 4 mi N, 1♀★, em 9.VIII.1939, W.K. Elliott, FIS 1939 BC-853A (CNC); 1♀, 31.VIII.1947, 1ex♁, 6.VI.1948, 1♂, (reared), 14.VII.1949, G.J. Spencer (SEM); 1♀, 20.VII. 1948, alfalfa, 1♀, 28.VII.1948, H.R. MacCarthy (SEM). Renata: 1♂★, em 20.VIII.1942, 1♀★, em 28.VIII.1942, FIS 1942 BC-3449A, Pinus contorta latifolia (CNC). Robson: 1♂★, 8.IV.1947, H.R. Foxlee (CNC); 1♀, 15.VII.1960, H.R. Foxlee (SEM). Ross Cr(eek): 5♀♀★, em 13.I.1958, FIS BC-58-5000-01, Pseudotsuga taxifolia (CNC). Rossland: 1ex♁★, em 14.VIII.1945, FIS 1945 BC-45-429 (CNC). Royal Oak: 1♀★, 16.V.1917, R.C. Treherne (CNC); 1♀★, 3.VI.1959, E.E. MacDougall (CNC). Saanich District: 1♀, 5.VI.1918, W. Downes (SEM). St Marys: 2♀♀★, 1ex♁★, 12.VII.1926, A.A. Dennys (CNC). Salmon Arm: 1♀★, 3.IX.1925, A.A. Dennys (CNC); 1ex♁★, 1.XI.1926, E.R. Buckell (CNC); 1PT♂▲©★, 3PTex♁▲©★, 1.XI.1926, E.R. Buckell (CNC 3309); 2(PT)♂♂, 1(PT)♀, 1.XI. 1926, E.R. Buckell (KSU); 1(PT)♀, 5.XII.1926, A.A. Dennys (BCPM); 1(PT)♀, 15.XII.1926, W. Downes (SEM); 1PT♀, 15.XII. 1926, W. Downes (CNC 3309); 1ex♁, 1928, Hugh B. Leech (SEM). Sechelt: Indian Reserve, 1♂△®★, em 12.VIII.1942, FIS 1942 BC-3304B, Tsuga heterophylla (CNC). Seton Lake, Lillooet: 1PT♀▲©★, 20.I.1919, A.W.A. Phair (CNC 3309); 1♂★, 26.VI. 1926, J. McDunnough (CNC). Shuswap Falls: 1♀, 28.VI.194__,

D. Evans (SEM). Skeena Crossing: 1♀★, 23.IX.1958, FIS 1958 58-2100-06, Picea glauca (CNC). Smith R(iver): 1♀★, 21. VIII.1952, FIS 1952 BC-52-3027-07, Picea glauca (CNC). Soda Creek: 2♀♀, 22.VII.1947, 1♂, 2♀♀, 11.VI.1950, 1♀, 25.VI.1950, 1♀, 27.VIII.1950, G.J. Spencer (SEM). South Okanagan (unspecified locality): 1♂★©, VI.1961, W.H. Wilde (CNC). Spences Bridge, 15 mi E: 1♀★, 22.VIII.1947, Hugh B. Leech, Epilobium flowers (CAS). Steelhead: 1♀, VIII.1933, H.B. Leech (SEM). Sugar Lake: 1♂★, em 12.VIII.1943, FIS 1943 BC-4043E, Larix occid(entalis) (CNC). Summerland: 1♀★, 8.VII.1928, E.B.S. Logier (ROM); 2♂♂★, 1♀★, 1ex♂★, 15.IX.1930, A.A. Dennys (CNC); 1♂★, 1♀★, 23.VII.1931, 1♂★, 19.IX.1931, 1♂★, 1♀★, 26.I.1932, 3♂♂★, 3.II.1932, A.N. Gartrell (CNC); 1♀, 25.VII.1942, M.G. Thomson (SEM); 1♂△©, 3♀♀△©, 17.IX.1953, 1♀△©, 18.IX.1953, J.H. McLeod (et al.), Malus sp (SDARS); 1♀★, 5.VI.1959, R.E. Leech (CNC); 10♂♂, 6♀♀, 1968, C. Jong (SDARS). Swinton: 1ex♂★, em 18.VIII. 1938, R. Cameron, FIS 1938 BC-179B (CNC); nr Morrisey, 1♀★, em 17.VIII.1945, FIS 1945 BC-45-399 (CNC). Trinity Valley: 1♀★, 9.VIII.1937, K. Graham, cocoon on spruce (CNC); 1ex♂★, em 3.VIII.1939, J. McCluskey, FIS 1939 BC-812 (CNC); 1♀★, em 3.VIII.1939, J. McCluskey, FIS 1939 BC-813 (CNC); 1♂★, em 29.VII.1941, FIS 1941 BC-2383, Picea engelmanni (CNC). U(niversity of) B(ritish) C(olumbia): 1♂△©, 5.VI.1927, G.J. Spencer (SEM); 1♂, 17.X.1928, V.Z. Lucas (SEM); 1♀, 1929, D. Sutherland (SEM); 1♀△©, 1929, E. Peden (SEM); 1♀, 4.X.

1949, E. Fridell (SEM); 1♀, 15.V.1974, 1♂, 29.V.1974, 1♀, 30.V.1974, 1♀, 4.VI.1974, 1♀, 5.VI.1974, 1♀, 7.VI.1974, 1♀, 11.VI.1974, 2♀♀, 12.VI.1974, 2♀♀, em 17.VII.1974, M. Isman (SEM); U.B.C. forest, 1ex♦ △®, 8.III.1940, Ray E. Foster (SEM). Upper Arrow Forest, Trout Lake: 1♀★, em 16.VIII.1943, FIS 1943 BC-3997, Thuja placita (CNC). Vancouver: 2♀♀★, 24.V.1903 (CNC); 1♀, 17.VIII.1927, G.J. Spencer (SEM); 1♀, 30.IX.1928, V.Z. Lucas (SEM); 1♀, 19. VII.1931, H.B. Leech (SEM); 1♂, 12.VI.1933, W. Touzeau (SEM); 1♂△©, 20.IV.1934, J.K. Jacob (SEM); 1♀, 7.X.1934, G.M. Neal (SEM); 1♂, 10.IX.1937, J.D.M. (SEM); 1♀, 30.XI. 1938, G.L. Steelz (SEM); 1♀★, 7.VIII.1941, M.L. Prebble (CNC); 1ex♦, 29.IX.1942, Ian D. Matheson (SEM); 1♀, 6.X. 1942, R. Duncan (SEM); 1♂, 13.X.1942, F. Sandall (SEM); 1♂, 10.IX.1953, K. Racey (SEM); 1♀, 10.VI.1960, 1ex♦ (dead in laboratory), 28.I.1961, G.J. Spencer (SEM); 1♀, 3.VIII. 1977, J.A. Van Reenen (SEM). Vaseaux L(ake), Oliver: 1♂★, 1♀★, 14.V.1959, 1♀★, 16.V.1959, 2♀♀★, 29.V.1959, R.E. Leech (CNC). Vernon: 1♀★, 17.VII.1924, E.A. Rendell (CNC); 4(PT)♂♂, 1(PT)♀, 29.X.1925, W. Downes (SEM); 2PT♂♂▲© ★, 29.X.1925, 4PT♂♂▲© ★, 1HT♀▲© ★, 4PT♀♀▲© ★, 15.XII.1926, W. Downes (CNC 3309); 1PT♂, 1PT♂▲©, 15.XII.1926, W. Downes (MCZ 22238); 1♀△©, 19.IV.1934, H.B. Leech (SEM); 1♀★, 8. VII.1935, Hugh Leech (CNC): 2♂♂, 1♀, 8.XII.1935, Hugh Leech, under bark Pinus ponderosa (SEM); 1♀, 19.V.1943, D. Evans, sunflower (SEM); 1♀, 8.IV.1949, D. Evans (SEM);

BX range, 2000 ft, 1♀, 4.VII.1979, R.A. Cannings (SEM). Victoria: 1ex♂, VII, Crotch (MCZ); 1ex♂ ★, 15.V.1926, W. Downes (CNC); 1♂▲® ▲®, 16.V.1926, W. Downes (SEM); 1PT♀▲© ★, 12.VI.1926, W. Downes (CNC 3309); 1♂★, 6.XI. 1926, 1♂★, XII.1926, 1♂★, 1♂▲® ★, 3.VIII.1927, 1♀★, 15.V. 1928, W. Downes (CNC); 1♀, 20.V.1928 (SEM); 1♀, 10.VIII. 1961, FIS 1961 61-2292-01, Hemlock (PFRC); 1♀★©, 19.VI. 1962, D. Evans (CNC); 1▲, 11.X.1964, D. Evans, Oak (CNC). Walhachin: 1♂, 16.VII.1918, E.R. Buckell, Carrot (SEM). Wellington: 1♂▲©, 14.V.1897, 1♂, 14.V.1897, common on Currant trees, 1♀▲©, 18.V.1897 (MCZ Banks Collection); 1♀★, 22.VI.1901, 1♂★, 7.VI.1908, 1♀★, 1ex♂ ★, 20.VI.1908 (CNC). W(est) Crescent Valley: 49°24' 117°39', 3000 ft, 1♀, 12.VI. 1967, J. Shepard, dry (SEM). Westwick L(ake), Cariboo: 1♀, 13.VI.1961, G.G.E. Scudder (SEM). Williams Lake: 5 mi N, 1♂★, em 24.VII.1944, FIS 1944 BC-44-177A, Douglas Fir (CNC); 1♂★, 20.VIII.1960, B. Heming (CNC); 1♀★, 20.VIII.1960, W.R. Richards (CNC). Winslow: 2♂♂, 1♀, 14.IX.1925, G.J. Spencer (SEM). Yale: 1♀★, em 26.VII.1939, J.D. Calder, FIS 1939 BC-748 (CNC). Yoho Pk: Ottertail, 1♂★, em 25.VIII.1943, FIS 1943 BC-4016B, Picea sp (CNC).

ALBERTA Banff Nat'l Pk: Banff, 1♀★, em 27.VIII.1945, FIS 1945 BC-45-523A (CNC). Beaverlodge: 1♀▲© ▲©, 9.VI.1931, E.H. Strickland (UAE); 1♀, 22.VI.1960, K.C.S. Tuckey (UG); 2♂♂★, 2♀♀★, 1.VIII.1961, A.R. Brooks (CNC). Belly River

R(anger) S(tation): 1♂★, 3.IX.1949, FIS 1949 A-1714, Rose (CNC). Bilby: 2♂♂★, 22.VI.1924, O. Bryant (CAS). Calgary: 1♀★, 3.V.1923, 1♂★, 12.V.1923, G. Salt (CNC); 1♀, 5.VI.1939, W.S. McLeod (UMW). Chip Lake: 1♀★, 1.VIII. 1949, FIS 1949 A-928, W(hite) Spruce (CNC). Claresholm: 1♀★, 2.VIII.1949, FIS 1949, Wild Rose (CNC). Clymont: 1♀, 1.VIII.194___, E.H. Strickland (UAE). Cochrane: 1ex♂★, 11.VI.1915, E.H. Strickland (CNC). Colinton: 1ex♂★, 5. VIII.1949, FIS 1949 A-514C, W(hite) Spruce (CNC). Cow Cr(eek): 1♀★, 28.V.1951, FIS 1951 A-11, W(hite) Spruce (CNC). Crowsnest Lake: 1ex♂★, 15.VIII.(1949), FIS 1949 A-1225, Spirea (CNC). Cypress Hills: 1♀★, 21.VII.1951, FIS 1951 A-697, W(hite) Spruce (CNC). Delburne: 1♀, 11. VII.1959, D.H. Pengelly (UG). Dovercourt: 1♀★, 1.VIII.1950, FIS 1950 A-1898, Juniper (CNC); 1♂★, 7.VIII.1950, FIS 1950 A-2577, W(hite) Spruce (CNC); 1♂★, 10.VIII.1950, FIS 1950 A-1481B, W(hite) Spruce (NFRC). Drumheller: 3♂♂★, 3♀♀★, 11.VIII.1957, A.R. & J.E. Brooks (CNC). Edmonton: 1♂, 18. VIII.1936, 1♂Δ©, 17.V.1938, E.H. Strickland (UAE); 2♂♂, 14.IV.1939, W.S. McLeod, Spruce (UMW); 1♀, 14.IX.1947, E.H. Strickland (UAE); 1ex♂, 30.V.1967, G. Walker (PIDAA); 1♀, 26.IV.1975, D. Shpeley (UAE). Edson: 1♀+★, (em) VIII.1950, FIS 1950 2870, W(hite) Spruce (CNC); 1ex♂★, 14.VIII.1950, FIS 1949 A-2487, Larch (CNC); 1♀★, 14.VIII.195_, FIS 1950 A-2479, L(odge) P(ole) Pine (CNC). Elkwater: 1♀★, 11.VIII. 1950, FIS 1950 A-2493, W(hite) Spruce (CNC); 1♀★, 14.VIII.

1950, FIS 1950 A-2508, L(odge) P(ole) Pine (CNC); 1♀★, 14.VIII.1950, FIS 1950 A-2500, W(hite) Spruce (CNC); 1♀★, 25.VI.1951, FIS 1951 A-671, Gooseberry (CNC); Elkwater Pk, 1♂★, 14.VIII.1952, L.A. Konotopetz (CNC); Elkwater Pk, 1♀★, 15.VIII.1952, A.R. Brooks (CNC). Entrance: 1♂★, 5.IX.1950, FIS 1950 A-3121, W(hite) Spruce (CNC); 1♂★, 5.IX.1950, FIS 1950 A-3237, W(hite) Spruce (CNC); 1♂★, 11.VI.1951, FIS 1951 A-147, W(hite) Spruce (CNC). Entwhistle: 1♂★, 18.VIII, FIS 1949 A-862B, B(lack) Spruce (CNC). Fawcett: 2♀♀ ★, 12. VIII.1949, FIS 1949 A-642B, W(hite) Spruce (CNC). Fort Assiniboine: 1ex ▲® ★, 25.VII.1939, FIS 1939 BC-556, R. Krauss (CNC). Gleichen: 1♂, 5.VII.1959, D.H. Pengelly (UG). Grande Prairie: 1♂★, 1ex ★, 12.VII.1940, C.L. Neilson (CNC); 1♂★, 25.VII.1961, 1♂★, 2♀♀★, 1ex ★, 26.VII.1961, 1♀★, 26. VIII.1961, A.R. Brooks (CNC). High Prairie: 2♂♂★, 1♀★, 16. VII.1961, 3♂♂★, 5♀♀★, 17.VII.1961, 1♀★, 25.VII.1961, A.R. Brooks (CNC). Horburg: 1♂★, 16.VIII.1950, FIS 1950 A-2553, L(odge) P(ole) Pine (CNC). Jasper Pk: Fiddle Creek, 1ex ★, 17.IX.1943, FIS 1943 BC-4318, Picea sp (CNC); Pocahontas area, 1♂★, em 17.IX.1943, FIS 1943 BC-4087, Pinus contorta latifolia (CNC); Pocahontas District, 1♀★, em 24.VII.1944, FIS 1944 BC-44-268, Picea sp (CNC); Jasper, 1♀ ★, 8.I.1952, FIS 1951 A-2840C, W(hite) Spruce (CNC). Kinuso: 1ex ♀ ★, 17.VIII, FIS 1949 A-795D, W(hite) Spruce (CNC). Lac la Biche: 3♀♀★, 25.VI.1961, A.R. Brooks (CNC). L(ake) Minnewanka: 1♂ ★, em 1.IX.1944, FIS 1944 BC-44-599C, Picea sp

(CNC). Leadale: 1♀△©, 6.X.1952, FIS 1952 A-2202 (NFRC). Lethbridge: 1ex♂ ★, 20.IX.1913, E.H. Strickland (CNC); 1♀★, 30.V.1921, 1♀▲© ★, 29.V.1922, H.L. Seamans (CNC); 1PTex♂ ▲© ★, 26.VII.1922, Walter Clark (CNC); 1♂★, 1.V. 1923, 1♀★, 8.V.1923, H.L. Seamans (CNC); 1♀★, 28.V.1929, 1♀★, 29.V.1929, 1♂★, 23.IX.1929, J.H. Pepper (CNC); 1♀★, 21.V.1938, G.S. Walley (CNC); 1ex 3rd instar larva, 7.VI. 1940, alfalfa, 1♀, 8.V.1941, 1♀, 18.V.1941, 1♀, 24.V.1941, R.W. Salt (UAE); 1♂, 11.VII.(E.H. Strickland), alfalfa (UAE). Medicine Hat: 1♂★, 23.IV.1927, F.S. Carr (CNC); 1♀△©, 7.VIII.1938, 1ex♂, 11.VIII.1949, E.H. Strickland (UAE); 1♀, 11.VIII.1949, B. Hocking (UAE). Midnapore: 1♂, 10.IV.1914, W.H. Tams (CNC). Miette Hot S(prings): 1♀★, 6.IX.1950, FIS 1950 A-3306, W(hite) Spruce (CNC). Minnewanka: 1♂★, 7.IX.1950, FIS 1950 A-3411, D(ouglas) Fir (CNC). M(oun)t Laurel, Waterton: 1♀★, 28.V.1950, FIS 1950 A-49 (CNC). Nordegg, 28 mi W: 1♀★, 5.IX.1950, FIS 1950 A-3234, L(odge) P(ole) Pine (CNC). 1-4 (Onefour): 7♂♂★, 2♀♀★, 19.VIII.1952, L.A. Konotopetz (CNC); 3♂♂★, 1♀★, 19. VIII.1952, A.R. Brooks (CNC); 1♀★, 1.VI.1956, O. Peck (CNC). Peace River, Athabaska: 1♀△©, VII, Raup (MCZ). Pedley: 1♀± ★, 22.VIII.1950, FIS 1950 A-1476A, Aspen (CNC). Red Deer: 1♀★, 25.VI.1957, Brooks & MacNay (CNC). Reno: 1♀★, em 12.VI.1961, FIS 61-A-602-04, Salix sp (CNC). Rocky, 27 mi SW: 1♂★, 7.VIII.1950, FIS 1950 A-2146, W(hite) Spruce (CNC). Salway: 1♂★, 19.VIII.1950, FIS 1950 A-2695, W(hite) Spruce

(CNC). Saunders, 12 mi W: 1♂★, 1♀★, em 29.VII.1940, FIS 1940 BC-1613A, Picea sp (CNC). Seebe: 1ex♦★, em 20.VII. 1940, FIS 1940 BC-1554, Pseudotsuga taxifolia (CNC); 1♂★, em 19.VII.1940, FIS 1940 BC-1556B, Picea glauca (CNC); 1♀★, em 19.VIII.1942, FIS 1942 BC-3426A, Pinus contorta latifolia (CNC). Smith, 20 mi SE: 1ex♦★, 22.VI.1950, FIS 1950 A-471, W(hite) Spruce (CNC). Stettler: 2♂♂, 3.VIII. 1957, A.R. & J.E. Brooks (USS). Sundre, 20 mi W: 1♀±★, 8.VIII.1951, FIS 1951 A-17420, W(hite) Spruce (CNC). Sylvan Lake: 1♀★, 8.VI.1918, A.R. B(rooks) (CNC). Tawatineau: 1♀★, 4.VIII.1949, FIS 1949 A-557C, W(hite) Spruce (CNC). Valley-view: 1♀★, 4.VI.1961, 1♂★, 6.VI.1961, 1♀★, 10.VIII.1961, A.R. Brooks (CNC). Waterton: 1ex♦★, 19.IX.1950, FIS 1950 A-2409C, W(hite) Spruce (CNC). Whitecourt: 1♀★, 28.VI.1949, FIS 1949 A-175, W(hite) Spruce (CNC); 1♂±★, 29.VII.1949, FIS 1949 A-274D, Jack Pine (CNC). Wildwood: 1♂★, 21.VIII. 1950, FIS 1950 A-2759, W(hite) Spruce (CNC). Yahatinda Ranch, 14 mi E: 1♂★, 19.VIII.1950, FIS 1950 A-2635, L(odge) P(ole) Pine (CNC).

SASKATCHEWAN Amisk Lake: 1♂★, 9.IX.1946, FIS W-1044, White Spruce (CNC). Ardill: 1♂Δ©, 3.VIII.1977, P. Goode, swept from Polygonum sp (RARS). Avonlea: 1♀, 21.VI.1974, R. Hooper (SMNH); 1♀Δ©, (1976), M.G. Maw, swept from Convolvulus sepium (RARS); 1♀Δ©, 1.IX.1976, M.G. Maw, net from Convolvulus sepium (RARS); 1♂Δ©, 1.IX.1976, M.G. Maw, swept

Polygonum coccineum (RARS); 1♀$^{\Delta ©}$, 17.IX.1976, M.G. Maw, swept from Convolvulus sepium (RARS); 1♂$^{\Delta ©}$, 1♀$^{\Delta ©}$, 19.VIII. 1977, L. Fisher, swept from Solidago sp (RARS); 1♀$^{\Delta ©}$, 14. VII.1978, G. Volk, swept from Cirsium arvense (RARS). Beaupre: 1♀*, 8.VI.1956, FIS W-120, B(lack) Spruce (CNC). Big River: 1♀*, 3.VII.1959, A. & J. Brooks (CNC). Canora: 6♂♂*, 4♀♀*, 6.IX.1959, A. & J. Brooks (CNC). Crest(wynd): 1ex$^{\bullet}$, em 27.VIII.1952, FIS W-2-3727, Alder (UMW). Cut Knife: 2♀♀*, 1ex$^{\bullet}$ *, 29.VIII.1940, A.R. Brooks (CNC). Cypress Hills: 2♀♀, 6.IX.1967, 2♂♂, 7.IX.1967, R. Hooper (SMNH). Debden: 1♀* $^{\Delta ©}$, 15.VI.1954, FIS W-317, Willow (CNC). Delmas: 1♂, VII.1912, Claude Morley (BMNH). Dilke: 1♀$^{\Delta ©}$, 22.VI.1978, M. Maw, swept from Artemesia absinthium (RARS). Dunblane: 2♂♂$^{\star ©}$, 1♀$^{\star ©}$, 10.IX.1959, J.R. Vockeroth (CNC). Edenwold: 1♀$^{\Delta ©}$, 20.VII.1979, M.G. Maw, swept from Matricaria maritima (RARS). Estevan: 1♀*, 23.VII.1958, A. & J. Brooks (CNC); 1♂*, 1♀*, 29.VIII.1929, P.C. Brown (CNC). Findlater: 1♀$^{\Delta ©}$, 28.VIII.1979, M.G. Maw, swept from Solidago canadensis (RARS); 1♀$^{\Delta ©}$, 28.VIII.1979, M.G. Maw, swept from Artemesia absinthium (RARS). F(or)t à la Corne: 1♀*, em 9.IX.1963, FIS W-63-3672, Picea mariana (CNC). Fort Qu'Appelle: 1♀$^{\blacktriangle ©}$ *, 1919, R.H. Carter (CNC). Great Deer: 1♂*, 2♀♀*, 17.IX.1948, 2♀♀*, 18.IX.1948, 3♂♂*, 19.IX.1948, 2♂♂*, 2♀♀*, 1ex$^{\bullet}$ *, 25. IV.1949, J.R. Vockeroth (CNC). Hudson Bay: 1♂$^{\star ©}$, 1♀$^{\star ©}$, 15. IX.1959, J.R. Vockeroth (CNC). Indian Head: 1♂*, 10.IV.1925, J.J. de Gryse (CNC); 1♂, 18.VIII.1934, Kenneth Stewart (IHTN);

1♂, 20.XI.1936, C. Douglas, debris (IHTN); 1♂, 1♀, 2.VIII. 1939, C.R. Douglas (IHTN); 1♀, 23.VII.1941, Aspen Poplar cut in 1940 (IHTN); 1♀, 24.VII.1941, White Spruce (IHTN); 1♀, 3.VII.1950, A.F. Hedlin (UMW). Jameson: 1♀[Δ©], 19.VI. 1976, 1♀[Δ©], 30.VIII.1976, 1♀[Δ©], 12.VII.1977, G. Thomas, swept from Euphorbia esula (RARS); 1♀[Δ©], 20.VII.1978, R. Wise, swept from Euphorbia esula (RARS). Kamsack: 1♂, 4.V, A. Aschim (SMNH). Kenosee: 7♀♀[★], 1ex[♁ ★], 7.VI.1958, 9♀♀[★], 15.VI.1958, A.R. Brooks (CNC); 5♀♀[★], 19.VII.1958, A. & J. Brooks (CNC). Kronau: 1♂[Δ©], 3.VII.1977, G. Kelley, swept from Rumex sp (RARS). Lac la Ronge: 1♀[★], 22.VIII.1958, (FIS) W-58-2844, Picea mariana (CNC). Lanigan: 1♀[Δ©], 27. VII.1978, R. Vanstone, swept from Rumex sp (RARS). Lebret: 2♀♀[★], 15.VII.1958, A. & J. Brooks (CNC). Loon L(ake): 1♀[★], 22.VIII.1963, FIS W-63-3310, Pinus banksiana (CNC). Meacham: 1♀[Δ©], 28.VIII.1979, M.G. Maw, swept from Atriplex hortensis (RARS). Mozart: 1♂, 12.IX.1931, A.P. Arnason (CNC). Nisbet P(rov) F(orest): 1♂[★], FIS W-4422, Birch (NFRC). Pelican Narrows: 1♀, 23.VII.1976, R. Hooper (SMNH). Prince Albert: 1♂[★], 2♀♀[★], 1ex[♁ ★], 6.VIII.1954, Brooks & Wallis (CNC). Punnichy: 1♂, 30.III.1963 (SMNH). Qu'Appelle Valley: 1♀[Δ©], 12.VII.1977, L. Hustak, swept from Cirsium arvensis (RARS). Regina: 1♀, 16.VI.1943, P. Larkin (SEM); 1♂[Δ©], 3♀♀[Δ©], 27.VIII. 1973, M.G. Maw, from Artemesia absinthium (RARS); 2♀♀[Δ©], 27.VIII.1973, M.G. Maw, from Verbascum thapsus (RARS); 1♀[Δ©], 27.VIII.1973, M.G. Maw, from Sonchus arvensis (RARS); 1♀[Δ©],

27.VIII.1973, M.G. Maw, from Rumex stenophyllus (RARS); 1♀[△©], 16.VII.1974, R. St Pierre, from Polygonum coccineum (RARS); 1♂[△©], 27.VIII.1974, M.G. Maw, from Rumex crispus (RARS); 1♀[△©], 6.VII.1976, M.G. Maw, swept from Oenothera biennis (RARS). Roche Percee: 1♂, 11.IV.1964, R. Hooper (SMNH). Rockglen: 4♂♂[★], 13♀♀[★], 2.VIII.1955, A.R. Brooks (CNC); 1♀, 2.VIII.1955, A.R. Brooks (USS). St Gregor: 2ex (3rd instar larvae), 10.VIII.1979, L. Burgess, predatory on Phyllotreta cruciferae adults (SARS). Saskatoon: 1♀, 16. XI.1919, H.G. Dyar (USNM); 2♂♂[★], 1♀[★], 24.V.1923, N.J. Atkinson (CNC); 1♀[★], 14.X.1923, 1♀[★], 14.V.1924, Kenneth M. King (CNC); 1PT♂[▲©] [★], 23.IX.1925, Kenneth M. King (CNC 3309); 1♀[★], 26.V.1926, 1♀[★], 15.VI.1928, Kenneth M. King (CNC); 2♂♂[★], 7♀♀[★], 16.VIII.1939, 2♂♂[★], 2♀♀[★], 1ex[♁] [★], 7.IX.1940, A.R. Brooks (CNC); 1♀[★], 15.IX.1942, F. Andrews (CNC); 1♀, 7.VII. 1948, G.E. Fraser (USS); 1♂[★], 3.V.1949, J.R. Vockeroth (CNC); 1♂[★], 1ex[♁] [★], 11.VI.1950, 1♀[★], 11.VI.1951, 1♀[★], 22.VI.1951, 1♀[★], 31.V.1951, 5♂♂[★], 1ex[♁] [★], 6.X.1960, A.R. Brooks (CNC). Val Marie: 1♀, 18.VI.1974, R. Hooper (SMNH). Waterhen: 1♀[★], em 19.VII.1948, FIS W-956, W(hite) Spruce (NFRC). White City: 1♀[△©], 24.VI.1977, L. Hustak, swept from Hordeum jubatum (RARS). Whitefox: 2♀♀[★], 22.VIII.1959, A. & J. Brooks (CNC).

MANITOBA Agassiz F(orest) R(eserve): 1♀[★], 3.IX.1963, FIS W-63-3573, Picea glauca (CNC); 1♀[★], 3.IX.1963, FIS W-63-3575, Quercus macrocarpa (CNC). Altona: 1♂[★], 3♀♀[★], 13.VIII.

1953, C.F. Barrett (CNC). Aweme: 1PT♂▲© ★, 20.IX.1914, N. Criddle (CNC 3309); 1♀★, 23.IX.1915, N. Criddle (CNC); 1♀★, 5.V.1920, P.N. Vroom (CNC); 1♀★, 27.IX.1920, N. Criddle (CNC; 1PTex▲© ★, 27.IV.1922, E. Criddle (CNC); 1♀▲® ★, 21.VI.1924, R.D. Bird (CNC). Bald Head Hills, 13 mi N Glenboro: 1♀★, 21.VI.1958, J.F. McAlpine (CNC). Beasejour: 2♀♀, 16.VIII.1978, K.M. McGinnis (UMW). Bissett: 1♀+ ★, 10.VII.1944, FIS W-0198C, B(lack) Spruce (NFRC). Brandon: 1♀★, 8.VII.1946, P.H. Westdal, on Potato (CNC); 1♀, 1.VI.1948, A.G. Robinson (UMW); 1♂, 12.VIII. 1949, 1♂, 16.VIII.1949, D.F. McLean (UMW); 1♀, 16.VI.1950, T.V. Cole, on Brome grass (UMW); 1♀★, 6.VII.1950, C.F. Barrett (CNC); 1♀▲© ★, 21.VIII.1951, 1♂▲® ★, 31.VIII.1951, A.G. Robinson (CNC); 6 mi NW, 1♀★, 1.VII.1958, R.B. Madge (CNC); 1♀★, 24.VII.1958, R.L. Hurley (CNC). Carberry: 1♂, 22.VIII.1948, E.A.R. Liscombe (UMW); 1♀★, 13.V.1953, 1♀★, 19.VI.1953, 5♀♀★, 23.VI.1953, Brooks & Kelton (CNC). Carey: 1♀★, 3.VIII.1958, A. & J. Brooks (CNC). Cedar Lake: 1♂▲©, 1-15.VII.1936, F.M. Carpenter & C.T. Parsons (MCZ); 3 mi S, 1♀★, 15.VII.1961, H.E. Milliron (CNC). Clear Lake, Riding Mountain Nat'l Pk: 1♀★, 12.VIII.1958, N.B. Chillcott (CNC). Cross L(ake): 1♀★, 27.VIII.1942, FIS W-731, Spruce (CNC); 1♀▲© ★, 3.IX.1946, FIS W-1026, Balsam (CNC). Falcon Lake Campground, Whiteshell Prov Pk: uvl, 1♀, 10.VII.1970 (ROM 700382). Flin Flon: 1♂+ ▲© ★, em 20.VIII.1954, FIS W-2216 (CNC). F(or)t Garry: 1♀★, 23.VIII.1944, FIS W-0441, Willow

(NFRC); 1♂ ★, em 18.VIII.1945, FIS W-357-X (CNC). Gladstone: 5♂♂★, 14.VIII.1958, A. & J. Brooks (CNC). Glenlea Research Station, Glenlea: 1♂, 21.IV.1980, 1♀, 2.V.1980, P. Arntfield (UMW); at 1t, 2♂♂, 1♀, 20.VI.1980, P.W. Arntfield (LEM); 1♀, 7.VIII.1980, A.G. Robinson (UMW); 1♂, 7.VIII.1980, B.A. Batulla (UMW); at 1t, 3♂♂, 5♀♀, 20.VIII. 1980, P.W. Arntfield (LEM); at 1t, 2♂♂, 29.VIII.1980, P.W. Arntfield (UMW); at 1t, 1♀, 5.IX.1980, P.W. Arntfield (LEM); at 1t, 12♂♂, 8♀♀, 8.IX.1980, 8♂♂, 5♀♀, 12.IX.1980, P.W. Arntfield (UMW). Husavick: 3♀♀★, 12.VI.1953, Brooks & Kelton (CNC). Ile des Chenes: 2♀♀, 20.VI.1978, Jim Broatch (UMW). Kenville: 1♂△© ★, em 27.VIII.1954, FIS W-2919, W(hite) Poplar (CNC). La Barriere Pk (Winnipeg): 2♀♀, 6.VIII.1980, B.A. Batulla (UMW). Mafeking: 4♂♂★, 11♀♀★, 3.IX.1959, A. & J. Brooks (CNC); 1ex●, 3.IX.1959, A. & J. Brooks (USS). Minnedosa, 5 mi N: 2♀♀★, 8.VII.1958, R.L. Hurley (CNC); 1♂★, 7♀♀★, 8.VII.1958, R.B. Madge (CNC). Morden: 1♂★, 29. VIII.1951, A.G. Robinson (CNC); 1♂, 19.IX.1951, A.G. Robinson (UMW). Morris: 7♂♂★, 3♀♀★, 4.VIII.1958, A. & J. Brooks (CNC). Napinka: 1♀★, 22.V.1953, Brooks & Kelton (CNC). Neepawa: 2♀♀★, 17.VI.1963, FIS W-63-688, Caragana (CNC). Ninette: 4♀♀★, 14.VI.1958, R.B. Madge (CNC). Ninga: 5♀♀★, 24.VII.1953, A.R. Brooks (CNC); 1♀, 24.VII.1953, A.R. Brooks (USS). Norgate: 5 mi W, Riding Mt Nat'l Pk, 1♂★, 16.VIII.1958, R.L. Hurley (CNC). Pilot Mound: 5♀♀★, 31.VII. 1958, A. & J. Brooks (CNC). Pinawa: 1♀, 29.VII.1978, P.T.

Copps (UMW). Pine Falls: 1♂*, (em) 7.VIII.1961, FIS P.F. 13, Larix laricina (UMW); at lt, 3♂♂, 3.VIII.1961 (UMW); 1♂, 4.VIII.1961, FIS P.F. 43 (UMW); at lt, 3♂♂, 1♀, 17. VIII.1961, 4♀♀, 31.VIII.1961 (UMW). Portage: 1♀, 5.VII. 1978, P.T. Copps (UMW). Rennie: 1♀, 25.VII.1950, W.G.H. Ives (UMW); 1♂★, 13.VIII.1959 (CNC); 1♀, 16.VII.1961, FIS, Larix laricina (UMW); uvl, 1♂, 1.VIII.1961, FIS (UMW); uvl, 1♀, 6.VIII.1961, FIS (UMW); 1♂Δ©, 14.VI.1965, Life Table Plot (CNC). R(iding) M(ountain) N(ational) P(ark): 1♀★, 14.VI.1949, H. McKinnon (CNC); 1♀★, em 16.IX.1963, FIS W-63-3_43-03, Chokecherry (CNC). Ste Rita: 7.3 mi E, 1♂, 8.IX.1971, W.B. Preston, Pine forest (MMMN). Sandilands: Hwy 1 at 506, 2♂♂, 9.VIII.1977, B. McKillop (MMMN). Sanford: 1♂, 9.VII.1968, A. Bergen (UMW). Sasaginnigak: 1♂★, 25.VIII. 1945, FIS W-529, Balsam (CNC). Selkirk: 1♀, 15.VIII.1978, Jim Broatch (UMW). Shilo, 5 mi SW: 2♀♀★, 10.VI.1958, 1♀★, 1ex♁★, 16.VI.1958, R.L. Hurley (CNC); 1♀★, 16.VI.1958, J.F. McAlpine (CNC); 4♀♀★, 16.VI.1958, 1♀★, 30.VI.1958, 2♀♀★, 2.VIII.1958, R.B. Madge (CNC); 1♂★, 13.VIII.1958, J.G. Chillcott (CNC). Shortdale: 1♀, 23.VII.1952, FIS W-52-2432, Wh(ite) Spruce (UMW). Starbuck: 1♂, 9.VIII.1978, K.M. McGinnis (UMW). Stockton, 2 mi W: 1♂★, 6.VIII.1958, R.L. Hurley (CNC). Stony Mountain: 1♂Δ©, 16.X.1910, J.B. Wallis (MCZ Banks Collection); 1♂Δ© ★, 16.X.1910, J.B. Wallis (CNC). Swan R(iver): 2♀♀★, 17.VI.1963, FIS W-63-757, Salix sp (CNC). Telford: at lt, 6♂♂, 2♀♀, 9.VIII.1961, 2♂♂, 2♀♀, 16.VIII.1961, 1♀, 30.VIII.1961 (UMW). The Pas:

1♂★, 3♀♀★, 30.VIII.1959, A. & J. Brooks (CNC). Treesbank: 1♀★, 18.VI.1958, J.F. McAlpine (CNC); 1ex♂★, 17.VIII.1958, J.G. Chillcott (CNC). U(niversity of) M(anitoba), at 1t: 1♂, 20.VIII.1980, P.W. Arntfield (UMW); 1♂, 5.IX.1980, P.W. Arntfield (LEM); 1♀, 10.IX.1980, 1♀, 15.IX.1980, P.W. Arntfield (UMW). Wabowden: 1♀★, 28.VIII.1942, FIS W-732, Spruce (CNC). Wanless: 1♀★, 6.VII.1961, H.E. Milliron (CNC). Whitemouth: 1♀★, 20.VIII.1947, FIS W-1153, J(ack) Pine (CNC). Whitewater L(ake), 4 mi N Whitewater: 1♀★, 30.VII. 1958, R.L. Hurley (CNC). Winkler: 1♀★, 5.IX.1950, C.F. Barrett (CNC). Winnipeg: 1♀△©, 7.X.1910, J.B. Wallis (MCZ Banks Collection); 1ex, 26.IX.1911, J.B. Wallis (CNC); 1♀, 19.VI.1927, J.J. Neilson (UMW); 2ex♂, 2.IX.1948, W.H. Fell (UMW); 1♂, 16.VIII.1950, 1♀, 25.VIII.1950, W.H. Foott (UMW); 2♂♂, 5♀♀, 24.VIII.1953, A.G. Robinson (UMW); 2♂♂★, 1♀★, 9. VIII.1958, A. & J. Brooks (CNC); 1♀, 29.VIII.1962, W. Tostowaryk (UMW); 1ex♂, 7.VIII.1975, D.C. Turnock (MMMN); 1♀, 4.VIII.1978, J.A. Garland (LEM); 1♀, 24.VIII.1978, J.L. Buth (UMW); 1♀, 5.VII.1979, 1♂, 16.IV.1980, P. Arntfield (UMW); 1♂, 1.VIII.1980, B.A. Batulla (UMW).

ONTARIO Agawa Bay: 1♀, 2.VIII.1959, R.E. Crawford (UG). Amethyst: 1♀, 21.VI.1970, K.J.G. Deacon (UG). Ancaster: 1♂, 1♀, 13-14.IV.1968, J.E.H. Martin (CNC). Attawapiskat, 52°N: 1♀★®, 17.VI.1939, C.E. Hope (ROM). Batchawana: 1♀, 10.VII.1955, J. Gustafson (LEM). Beardmore: 1♂★, em 14.VII.

1941, FIS 1941 132E, White Spruce (NFRC). Belleville: 1♀, 2.IX.1950, J.C. Fisher (UG); 1♂, 3.X.1969, Ikram, adult from cage containing Convolvulus (RARS). Bell's Corners: 2♂♂★, 26.IV.1940, O. Peck (CNC); 1♂★, 1♀★, 1.V.1951, J.F. McAlpine (CNC); 1♂★, 10.IV.1952, C.D. Miller (CNC). Biscotasing: 1♀★, 19.VI.1931, 2♀♀★, 14.VII.1931, 3♀♀★, 16.VII.1931, 2♀♀★, 20.VII.1931, 1♀★, 1♀▲©★, 23.VII.1931, 1♀★, 28.VIII.1931, 1♀★, 4.IX.1931, Karl Schedl (CNC). Black Sturg(eon) Lake: 3♀♀, 1-15.VIII.1956, Lindberg (ZMUH); 1♀★, 27.VI.1957, K. Beanlands (CNC). Brighton: 1♀★, 7.IX.1954, John C. Martin (CNC). Carp: 1♀★, 7.X.1950, FIS 050-1761, White Pine (CNC). Cawaja Beach, Tiny Tp, Simcoe Co: 1♀, 24.VII.1968, J.C.E. Riotte (ROM). Cedar Lake: 1♀★, 2.VIII.1948, L.M. Gardiner (CNC); Chaffeys Locks: 3♀♀, 25.V.1961, G.K. Morris (UG); uvl, 1♀, 23.VIII.1964, J.C.E. Riotte & P. Hebert (ROM); uvl, 1♂, 18.VII.1974, J.C.E. Riotte (ROM). Chatham: 1♀, 30.VII.1930, Geof. Beall (UWO); at lt, 1♀, 1931 (CNC); 2♀♀, 11.V.1953, K. Davey, alfalfa (CNC); 1♀, 10.VI.1953, K. Davey, Baker Red Clover (CNC); 1♀, 25.V.1954, J. Evans, alfalfa (CNC); 1♀, 22.VI.1954, 1♀, 20.VII.1954, K.G. Davey, alfalfa (CNC). Clinton: 1♀, 4.VII.1963, J.D. Van Loon (UG). Cooksville: 1♀, 25.IV.1959, D. Barr (ROM). Crystal Lake: 1♂, 2.VII.1978, Jim Broatch (UMW). Dunn Tp: 1♀± △, 1.VIII.1962, em 17.VIII.1962, (gall) A22, 1♂± △, 2.VIII.1962, em 10.VIII.1962, gall A44, 1♂± △, 3.VIII.1962, em 13.VIII.1962, gall A99, W.W. Judd (UWO).

E(l)mira: 1♀, 1.V.1962, 1♀, 5.V.1962, A.F. Johnson (UG). Eramosa: 1♀, 6.V.1959, R.D. Crawford (UG). F(or)t Francis: 2♀♀★, 28-29.VI.1960, Kelton & Whitney (CNC). Foxboro: 1♂, 9.V.1963, C.J. Edwards (UG). Georgian Bay Island 421: 1♀, 26.VIII.1963, J.P. Bogart (UG). Goderich, Maitland R(iver) at Hwy 21: 1♀, 19.VII.1977, B. Marshall, fields and trees (ROM 770156a); 1♀, 20.VII.1977, D. Maddison, Wild Carrot (ROM 770159b). Gogama: 2♀♀★, em 22.VIII.1960, FIS 560-5122-04, Picea mariana (GLFRC). Guelph: 1♀, 3.VIII.1957, D.H. Pengelly (UG); 1♀, 3.V.1959, 1♂, 2♀♀, 20.V.1959, R.D. Crawford (UG); 1♀, 25.IX.1959, T.H. Scholten (UG); 1♀, 5.VIII.1960, Tran Van Quynh (UG); 1♂, 13.V.1961, C.S. Henry (UG); 2♀♀, 20.V.1961, Tran Van Quynh (UG); 1♀, 4.VI.1961, 1♂, 22.VII.1961, C.S. Henry (UG); 1♂, 4.XI.1965, D.H. Pengelly (UG); 1♂, 15.V.1971, K.J.G. Deacon (UG); 1♂, 17.X.1971, Barry Wright (UG); 1♂, 11.IX.1973, R.J. Hellewell (UG). Hamilton: 1♀, 4.VIII.1947, W. Judd (UWO); 3♀♀, 13.VIII.1950, J. Reid (MCMU). Harrow: 1♀, VII.1956, A. Hoeberlin (MCMU); 1♂, 24.VI.1962, R.S. Dickhout (UG). Hawk L(ake): 1♀★, em 18.VIII.1941, FIS 1941, Jack Pine (NFRC). Hunta: 1♂★, 1♀★, em 12.IX.1960, FIS 560-7216-14, Picea glauca (GLFRC). Ignace: 1♂★, 16.IX.1942, FIS W-760, Spruce (CNC). Island Falls: 1♂★, 9.VIII.1949, FIS 1949 949-5413, Balsam (CNC). Iron Bridge: at 1t, 1ex♂★, 29.VIII.1959, R.E. Leech (CNC). Iroquois: 1♂★, 18.IX.1956, G.B. Wiggins (ROM). Jordan: 1♀Δ©, 9.VII.1914, 1♀, 10.VIII.1914, W.A. Ross (USNM); 1♂Δ©★, 1♀Δ©★, 10.VIII.1914, W.A. Ross (CNC). Kendal: 1♂★,

1♀★, 8.X.1955, G.B. Wiggins (ROM). Kenora: 5-10 mi N, 1♀★, 13.VII.1961, H.E. Milliron, Sweet Clover (CNC); 1♀, 10.VII.1978, D.H. Marlow (UMW). Kingsville: 1♂★, 17.VII. 1955, L.A. Kelton (CNC). Lambeth: 1♂Δ®, 13.XI.1936, W.C. McGuffin (UWO). Leaside: 1♂, 13.V.1961, G.K. Morris (UG). London: 1♀ , W. Saunders (UG); 22 mi E, 1♂, 19.VII.1967, C. & W. Boyle (LEM). Longlac: 1♀★, em 10.VII.1960, (FIS) 560-3420-04, Picea glauca (GLFRC); 1♀★, em 23.IX.1960, (FIS) 560-7477-03, Picea glauca (GLFRC). Magpie: 1♂+ Δ© ★, 5.VIII.1941, FIS W-4885C, Spruce & Balsam (CNC). Malachi: 1♀★, 19.VIII.1946, FIS 1946 546-3237, W(hite) Spruce (CNC). Manitoulin: 1ex♦, 27.VII.1959, E.A. Cameron (UG). Marathon: 1♀★, em 21.IX.1960, (FIS) 560-7494-03, Picea mariana (GLFRC). Marmora: 1♀★, 28.IV.195___, J.F. McAlpine (CNC); 1♀★, 7.VII. 1952, 2♀♀★, 10.VII.1952, 2♀♀★, 1_.VII.1952, 4♀♀★, 18.VII. 1952, C. Boyle (CNC). Mattice: 1♂★, em 10.VIII.1960, (FIS) 560-5681-06, Picea glauca (GLFRC). Merivale: 1♂★, 28.IV. 1939, G.S. Walley (CNC). Niagara: 1♂Δ©, 27.VIII.1931, W.L. Putman (UG). Nipigon: 1♂, 8.VIII.1978, J.A. Garland (LEM). Ogoki: 1♀★, 16.VIII.1952, J.B. Wallis (CNC). One Sided Lake, Larsson's: uv1, 1♀, 4.VII.1962, J.C.E. Riotte (ROM). Orono: 1♀, 21.X.1951, G.B. Wiggins (ROM). Ospringe: 1♂, VI.1950, S.E. Brown (UG). Ottawa: 1♂★, 20.IV.1944, T.N. Freeman (CNC); 1♂★, 23.X.1946, G.E. Shewell (CNC); 1♂★, 1♀★, 17.X.1951, J.R. Vockeroth (CNC); 1♂★, 26.VIII.1953, G.S. Walley (CNC); 1♂★, 20.IV.1955, J.R. Vockeroth (CNC); 1♂★ , 1.XI.1957, H.F.

Howden (CNC). Paris: 1ex♂, 6.VIII.1964, B.K.W. Wyatt (UG). Pelee Is(land): 1♂★, 3.VII.1950, 1ex♂ ★, 10.VII.1950, 1♂★, 20.VII.1950, 1♂★, 18.VIII.1950, V. Kohler (ROM). Petawawa Res(earch Centre): 1♂, 24.VII.1940, N.R. Brown (UWO). Peterboro: 1ex♂, 7.IX.1977, Peggy Morton (UG). P(oin)t Pelee: 1♂★, 8.IX.1954, G.S. Walley (CNC); 1♀★, 28-29.VI. 1961, Kelton & Brumpton (CNC). Port Credit: 1♂, 3.V.1965, Ian Smith (ROM); uvl, 1♀, 25.VII.1965, 1♀, 12.IX.1968, I.M. Smith (ROM). Red Lake: 2♀♀★, em 30.IX.1960, (FIS) 560-7585-04, Picea mariana (GLFRC). Ryland: 1♀★, 1ex♂, em 19. IX.1960, (FIS) 560-7461-11, Picea glauca (GLFRC). St Davids: 1♀, 20.VIII.1931, W.L. Putman (UG). Sauble Falls Prov Pk, 3.5 km E: 2♀♀, 24.VII.1977, D. Maddison, dry roadside field (ROM 770172a). Sault Ste Marie: 1♂+ △© ★, 1♂+ ★, 2♀♀+ ★, 12.VIII.1953, S. Wyatt, FIS 1953, Platysamia cecropia (CNC). Sioux Lookout: 1♀★, 29.VII.1942, FIS W-594A, B(lack) Spruce (CNC). Southampton: 1♂★, 1♀★, 5.IX.1939, G.S. Walley (CNC). S(outh) Neebing Tp: 1♀, 29.VI.1962, J.C.E. Riotte (ROM). Spanish: 1♀, 30.VII.1957, Merrill H. Prime (UG). Stoney Creek: 1ex♂, 23.IV.1968, Paul Budd (UG). Sudbury: uvl, 1♀, 11.VII.1961, J.C.E. Riotte (ROM). Tashoto: 1♀△© ★, 13.IX. 1941, FIS W-373, J(ack) Pine (CNC). Thessalon: 1♀, 15.VI. 1963, 1♀, 25.VI.1963, R.G. Brumpton (UG); 1♀, 19.VI.1965, 1♂, 12.VI.1965, K.P. Butler (LEM). Thunder Bay: 1♀, 17.VI. 1970, K.J.G. Deacon (UG). Tillsonburg: 1♂★, 1♀★, 14.VII. 1955, L.A. Kelton (CNC). Timmins: 1♂★, 16.VII.1951, FIS

1951 551-3336-12, Spruce (CNC). Toronto: 1♂*, XI.1951, W.Y. Watson (GLFRC); 1♂, 14.VII.1957, 1♀, 20.VIII.1957, P.W. McMullen (UG); at 1t, 1♀, 2.VIII.1961, J.C.E. Riotte (ROM); 1♀, 28.X.1964, J.C.E. Riotte (ROM); at 1t, 1♂, 8.XI.1966, 1♂, 10.XI.1966, J.C.E. Riotte (ROM). Unaka: 1♂*, 8.VIII.1946, FIS 1946 546-1994, J(ack) Pine (CNC). Vermilion Bay: 1♀*, 13.VII.1961, H.E. Milliron (CNC). Whitby: 1♀, 8.X.1973, G.J. Umphrey (UG). Woodstock: 1♂, 1ex♂, 10.X.1970, R.D. Fairbairn (UG).

QUEBEC Berthier: 1♀Δ©, 10.VIII.1949, RB2950 (UdeM). Berthierville: 1♀Δ©, 5.VIII.1948, A. Robert, sur orme (UdeM); 1♀Δ©, 2.IX.1949, 1♂Δ©, 5.IX.1949, 1♀Δ©, 30.VII. 1950, A. Robert (UdeM); 1♂Δ©, 30.VIII.1950, A. Robert, sur orme (UdeM). Canton Bousquet, Cté R(ouyn)-Noranda: 1♀+, 1.VII.1940, (FIS) 1940 9282-C, sapin (CSQ). Padoue, C(an)ton Cabot, Cté Matapedia: 1♂, 7.VIII.1978. (FIS) 78-7176-01, Picea glauca (CSQ). Canton Fox, Cté Bonaventure: 1♀, 19.VIII.1971, (FIS) 7724-B (CSQ). Canton Descombes, Cté Abitibi-Est: 1♀, 16.VIII.1979, (FIS) 74-7185, Picea mariana (CSQ). Canton Duparquet, Cté Abitibi-O(uest): 1♀, 18.VI.1947, (FIS) 47-38987-C (CSQ). Canton Duquesne, Cté Rimouski: 1♀, 25.VIII.1947, (FIS) 47-41706-B (CSQ). Canton Fournière, Cté R(ouyn)-Noranda: 1♀+, 9.VII.1941, em 24.VII, (FIS) 1940-9822-B, epinette blanche (CSQ); 1♀+, 21.VIII. 1941, em 21.VIII, (FIS) 41-10891-C, sapin (CSQ). Canton

Low, Cté Gatineau: 1♂, 24.VIII.1971, (FIS) 8015-B (CSQ). Canton Plessis, Cté Chicoutimi: 1♂, 7.VIII.1978, (FIS) 78-7209-02, Picea glauca (CSQ). Canton Preissac, Cté R(ouyn)-Noranda: 1♂[‡], 9.VII.1940, (FIS) 1940 9825-E, epinette (CSQ). Canton Saguenay, Cté Charlevoix: 1♂, 23. IX.1947, (FIS) 47-42089-B (CSQ). Cap Chat: 1♀[★], 4.IX.1948, N.R. Brown (CNC). Cap-Rouge: 1♂, 2.IX.1953, J.P. Laplante (UL). Choisy, nr Rigaud: 1♀, 28.VII.1956, 1♂, 25.VIII. 1956, Lindberg (ZMUH). Farnham: 1♀[Δ©], 10.IV.1951, A. Robert (UdeM). Harrington L(ake), Gatineau Pk: 1♀[★], 27.V. 1954, H.J. Huckel (CNC). Hudson Heights: 1♂, 2♀♀, 1ex[♦], 24-30.VII.1956, 1♂, 1-4.IX.1956, Lindberg (ZMUH). Kirks Ferry: 1♀[★], 25.V.1950, B.P. Beirne (CNC). Lac Brulé, Cté Labelle: 1♀[‡], 5.VIII.1942, (FIS) 1942 17446-D, epinette blanche (CSQ). Lac des Pins, Cté Labelle: 1♀[‡], VII.1940, (FIS) 1940 9544-F, epinette (CSQ). Lac Mondor, Ste Flore: 1♀[★], V-VI.1951, E.G. Munroe (CNC). Lacolle: 1♂, IX.1976, W. Norrish (LCCU). Lac Serpent, Notre Dame du Laus: 1♀, 27.VII.1970, S.D. Vickery (LEM). Laniel: 1ex[♦★], 18.VII. 1931, H.S. Fleming (CNC); 1♀, 20.VII.1931, M.B. Dunn (UAE); 1♀[★], 1.VIII.1933 (CNC). Lanoraie: 1♂[Δ©], 3.VII.1949, A. R(obert) (UdeM). Laval: 1♂, 11.V.1977, 1♀, 16.VIII.1980, 1♀, 25.VIII.1981, A.C. Sheppard (LEM). Mac(donald) College: 2♀♀, 9.VI.1954, Quercus (LEM). Montreal: 1♀[Δ®], 10.VI.1934, A. Robert (UdeM); 1♂[Δ©], 28.VII.1941, J. Ouellet (UdeM); 1♀[Δ®], 10.X.1946, A. Robert (UdeM); 1♀, 20.VIII.1949 (LEM);

1♂$^{\Delta©}$, 24.IX.1949, A. Robert (UdeM); 1♂, 18.X.1952, 2♀♀, 2_.X.1952, 1♂, 27.VIII.1957, 1♂, 25.IX.1957, 1♀, 28.X, G.A. Moore (LEM); 1♀$^{\Delta®}$, 1958, A. Robert (UdeM); 1♂, 6. X.1958, 1♀, 16.X.1959, G.A. Moore (LEM). M(on)t St Hilaire: 1♀, 12-16.VIII.1977, A.T. Finnamore (LEM). Nomingue: 1♂$^{\Delta©}$, 8.VII.1935, A. Robert (UdeM). Parc du Mont Tremblant: 1♀$^{\Delta©}$, 21.VII.1961, A. Robert (UdeM). Pépinière Berthier, Cté Berthier: 1♀, VII.1960, (FIS) 60-8009 (CSQ). Pointe des Cascades: 1♂, 25.VIII.1977, D.N. Duffy (LEM). Portage du Lac Brochet, Cté Roberval: 1♀, 30.VII.1939, (FIS) 39-2377 (CSQ). Région de Authier, Cté Abitibi-O(uest): 2♂♂, 17.VI. 1944, (FIS) 44-_0031-B (CSQ). Région Forestville, Cté Saguenay: 1♂, 11.IX.1941, (FIS) 41-14147-B (CSQ). Région Val-d'Or, Cté Abitibi-E(st): 1♂, 5.VII.1938, (FIS) 38-6335-B, epinette noire (CSQ). Rivière-à-Pierre, Cté Portneuf: 1♂, 16.VIII.1938, (FIS) 1938 7448E (CSQ). Rougemont: 1♂, 3.V.1967, B.P. Mehra (CNC). Ste Anne de Bellevue: 1♀, VIII.1962, 1♀, 5.VI.1963, V.R. Vickery (LEM); 1♀, 6.V.1964, G. Jamieson (LEM); 1♀, 6.V.1965, W. Boyle (LEM); 1♀, 24. VIII.1967, 1♀, 1.IX.1967, R. Lalonde (LEM); 1♀, 25.VIII. 1978, J.A. Garland, Spruce-Fir association (LEM); 1♀, 31. VIII.1978, 1♂, 21.IV.1979, J.A. Garland, Spruce association (LEM). Ste Clotilde: 1ex♦, 29.VII.1965, J. Lafrance (SJRS). Senneterre, Cté Abitibi-E(st): 1♀, 28.VII.1940, (FIS) 1940 9829-D, epinette noire (CSQ). Villedonne, Cté Gatineau: 1♀, 30.VII.1979, Acer rubrum (CSQ). York: 1♂, 28.VIII.1965, G. Jamieson (LEM).

NEW BRUNSWICK F(rederic)ton: 1♀★, VIII.1948, G.R. Underwood (CNC); 1♀★, 10.VIII.1948, F.E. Webb (CNC); 1♀★, 10.VI.1949, G.T. Silver (CNC); 1♂★, 12.VII.1949, R. Clark (CNC); 2♀♀★, 16.VIII.1959, N.R. Brown (MFRC); at lt, 1♀★, 29.VIII.1959, R.C. Clark (MFRC). Greenriver: at lt, 1♀★, 30.VII.1949, D.O. Greenbank (CNC). Jaquet Head, Restigouche Co: 1♀★, 1.IX.1956, B. Hodgson (CNC); 1♀★, 7.VIII.1960, G.M. Howse (CNC). McGraw B(roo)k: at lt, 1♀, 25.VIII.1968 (NDFRC). New Denmark, Vict(oria) Co: 1♂△©, 17.VII.1942, FIS 1942 42-L366, Picea glauca (MFRC).

NOVA SCOTIA Aldershot: 1♀★, 5.VI.1959, F.T. Lord, Apple (KARS). Cambridge: 1♂★, __.VIII.195___, H.T. Stultz, larva from bud moth spin-up (KARS). Centreville, Kings Co: 1♂, 2.X.1950, D.C. Ferguson (NSM); 1♂, 1♀, 2.X.1950, 1♀, 3.X.1950, D.C. Ferguson (USNM). Sable Island, Met Station: 1♀, 11-14.VIII.1978, B. Wright & D.C. Ferguson (NSM). Wellington: 1♂, 4.X.1950, D.C. Ferguson (USNM).

NEWFOUNDLAND Avalon Pen(insula): 1♀, 12.IX.1977 (MU). Bishops Falls: 1♀, 5.VII.1979, E. John (SJARS). Lewisporte: 1♀, 15.VIII.1976, Ray F. Morris (SJARS). St John's: 1♀, 14.VII.1969 (MU).

Nineta gravida

BRITISH COLUMBIA Departure Bay: 1♀▲© ★©, 13.VI.1908 (CNC). Vanc(ouver) Island: 1ex♂, 2.VI.1888, G.W. Taylor (CNC); Victoria, 1ex♂, W.H. Danby, Geo(logical) Survey (of) Canada (CNC).

Glenochrysa lineaticornis

SASKATCHEWAN Hazelcliffe: 1ex♂ ▲©, 14.VIII.1925, Kenneth M. King (CNC).

ONTARIO Bala: 1♀★©, 19.VII.1932, G.S. Walley (CNC). Black Lake, N Burgess Tp: 1ex☆ larva, head missing, 2nd instar, 20-30.VII.1971, J.A. Downes, larva 837-1-2 (LEM). Cawaja Beach, Tiny Tp, Simcoe Co: uvl, 1♀, 30.VII.1968, J.C.E. Riotte (ROM). Chaffeys Locks: uvl, 1♀, 7.VII.1963, J.C.E. Riotte & I. Smith (ROM); uvl, 1♂, 21.VIII.1970, J.C.E. Riotte (ROM). Constance Bay: 1♀, 24.VIII.1932, L.J. Milne (CNC). Fisher Glen: 1♀, 11.VI.1931, 1♂, 15.VI.1931, G.S. Walley (CNC). Go Home Bay: 1♀, 24.VI.1932, 1♂, 1♀, 27.VI. 1932, G.S. Walley (CNC). Marmora: 1♀, 27.VI.1952, C. Boyle (CNC). One Sided Lake: 1♀★©, 8.VIII.1960, Kelton & Whitney (CNC). Parry Sound: 2♂♂, 15.VII.1932, G.S. Walley (CNC).

St Davids: 1♂△©, 2.IX.1931, W.L. Putman (UG). S(outh) Neebing Tp: 1♀, 7.VII.1962, W. Hartley & J.C.E. Riotte (ROM). Wagerville: 1ex, 14.VII.1967, L.L. Pechuman (CU Pechuman in litt. 1980). Zealand Tp, Div(ision) 21: 1ex♦ ★©, 7.VII.1947, FIS 1947 247-1288, Balsam Fir (CNC).

QUEBEC Aylmer: 1♀▲©, 3.VIII.1927, G.S. Walley (CNC). Berthier: 1♀△®, 10.VIII.1949, RB 3047 (UdeM). Ile-Perrot: 1♂, 29.VI.1980, J.A. Garland, Alder thicket (LEM). Lac Mondor, Ste Flore: 1♂, 20.V.1951, 1♀, 25.VI.1951, 1♂, 8.VII.1951, 1♀, 9.VII.1951, E.G. Munroe (CNC). Meach Lake: 1ex, 21.VI.1916 (CU Pechuman in litt. 1980). Rigaud: 1♂△®, 10.VI.1936, A. Robert (UdeM). Ste Anne de Bellevue: at lt, 1♀, 16.VI.1979, J.A. Garland, Arboretum (LEM). Shawbridge: 1♂, 23.VIII.192__, A.F. Winn (LEM).

NEW BRUNSWICK Chipman: 1ex♦ ★©, 24.VII.1947, N.R. Brown (CNC). Fredericton: 1♀★©, 29.VI.1947, J. Clark (CNC). Tabusintac: 1♀, 20.VII.1939, J. McDunnough (CNC).

NOVA SCOTIA Bridgetown: 2♀♀, 31.VII.1912, G.E.S. (CNC). Mount Uniacke: 1♀★©, 7.IX.1950, D.C. Ferguson (USNM). S(outh) Milford: 1♂★©, 29.VI.1934, J. McDunnough (CNC).

Oviedus placitus

ONTARIO Chatterton: 1♀, 7-8.VIII.1968, R.H. Parry (UG).

QUEBEC Kazabazua: 1♂▲® ★©, 1♀★©, 16.VIII.1927, G.S. Walley (CNC).

Mallada perfectus

BRITISH COLUMBIA Penticton: 1♂, 22.VII.1976, 1♂, 26.VII. 1976, 1♂, 1♀, 27.VII.1976, 2♂♂, 1♀, 28.VII.1976, 2♂♂, 1♀, 2.VIII.1976, 1♂, 1ex♠, 4.VIII.1976, 2♀♀, 10.VIII.1976, 1♂, 18.VIII.1976, 1♂, 3.IX.1976, J.A. Garland (LEM). W(est) Summerland: 1♀, 26.VII.1963, G.J. Spencer (SEM).

Mallada slossonae

ONTARIO Kendal: uvl, 1♀, 17.VII.1967, 1♀, 24.VII.1967, Riotte & Kohalmi (ROM). Pinery Prov Pk, Lambton Co: Ausable R(iver) nr Riverside Campground, 1♂, 3.VII.1977, E. Oleksuik, sweeping understorey shrubs (ROM 770108). White Lake: uvl, 1♀, 4.VIII.1966, P.D. Hebert (ROM).

Nothochrysa californica

BRITISH COLUMBIA Bowser: 1♂*, 30.V.1955, 1♂*, 5.VI.1955, W.J. Brown (CNC). Sidney: 1♂, 11.IV.1927, W. Downes (SEM). S(outh) Pender Is(land): 1♀, 30.V.1950, FIS 1950 P50-197, D(ouglas) Fir (CNC). Vancouver: Seymour Mountain, 4700 ft, on snow, 1♂Δ, 1♀, 1♀Δ, 31.V.1931, H.B. Leech (SEM); 1♂†, em 24.IV.1932, G.J. Spencer (SEM). Victoria: 1♀, 5.V.1944, W. Downes (SEM).

The following information represents data from specimens which were not available during compilation of the text of this thesis, for which reason it was not included in the summary of localities for each of the species listed below, nor mapped.

Meleoma signoretti

QUEBEC Lakefield: 1♂, 22.VII.1981, A.C. Sheppard (LEM).

Meleoma emuncta

QUEBEC Laval: 1♂, 2.VI.1981, 1♀, 30.VII.1981, 1♀, 12.VIII. 1981, A.C. Sheppard (LEM).

Chrysopa oculata

YUKON TERRITORY Alaska Hwy: Horseshoe Bay Campground at 1713 km, 61°03' 138°30', 1♂Δ, 12.VII.1979, on plants along forest access road (ROM 791119b). Klondike Hwy: Pelly X-ing (Crossing) Campground, 466 km, 62°49' 136°35', 3♂♂Δ, 1ex♦Δ, 17.VI.1979, flying in clearing (ROM 791039c); 10 km N Pelly X-ing, pond at 476 km, 62°52' 136°30', 1♀Δ, 23.VII.1979, on plants in bog (ROM 791156b). Mayo: 1♂Δ, 19.VI.1979 (ROM 791045).

QUEBEC Laval: 1♀, 3.IX.1980, 1♀, 1.VII.1981, 1♀, 3.VIII. 1981, 1♂, 19.VIII.1981, 1♀, 26.VIII.1981, 1♂, 29.VIII.1981, 1♂, 30.VIII.1981, A.C. Sheppard (LEM). Ste Anne de Bellevue: 1♂, 5.IX.1980, D. Leprince (LEM); 1♀, 25.VI.1981, D.N. Duffy (LEM).

Chrysopa chi

YUKON TERRITORY Klondike Hwy: McCabe Cr(eek), 62°32' 136°45', 2♀♀$^{\Delta}$, 15.VI.1979, flying along road (ROM 791030c); Pelly X-ing (Crossing) Campground, 466 km, 62°49' 136°35', 1♂$^{\Delta}$, 17.VI.1979, flying in clearing (ROM 791039c); Dempster Hwy at Flat Cr(eek), 1 km E, 63°57' 138°37', 1♀$^{\Delta}$, 2.VII.1980, along edge of stream (ROM 800069b).

Chrysoperla carnea

YUKON TERRITORY Dempster Hwy: Eagle R(iver), 379 km, 66°27' 136°45', 1♀$^{\Delta}$, 5.VII.1979, flying nr river (ROM 791097b); 420 km, 66°35' 136°18', malaise trap, 1♀$^{\Delta}$, 3-7.VII.1979 (ROM 791098); Eagle R(iver), 379 km, 66°25' 136°41', 1♀$^{\Delta}$, 8.VII.1979, sweeping (ROM 791105a); Ogilvie R(iver), 198 km, 65°52' 138°19', 1♀, 19.VII.1980, sweeping beside river (ROM 800108a). Klondike Hwy: Pelly X-ing (Crossing) Campground, 466 km, 62°49' 136°35', 1♀$^{\Delta}$, 15.IV.1979 (ROM 791036); 1 km E junction Dempster Hwy at Flat Cr(eek), 63°57' 138°37', 2♀♀, 2.VII.1980, sweeping along river (ROM 800069c); von Wilczek L(ake), 450 km, 62°41' 136°43', 1ex 3rd instar larva, 26.VII.1980, sweeping (ROM 800123c).

DIRECTORY OF COLLECTORS

People who collected specimens in Canada and Alaska were, on the basis of information recorded on labels in the institution specified [cf. Materials and Methods]:

E. Adams (SEM), E.E. Adams (UMW), J.A. Adams (CNC), B.K. Akey (UG), J.M. Aldrich (USNM), C.P Alexander (USNM), S. Allan (UG), R.J. Alton (MCMU), W.B. Anderson (CNC), F. Andrews (CNC), D. Antonnuci (ROM), K.D. Archibald (NSM) A.P. Arnason (CNC), P.W. Arntfield (CNC, LEM, UG, UMW), A. Aschim (SMNH), A.W. Askey (CNC), D.B. Atkins (UMW), N.J. Atkinson (CNC), R.G. Atkinson (SEM), W.A. Attwater (UG), C.E. Atwood (ROM), K.F. Auden (SEM), D.B. (SEM), N.K.B. (ROM), K.L. Bailey (UG), T. Baird (CNC), A.D. Baker (CNC), S.M. Ball (UG), R.G. Ballmoug (CNC), C.M Barbeau (CNC), K. Barber (UG), L.A. Barlow (UG), D.W. Barr (ROM), I.Y.A. Barr (CNC), C.F. Barrett (CNC), B.A. Batulla (UMW), D. Beall (UWO), G. Beall (UWO), K. Beanlands (CNC), J.I. Beaulne (CNC), S. Beierl (UG), R. Beique (CNC), B.P. Beirne (CNC), P. Belanger (UL),B. Bendell (LEM), G. Bennett (SEM), R.G. Bennett (UG), A. Bergen(UMW), N.K. Bigelow (ROM), R.S. Bigelow (CNC), R.D. Bird (CNC), F.S. Blanton (USNM), J.P. Bogart (UG), J. Boone (SEM), C.L. Botham (CNC), S. Bower (UG), O.G. Boyd (SEM), C. Boyle (CNC), C. Boyle (LEM), W.Boyle (LEM), J.C. Bradley (CU), (Mrs.) Bramhall (SEM). E.J. Britten (USS), J. Broatch (UMW), W. Brodie (ROM), A.R. Brooks (CNC, USS), G.S. Brooks (MMMN), J.E. Brooks (CNC, USS), A.W.A. Brown (ROM), N.R. Brown (CNC, MFRC, UWO), P.C. Brown (CNC), S.E. Brown (UG), W.J. Brown (CNC), Brumpton (CNC), R.G. Brumpton (UG), L.H. Bruneau (CNC), D. Bryant (CAS, CU), D.G. Bryant (CNC), E.R. Buckell (CNC, KSU, SEM), P. Budd (UG), V.I. Burachynsky (UG), L. Burgess (SARS), J.V. Bushell (CNC), J.L. Buth (UMW), K.P. Butler (LEM), S. Byblow (RARS), B.L. Cadogan(UG), J.D. Calder (CNC), E.A. Cameron (UG), F. Cameron (CNC, SEM), J.K. Cameron (LEM), J.M. Cameron (LEM), R. Cameron (CNC), R.W. Cameron (UG), A. Campbell (LEM), D.K. Campbell (BCPM), W.I. Campbell (CNC, MCMU), R.A. Cannings (BCPM, SEM), S.G. Cannings (SEM), F.M. Cannon (CARS), I.J. Cantrall (UMAA), F.M. Carpenter (MCZ), F.S. Carr (CNC), R.H. Carter (CNC), W.R. Carter (CNC), E.F. Cashman (CNC), A.N. Caudell (USNM), G. Chagnon (UdeM), W. Chagnon (LEM), J.G. Chillcott (CNC), N.B. Chillcott (CNC), L. Choquette (UQC), R.H. Chrystal (CNC), J. Clark(CNC), R.C. Clark (CNC, MFRC), S.M. Clark (CNC), W. Clemens (ROM),J.W. Cockle (CNC), T.V. Cole (UMW), N.M. Comeau (UL), J. Conn (LCCU), J.A. Cook (CNC), F.C. Cooper (ROM), H.D. Cooper (ROM), P.T. Copps (UMW), C.E. Corfe (ROM), M. Coulloudon (UdeM), R. Coyles (CNC), Miss Cramp (CNC), R.D. Crawford (UG), E. Criddle (CNC), N. Criddle (CNC), W.J. Crins (APM), Crotch (MCZ), L. Crozier (LEM), E. Cumming (USS), J.M. Cumming (UG), C.H. Curran (CNC), R.P. Currie (USNM), E.L.D.(LEM), H.G.D. (CNC), N.D. (MCZ), W.H. Danby (CNC), K.G. Davey (CNC), L. Daviault (CNC, CRFL, CSQ), A.G. Davidson (CNC), D.M. Davies (MCMU), R.J. Day (NSM), K.J.G. Deacon (UG), C. Debora (SEM), J.J. DeGryse (CNC), A.A. Dennys (BCPM, CNC), R.S. Dickhout (UG), B.A. Dickson(SEM), A.W. Douglas (LEM), C.R. Douglas (IHTN), A.W. Dow (CNC), J.A. Downes (LEM), W. Downes (CNC, KSU, SEM), J.A. Doyle (CSQ), R. Drent (SEM), F. Drinkwater (LEM), D.N. Duffy (LEM), J. Duncan (CSQ), R. Duncan (SEM), M.B. Dunn (UAE), D. Dwyer (CNC), H.G. Dyar (USNM), J.R. Dymond (ROM), C.J. Edwards (UG), W.K. Elliott (CNC), Evans (ROM), D. Evans (CNC, PFRC, SEM), J. Evans (CNC), J.C.F. (UG), W.C.F. (USNM), R.D. Fairbairn (UG), G. Fairchild (MCZ), D.J. Farish (SEM), W.H. Fell (UMW), A.N. Ferguson (SEM), D.C. Ferguson (NSM, USNM), R.G. Ferguson (ROM), A.T. Finnamore (LEM), H.D. Fisher (SEM), J.C. Fisher (UG), J.G. Fisher (BCPM), L. Fisher (RARS), R.W. Fisher (LEM), G.H. Fisk(e) (CNC), H.S. Fleming (CNC), J. Fletcher (CNC), O.S. Flint (USNM), G. Fontana (LEM), W.H. Foott (UMW), W.T.M. Forbes (CU), M. Forest (CRFL), B. Fortin (UdeM), J.F. Fortin (UG), R.E. Foster (SEM), H.R. Foxlee (CNC, SEM), A. Francoeur (UQC), G.E. Fraser (USS), J.L. Frechette (UdeM), T.N. Freeman (CNC), E. Fridell (SEM), E. Fuller (ROM), H.G. Fulton (CNC), T.W. Fyles (USNM), A.M.G. (SEM), R.D.G. (LEM), G. Gagné (UL), C. Gardener (UG), L.M. Gardiner (CNC), J.A. Garland (LEM, UMW), C.B.(D.) Garrett (CNC, USNM), A.N. Gartrell (CNC), P.S. Geddes (LEM), N. Geech (SEM), A. Gibson (CNC), D.G. Gillespie (CNC), R. Glen (CNC), R. Glendenning (SEM), P. Goode (RARS), J.L. Gordon (SEM), R.P. Gorham (CNC), A.R. Graham (CNC), K. Graham (CNC, MCZ, SEM), D. Gray (UG), H.E. Gray (CNC, UAE), D. O. Greenbank (CNC), M. Greenstone (CU), G.C.D. Griffiths (UAE), J.H. Grobler (CNC), M.O. Guibord (LEM), M. Gunderman (ROM), J. Gustafson (LEM), R. Haines (MCMU), J.A. Ham (CNC), K.A. Hamilton (UMW), G.H. Hammond (CNC), R.H. Hannah (MCMU), B.A. Hannigan (UG), S. Hansen (SEM), D.F. Hardwick (CNC), P.P. Harper (UdeM), C. Harris (RARS), J.B. Hartley (CNC), W. Hartley (ROM), P.D. Hebert (ROM), A.F. Hedlin (UMW), R.J. Hellewell (UG), W.G. Helps (CNC, MCMU), B.S. Heming (CNC, UG), R. Henniger (CNC), C.S. Henry (UG), S.D. Hicks (CNC), A.E. Hildebrand (CNC), J.R. Hill (LEM), R.S. Hill (UG), O.S. Hillerud (UAE), (Mrs.) M.E. Hippisley (CNC, MCZ, USNM), B. Hocking (UAE), B. Hodgson (CNC), J. Hodsman (LEM), A. Hoeberlin (MCMU), G.P. Holland (CNC), R.R. Hooper (SMNH), C.E. Hope (ROM), J.K. Horie (CNC, SEM), R.L. Horsburgh (LEM), A. Howden (CNC), H.F. Howden (CNC), R.C. Howell (MCMU), G.M. Howse (CNC), H.J. Huckel (CNC), H.F. Hudson (CNC), Hughes (CNC), A. Hunter (CNC), L. Huot (UL), R.L. Hurley (CNC), L. Hustak (RARS), F. Huston (CARS), C.B. Hutchings (CNC), F.P. Ide (CNC, ROM), Idyll (SEM), Ikram (RARS), E.A. Innes (UG), M. Isman (SEM), W.G.H. Ives (UMW), R. Jaagumagi (ROM), J.K. Jacob (CNC, SEM), G. Jamieson (LEM), M.S. Jarial (SEM), L.J. Jobin (CSQ, UL), F. Johansen (CNC), E. John (SJARS), A.F. Johnson (UG), F. Johnson (CNC), D.E. Johnstone (LEM), C. Jong (SDARS), W.W. Judd (CNC, MCMU, UWO), P. Jursevskis (UG), G. Kelley (RARS), W. Kelly (CNC), L.A. Kelton (CNC), E.L. Kessel (CAS), D.K.McE. Kevan (LEM), F. Knab (USNM), F.T. Knapp (MCMU), C. Kofoe (RARS), L. Kohalmi (ROM), V. Kohler (ROM), L.A. Konotopetz (CNC), R. Krause (CNC), N.L.H. Krauss (USNM), H. Krogerus (ZMUH, I. Kukovica (UG), G. Ladd (LEM), J. Lafrance (SJRS), J.L. Laliberté (CSQ, UL), C.S. Lallamand (CNC), R. Lalonde (LEM), R. Lambert (CNC, CSQ), J. Lanko (SEM), J.P. Laplante (CNC, CRFL, UL), P. Larkin (SEM),

G.H. Larnder (BCPM), D.J. Larson (MU, WLNP), M.A. Larson (WLNP), J.S. Lee (UMW), M.B. Leech (CAS, CNC, SEM), R.E. Leech (CNC), R.H. Leech (CNC), L. LeSage (UdeM), E.G. Lester (UG), J.A. Letourneau (CNC), S. Leung (MCMU), D. Lewis (UG), G.G. Lewis (CNC), M. Lichtenberg (UG), Lindberg (ZMUH), E.A.R. Liscombe (UMW), C.C. Loan (CNC), D. Logan (CNC), E.B.S. Logier (ROM), R. Loiselle (UQC), R.H. Longmore (CNC, MCZ, SEM), F.T. Lord (CNC, KARS, UG), J.E. Lovrity (LEM), V.Z. Lucas (SEM), E. Lyle (UG), H. H. LYMAN (LEM *the oldest definitely dated specimen*), D.A. Lymburner (UG), D.B. Lyons (CNC), J.D.M. (SEM), Mc.M. (SEM), J.F. McAlpine (CNC), H.R. MacCarthy (SEM), F.L. McCarvell (LEM), M.H. McCleery (UG), J. McCluskey (CNC), D.J. McComb (UG), D. McCorquodale (APM), J.W. McCreadie (UG), A.P. Macdougall (ROM), E.E. MacDougall (CNC), J.H. McDunnough (CNC), J.E. McFarlane (USS), J.R. McGillis (CNC), H.G. MacGillivray (CNC), K.M. McGinnis (UMW), W.C. McGuffin (UWO), J.L. McHugh (MCZ, SEM), J. Mackenzie (CNC), B. McKillop (MMMN), H. McKinnon (CNC), J.E. Macklin (UG), D.F. McLean (CNC, UMW), J.H. McLeod (SDARS), J.M. McLeod (CNC), W.S. McLeod (UMW), P.W. McR.D. McMullen (SDARS), McNally (UWO), A.P. MacPhee (CNC), D.J. Madder (UMW), D. Maddison (ROM), R.B. Madge (CNC), B.J. Madsen (SDARS), G.A. Mail (UAE), C.H. Mann (CNC), D.M. Mann (CNC), R.L. Manuel (LEM), D.H. Marlow (UMW), B. Marshall (ROM), J. Marshall (UG), J.C. Martin (CNC), J.E.H. Martin (CNC), J.L. Martin (LEM), E. Mason (CNC), W.R.M. Mason (CNC), W. Mathers (CNC), I.D. Matheson (SEM), R. Matheson (CU), M.G. Maw (RARS), G.J. Mayson (CNC), B.P. Mehra (CNC), B. Merchant (UG), C.D. Miller (CNC), C.S. Miller (CNC), H.E. Milliron (CNC), L.J. Milne (CNC), J.C. Mitchell (CNC), M. Molloy (RARS), W.J. Moolenbeck (UG), G.A. Moore (LEM), P. Morisset (CSQ), C. Morley (BMNH), D. Morris (UG), G.K. Morris (UG), R.F. Morris (CNC, SJARS), F.O. Morrison (LEM, UAE), P. Morton (UG), W.W. Moss (CNC), E.G. Munroe (CNC, LEM), L. Nairn (CNC), G.M. Neal (ROM, SEM), R. Neill (MCMU), C.L. Neilson (CNC), J.J. Neilson (UMW), F.H. Nelson (CNC), W.A. Newcombe (BCPM), T. Norris (MCMU), W. Norrish (LCCU), A. Odum (ROM), E. Oleksuik (ROM), D. Oliveira (UdeM), J. Ouellet (UdeM), A.M.P. (LEM), C. Pallen (LCCU), K.E. Pardy (NDFRC), H.S. Parish (CU, MCZ), R.H. Parry (UG), C.T. Parsons (MCZ), F. Patenaude (UdeM), N.A. Patterson (CNC), L.L. Pechuman (CU), D. Peck (CNC, UAE), E. Peden (SEM), D.J. Peers (MCMU), D.M. Pengelly (UG), F.M. Pépin (UdeM), J.H. Pepper (CNC), J.M. Perron (UL), C.E. Petch (CNC), B.V. Peterson (CNC), J. Pettit (UG), A.W.A. Phair (CNC), J. Phipps (MU), N. Pierce (UG), R.J. Pilfrey (CNC, UG), M.L. Prebble (CNC), D.J. Pree (UG), W.B. Preston (MMMN), M.H. Prime (UG), L. Provancher (UL), W.L. Putman (CNC, UG), F. Quan (ROM), K. Racey (SEM), D. Radcliffe (SEM), T. Rankin (CNC), J.A. Rattenburg (SEM), Raup (MCZ), L. Raynault (CSQ), D.C. Read (CARS), D.R. Redmond (CNC), G. Reid (SJARS), J. Reid (MCMU), E.A. Rendell (CNC), W.R. Richards (CNC), A.W. Richardson (CNC), W.E. Ricker (ROM), J.C.E. Riette (ROM), G. Rioux (CSQ), A. Robert (UdeM), A.G. Robinson (CNC, UMW), R. Robataille (CSQ), B. Rolseth (UAE), D. Ross (UG), D.H. Ross (CNC), R.H. Ross (UMW), W.A. Ross (CNC, USNM), R. Roughley (UG), M. Roy (CNC), F.V. Royer (CNC), J. Rousseau (UdeM), K.L. Runciman (UG), L.S. Russell (CNC), Russell (MCZ), G.E.S. (CNC), J.M.S. (CNC), C. Sabrosky (USNM), R.I. Sailer (USNM), R. St-Pierre (RARS), H. Salkeld (CNC), G. Salt (CNC, UAE), R.W. Salt (UAE), W.A. Salter (UG), M. Sanborne (MCMU), F. Sandall (SEM), N.B. Sanson (CNC), W. Saunders (UG), T.A. Sawinski (UG), K.E. Schedl (CNC), T.H. Scholten (UG), G.E. Scott (ROM), G.G.E. Scudder (SEM), H.L. Seamans (CNC), G. Sevean (UG), M.J. Sharkey (LEM), G.V. Shearsmith (CNC), J. Shepard (SEM), A.C. Sheppard (LEM), G.E. Shewell (CNC), D. Shpeley (UAE), G.T. Silver (CNC), C.A. Small (UG), L. Smillie (MCMU), C.C. Smith (CNC), D.R. Smith (USNM), H.J. Smith (LEM), I.M. Smith (ROM), J.M. Smith (UG), R.G. Smith (SEM), S. Smith (ROM), K.D. Southern (UG), G.J. Spencer (CNC, MCZ, SEM), R. Stace-Smith (SEM), S.J. Stark (ROM), J. Steedman (SEM), G.L. Steelz (SEM), K. Stewart (IHTN), P.J. Stitsko (CNC), D.B. Stolz (UG), E.H. Strickland (CNC, UAE), H. Stultz (CNC), H.T. Stulz (KARS), K. Sunley (UMW), G.A. Surgeoner (UG), D. Sutherland (SEM), Swales (MU), W.H. Tams (CNC), P.M. Taschereau (NSM), C.A. Tauber (CU), M. Tauber (CU), P.A. Taverner (CNC), G.W. Taylor (CNC), K. Taylor (SEM), M.E. Taylor (USS), T.C. Taylor (UG), L. Templin (UG), H.J. Teskey (CNC), J. Thibault (UdeM), G.A. Thomas (RARS), J.B. Thomas (CNC, LEM), L.S. Thompson (CARS), M.G. Thomson (SEM), Thorpe (CNC), L.L. Tibbles (UG), D. Timmons (SJARS), W. Tomkinson (SEM), W. Tostawaryk (UMW), W. Touzeau (SEM), R.C. Treherne (CNC), K.C.S. Tuckey (UG), L. Turcotte (UG), D.C. Turnock (MMMN), F.A.U. (ROM), G.J. Umphrey (UG), G.R. Underwood (CNC), A. Unrau (SEM), E.C. VanDyke (CAS), J.D. VanLoon (UG), T. VanQuynh (UG), J.A. VanReenen (SEM), A.L. VanSlyke (CNC), R. Vanstone (RARS), E.P. Venables (CNC), S.D. Vickery (LEM), V.R. Vickery (LEM), H.L. Viereck (CNC), J.R. Vockeroth (CNC), G. Volk (RARS), P.N. Vroom (CNC), M.Y.W. (SEM), N.V.W. (SEM), E.M. Walker (MCZ, ROM), G. Walker (PIDAA), G.S. Walley (CNC), J.B. Wallis (CNC, MCZ), H.C.W. Walther (CNC), D. Ward (RARS), I.J. Ward (CNC), A.E. Warren (MCMU), R.H. Washburn (USNM), J. Waterfield (MCZ), J.S. Waterhouse (CNC), D.L. Watson (CNC), E.B. Watson (CNC), W.Y. Watson (GLFRC), F.W. Waugh (CNC), F.E. Webb (CNC), Wellington (SEM), M.F. Welsh (SEM), P.H. Westdahl (CNC), R.V. Whelan (ROM), D.P. Whillans (CNC), Whitney (CNC), G.B. Wiggins (ROM), R.H. Wigmore (CNC), N. Wilcox (UG), S.J. Wilcox (ROM), W.H. Wilde (CNC, SDARS, SEM), G.H. Wilson (UG), W.G. Wilson (CNC), A.F. Winn (LEM), R. Wise (RARS), B. Wit (UG), E. Wolfe (MCMU), A.A. Wood (CNC), D. Wood (SEM), B. Wright (CNC, NSM), B.K.W. Wyatt (UG), S. Wyatt (CNC), and H.W.H. Zavitz (UG).

ANNOTATED BIBLIOGRAPHIC SUPPLEMENT

To ensure continuity with the latest, comprehensive review of published information on the biology of Chrysopidae (cf. page 285, New 1975), this annotated bibliography was added as a supplement to the literature cited in the main body of the thesis. It is noteworthy that more recent contributions have concentrated on all three species of Chrysoperla in this coverage, as follows:

Chrysoperla rufilabris

Chrysopa rufilabris;

1980. Henry, Proc. ent. Soc. Wash. 82: 1-8.
ADULT BIOLOGY - acoustical communication

Chrysoperla harrisii

Chrysopa harrisii;

1974. Tauber & Tauber, Can. Ent. 106: 969-978.
LIFE HISTORY - thermal accumulation, diapause, oviposition

Chrysoperla carnea

Chrysopa carnea;

1975. Neuenschwander, Hagen & Smith, Hilgardia 43: 53-78.
LIFE HISTORY - phenology in alfalfa in California

1977. Jones, Lingren & Bee, Ann. ent. Soc. Am. 70: 43-47.
ADULT BIOLOGY - periodicity of feeding, mating and oviposition
- mating and remating in laboratory
- behaviour of grooming, aggression, trophallaxis

1978. Hassan & Hagen, Z. ang. Ent. 86: 315-320.
MAINTENANCE & REARING - artificial diet for mass rearing

1978. Jones, Kinzer, Bull, Ables & Ridgway, Ann. ent. Soc. Am. 71: 160-162.
MAINTENANCE & REARING - deterioration in mass rearing

1979. Tassan, Hagen & Sawall, Environ. Ent. 8: 81-85.
ADULT BIOLOGY - reproduction after artificial field food-spray

1979. Henry, Ann. ent. Soc. Am. 72: 68-79.
ADULT BIOLOGY - acoustical communication

Chrysopa downesi [nec Banks];

1975. Tauber & Tauber, Nature, London 258: 711-712.
LIFE HISTORY - diapause termination
- comparison with *Meleoma signoretti*

1976. Tauber & Tauber, Can. J. Zool. 54: 260-265.
LIFE HISTORY - seasonal response to photoperiod
- developmental thresolds and temperature requirements for each stadium to adult eclosion

1976. Tauber & Tauber, J. Insect Physiol. 22: 331-335.
LIFE HISTORY - effects of photoperiod upon life stages
- photoperiodic termination of diapause

1979. Henry, Psyche, Camb. 86: 291-297.
ADULT BIOLOGY - acoustical communication (based on six adults from laboratory culture, Cornell)

1981. Tauber & Tauber, Can. J. Zool. 59: 370-376.
LIFE HISTORY - seasonal response to photoperiod, Montana and New York populations compared
- developmental thresholds, Montana and New York populations compared
- effect of photoperiod and food availability on diapause and post-diapause development, Montana, New York, and California populations compared

THE CHRYSOPIDAE OF CANADA

by

J. A. GARLAND

PART 2: FIGURES and MAPS

[APPENDIX A]

A thesis submitted to the Faculty of Graduate Studies and Research of McGill University to fulfill requirements for the Doctor of Philosophy Degree.

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Macdonald College of McGill University
Ste-Anne-de-Bellevue, Québec, Canada

August 1981

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GLOSSARY OF TERMS FOR GENITALIA

[male]

acumen: projection on tignum

aedeagus: *vide true mediuncus*

arcessus: true mediuncus attached to gonarcus

entoprocessus: dorsolateral sclerites on gonarcus

gonapsis: ventromedial sclerite on hypovalva

gonarcus: sclerotised arch below anus

gonocristae: dentate setae on hypovalva

gonosaccus: hind body wall

gonosetae: dorsocaudal setae on gonosaccus

hypandrium: *vide gonapsis*

hypandrium internum: sclerite on ductus ejaculatorius

hypovalva: body wall above sterna VIII+IX

median pointed process: *vide gonapsis*

mediuncus: *vide secondary mediuncus or true mediuncus*

processus: *vide gonapsis*

pseudopenis: *vide true mediuncus*

secondary mediuncus: lobe on gonarcus in forms with pseudopenis

spinellae: ventral projections on gonosaccus

tignum: subrectal arch separate from gonarcus

true mediuncus: dorsomedial sclerite on gonosaccus

[female]

apical lobe: distal clasp on subgenitale

body: central bulb of spermatheca

duct: canal from body of spermatheca to oviduct

microtrichia: minute setae on subgenitale

praegenitale: median lobe between sterna VII and VIII

spermatheca: internal structure on bursa copulatrix

subgenitale: sternum VIII

transverse callus: proximoventral swelling on apical lobe

vela: flanges connecting spermatheca with bursa copulatrix

Figure 1 Male terminalia of Meleoma spp.

a. M. schwarzi

b. M. dolicharthra

c. M. signoretti

d. M. emuncta; QUEBEC

e. M. emuncta; BRITISH COLUMBIA

[based on a specimen collected by

a) J.A. Garland, Penticton, British Columbia, 20.VI.1977 ; LEM

b) J.A. Garland, Penticton, British Columbia, 10.VIII.1976 ; LEM

c) J.A. Garland, Ste-Anne-de-Bellevue, Québec, 6.VII.1979; LEM

d) A.F. Winn, Shawbridge, Québec, 6.VIII.1930

e) J.A. Garland, Penticton, British Columbia, 28.VII.1976; LEM]

LEGEND: ep = entoprocessus; g = gonocristae; ga = gonarcus; gs = gonosaccus; sm = secondary mediuncus; t = tignum; tm = true mediuncus

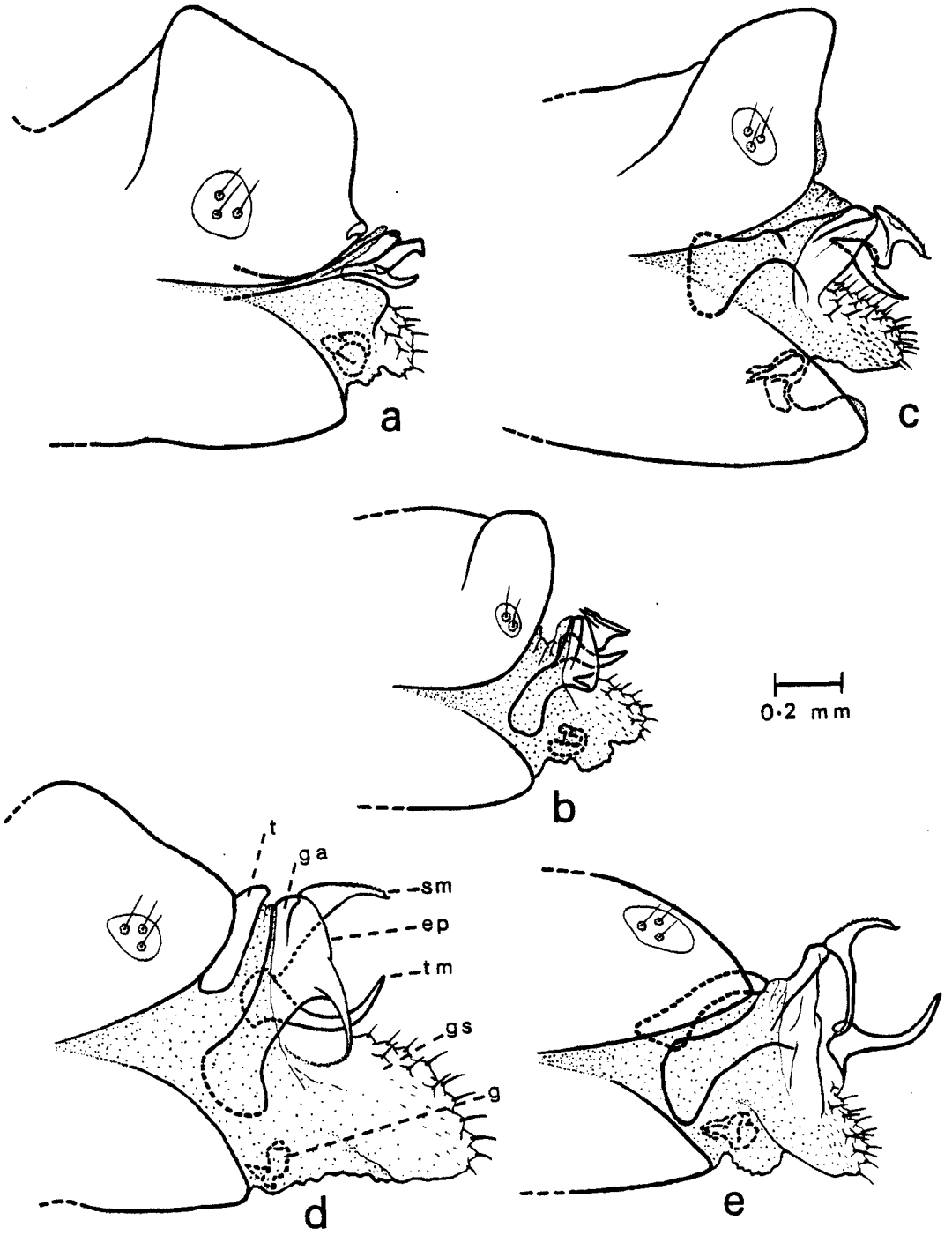

a
c
b
0·2 mm
t
ga
sm
ep
tm
gs
g
d
e

Figure 2 *Meleoma schwarzi*: male head

a. frontal

b. dorsal

c. lateral

[based on 3 specimens collected by

J.A. Garland, Penticton, British Columbia,

13-20.VI.1977; LEM]

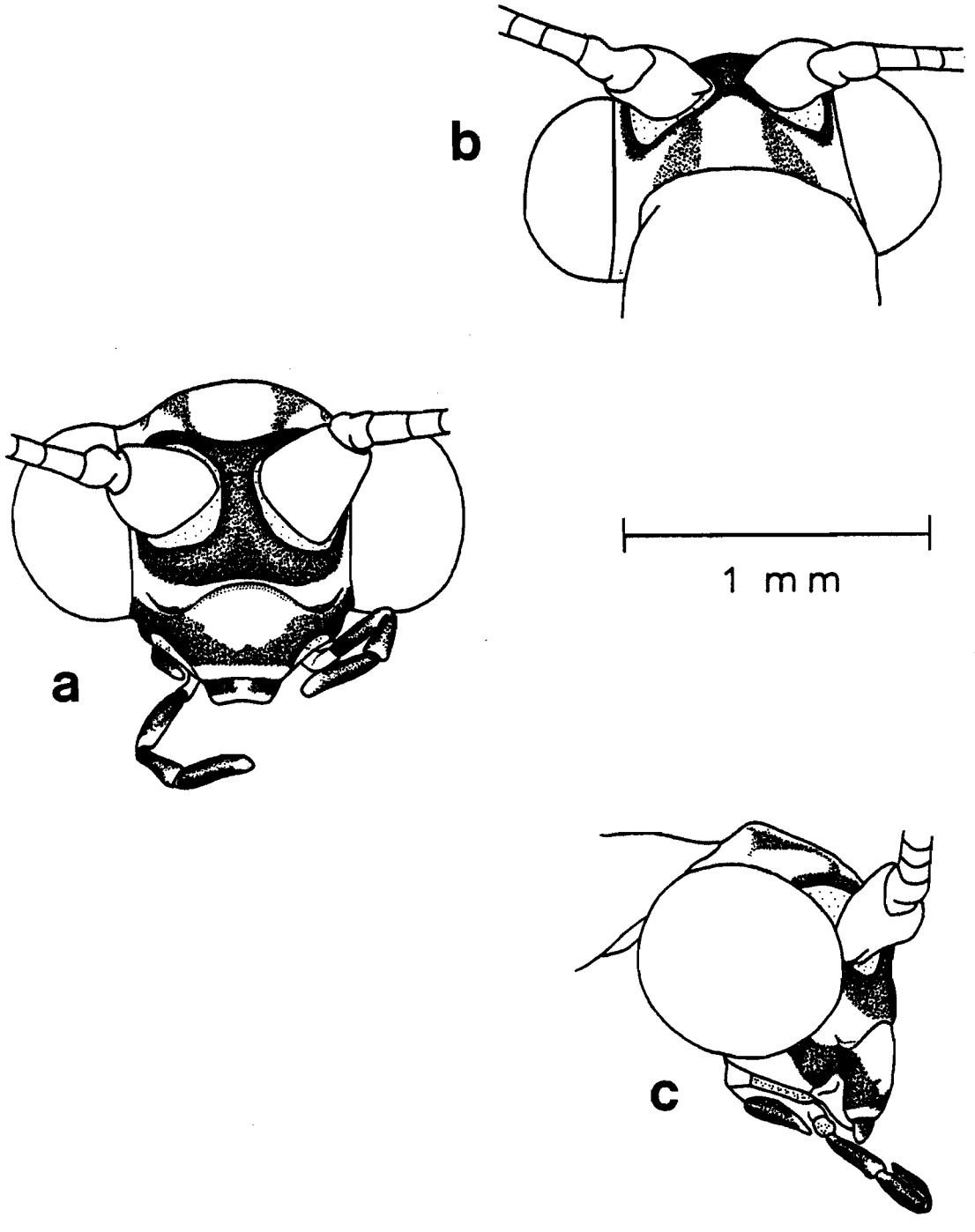

b
a
1 mm
c

Figure 3 Meleoma dolicharthra: male head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

10.VIII.1976; LEM]

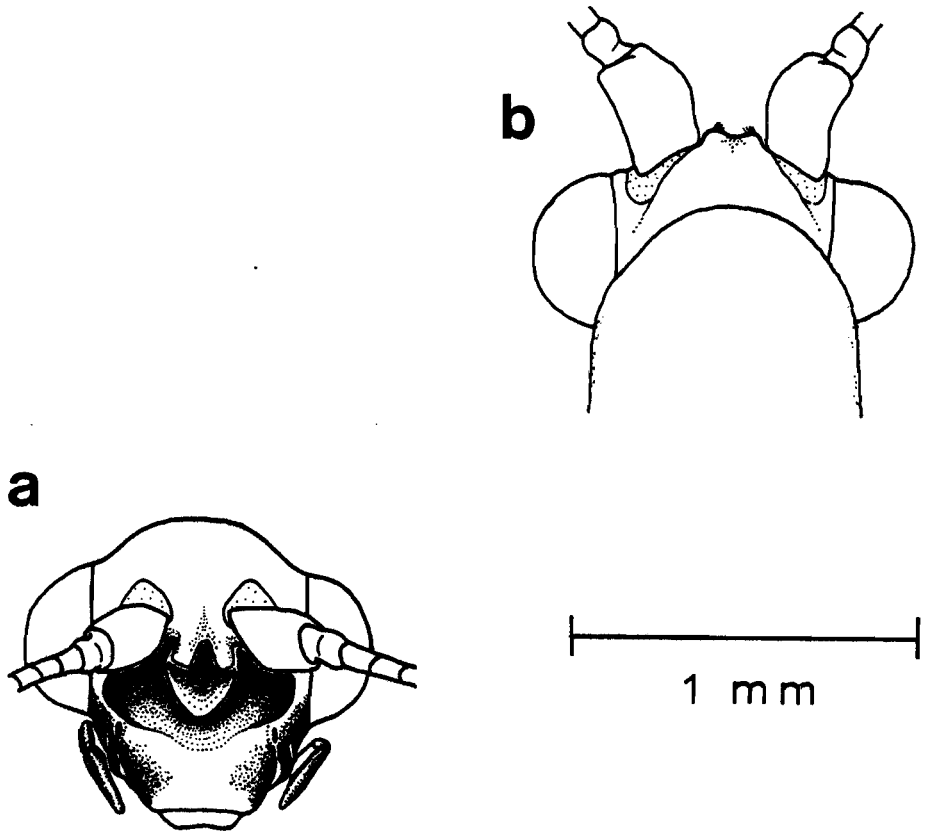

b
a
1 mm
c

Figure 4 Meleoma dolicharthra: female head

a. frontal

b. dorsal

c. lateral

[based on 4 specimens collected by

J.A. Garland, Penticton, British Columbia,

4.VIII-1.IX.1976; LEM]

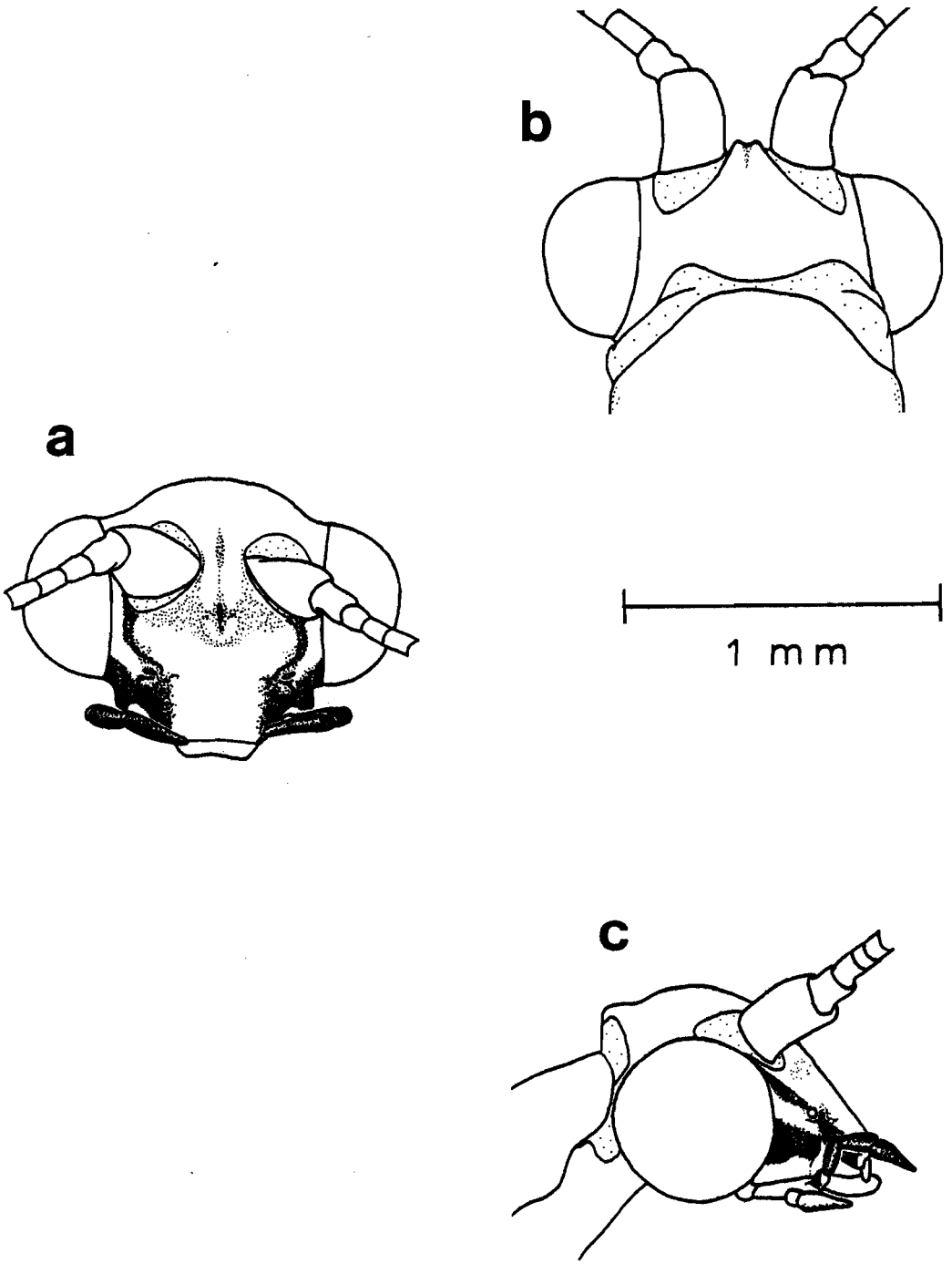

b
a
1 mm
c

Figure 5 Meleoma signoretti: male head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

J.A. Garland, Ste-Anne-de-Bellevue, Québec,

6.VII.1979; LEM]

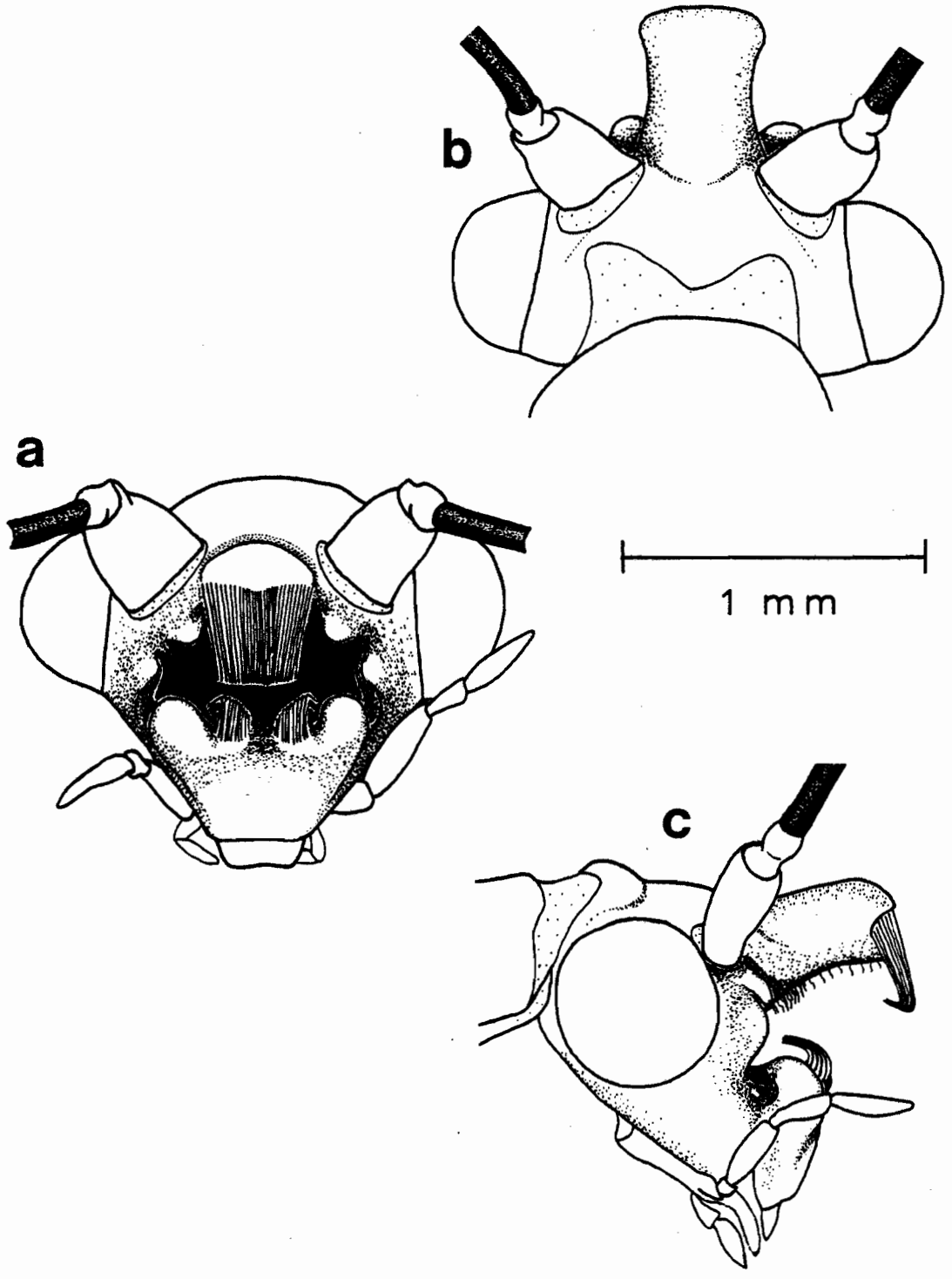

b
a
1 mm
c

Figure 6 Meleoma signoretti: female head

a. frontal

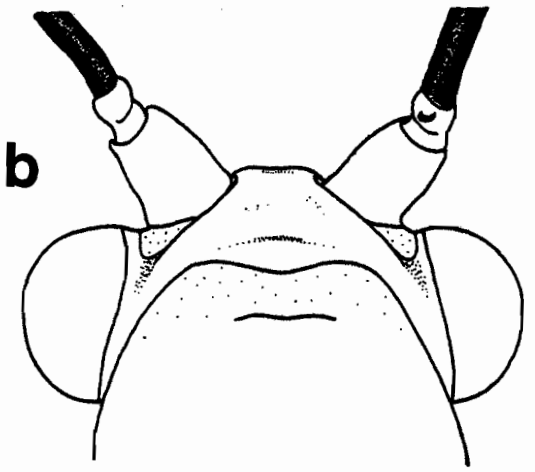
b. dorsal

c. lateral

[based on a specimen collected by

J. Lovrity, Ste-Anne-de-Bellevue, Québec,

26.VI.1965; LEM]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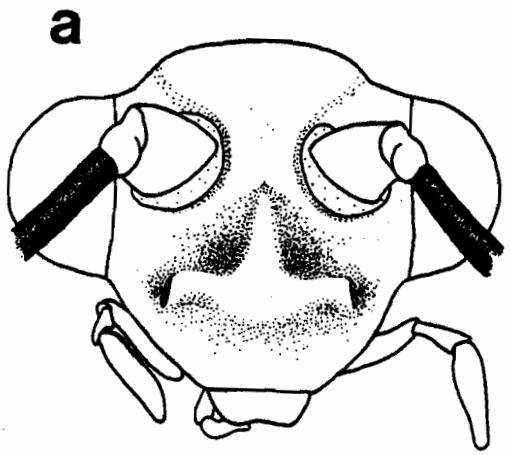
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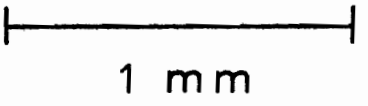
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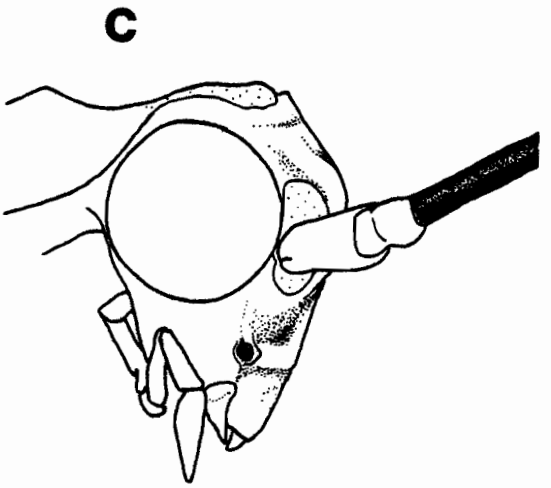

c

Figure 7 Meleoma emuncta: QUEBEC; male head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

A.F. Winn, Shawbridge, Québec,

6.VIII.1930; LEM]

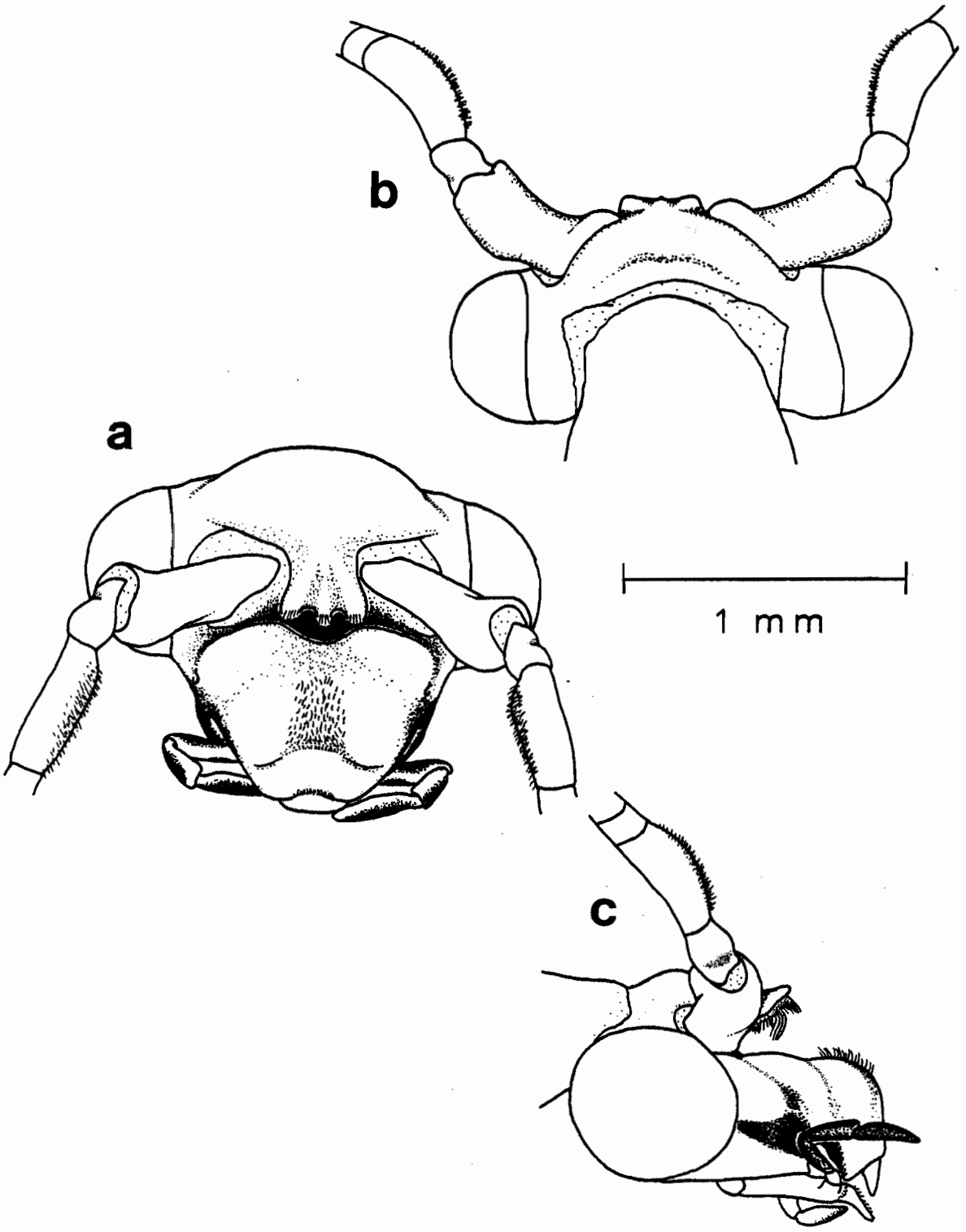

b
a
1 mm
c

Figure 8 Meleoma emuncta: QUEBEC; female head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

S.D. Vickery, Lac Serpent, Notre-Dame-du-Laus,

Québec, 27.VII.1970; LEM]

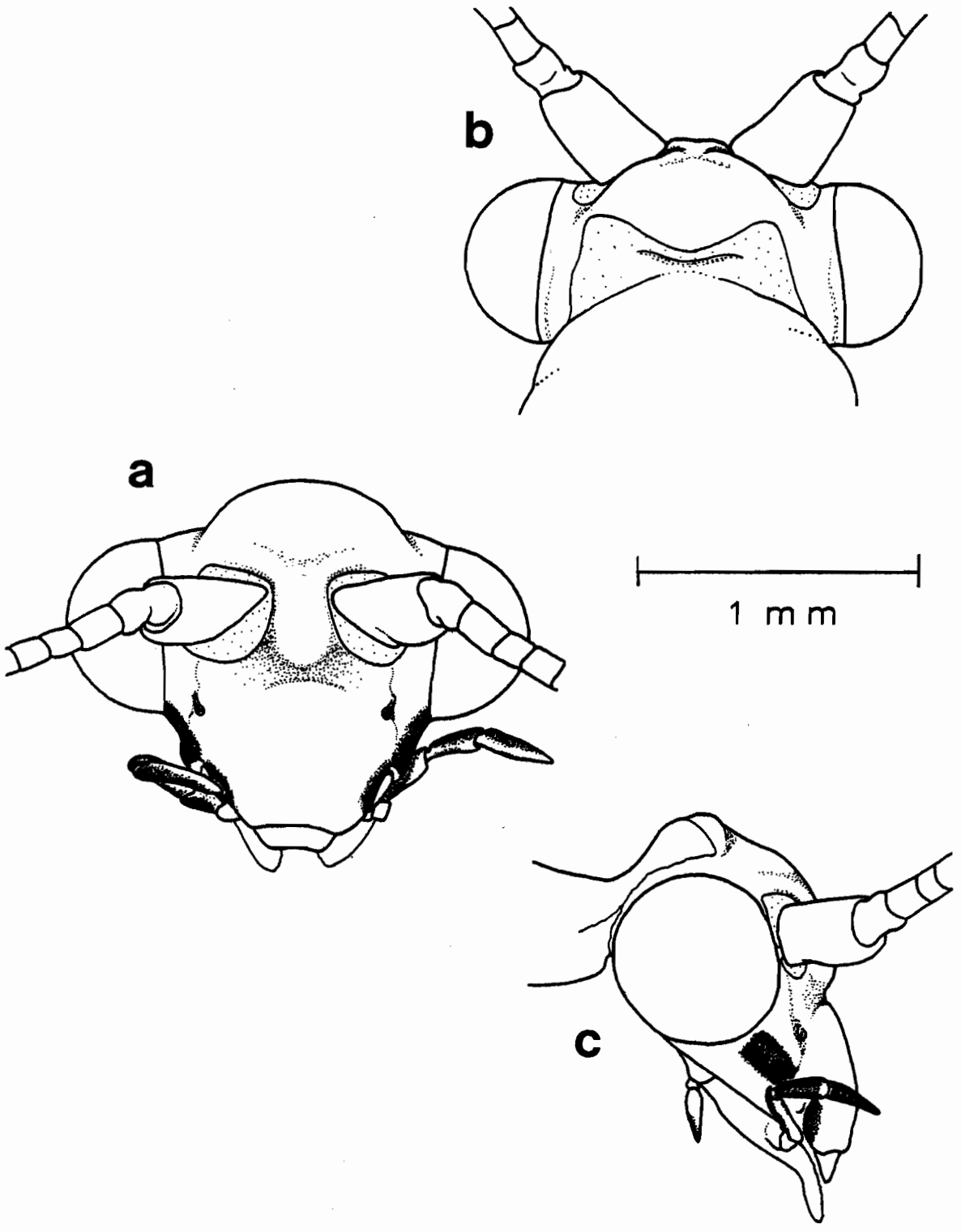

b
a
1 mm
c

Figure 9 Meleoma emuncta: BRITISH COLUMBIA; male head

a. frontal

b. dorsal

c. lateral

[based on 4 specimens collected by

J.A. Garland, Penticton, British Columbia,

28.VII-10.VIII.1976; LEM]

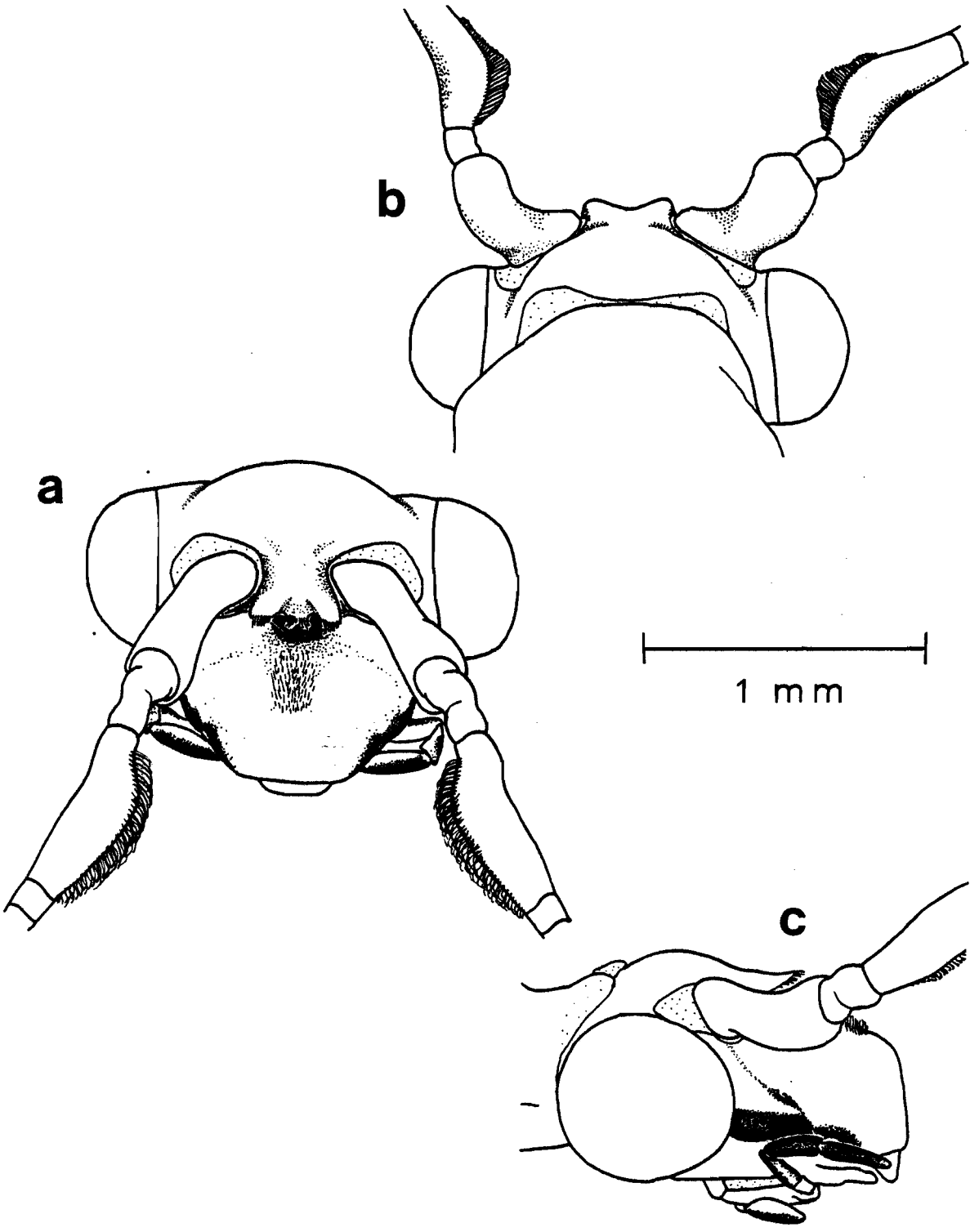

b
a
1 mm
c

Figure 10 Meleoma emuncta: BRITISH COLUMBIA; female head

a. frontal

b. dorsal

c. lateral

[based on 12 specimens collected by

J.A. Garland, Penticton, British Columbia,

29.VII-16.IX.1976; LEM]

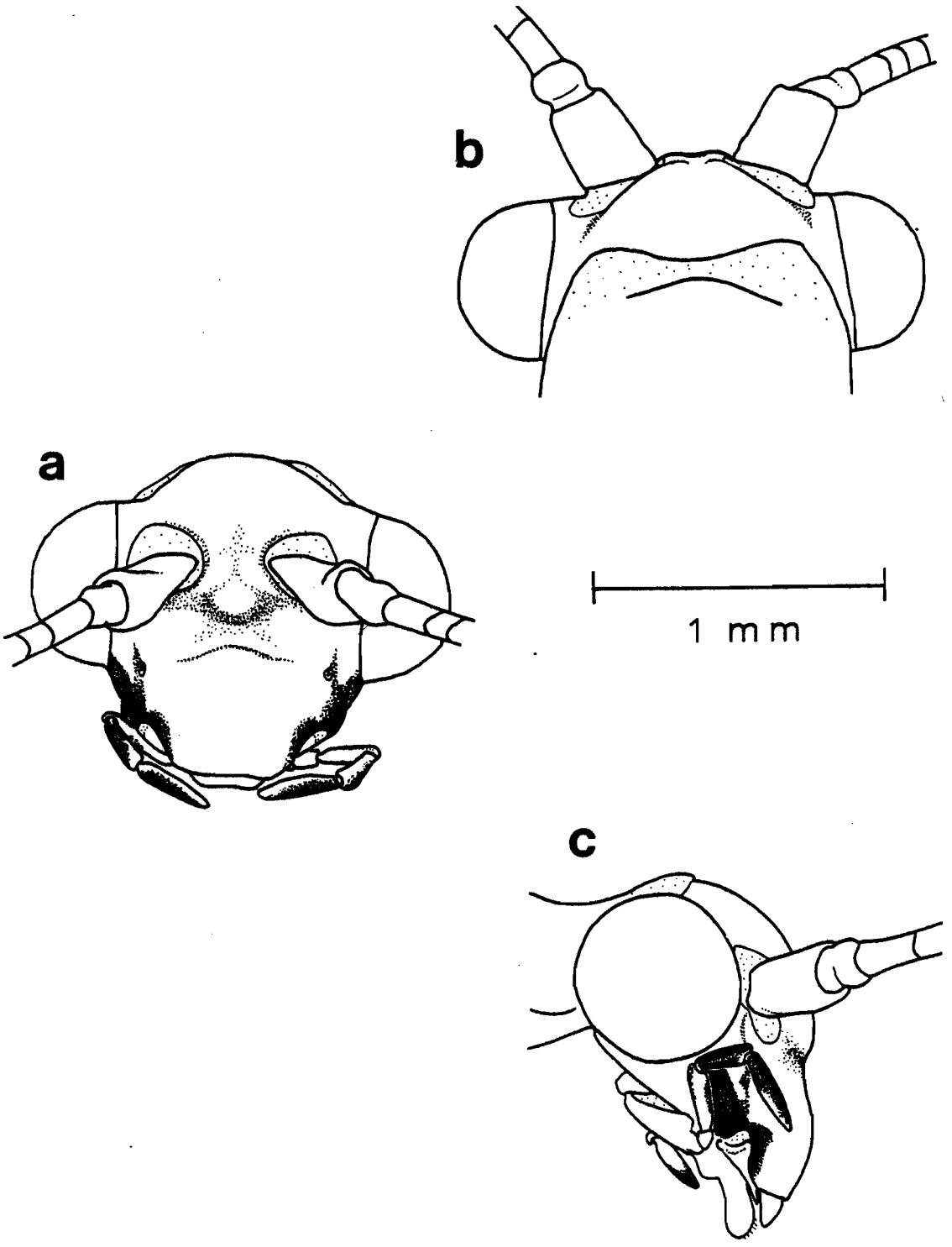

b
a
1 mm
c

Figure 11 Subgenitale of Meleoma spp.

a. M. schwarzi

b. M. dolicharthra

c. M. signoretti

d. M. emuncta

[based on a specimen collected by

a) [B. Wright], Rock Creek Canyon, Colorado Springs, Colorado, 22.VII.1963; NSM

b) J.A. Garland, Penticton, British Columbia, 18.VIII.1976; LEM

c) J. Lovrity, Ste-Anne-de-Bellevue, Québec, 26.VI.1965; LEM

d) A.F. Winn, Charlevoix Co., Québec, 6.VIII.1918; LEM]

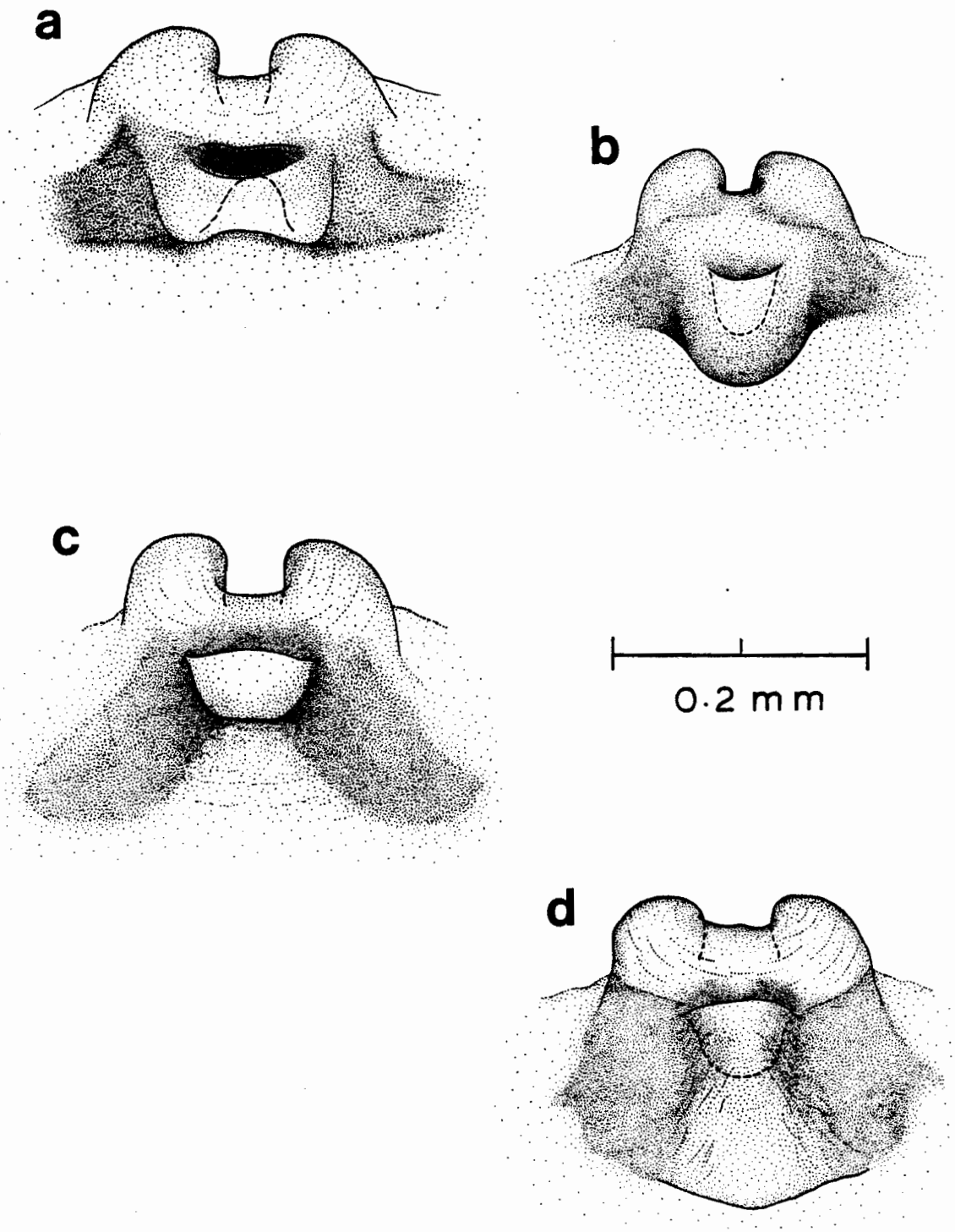

a
b
c
0·2 mm
d

Figure 12 Mandibles of Meleoma spp., females

a. M. schwarzi

b. M. dolicharthra

c. M. signoretti

d. M. emuncta

[based on a specimen collected by

a) [B. Wright], Rock Creek Canyon, Colorado Springs, Colorado, 22.VII.1963; NSM

b) J.A. Garland, Penticton, British Columbia, 18.VIII.1976; LEM

c) [unknown], Ste-Anne-de-Bellevue, Québec, 21.VII.1938; LEM

d) A.F. Winn, Charlevoix Co., Québec, 6.VIII.1918; LEM]

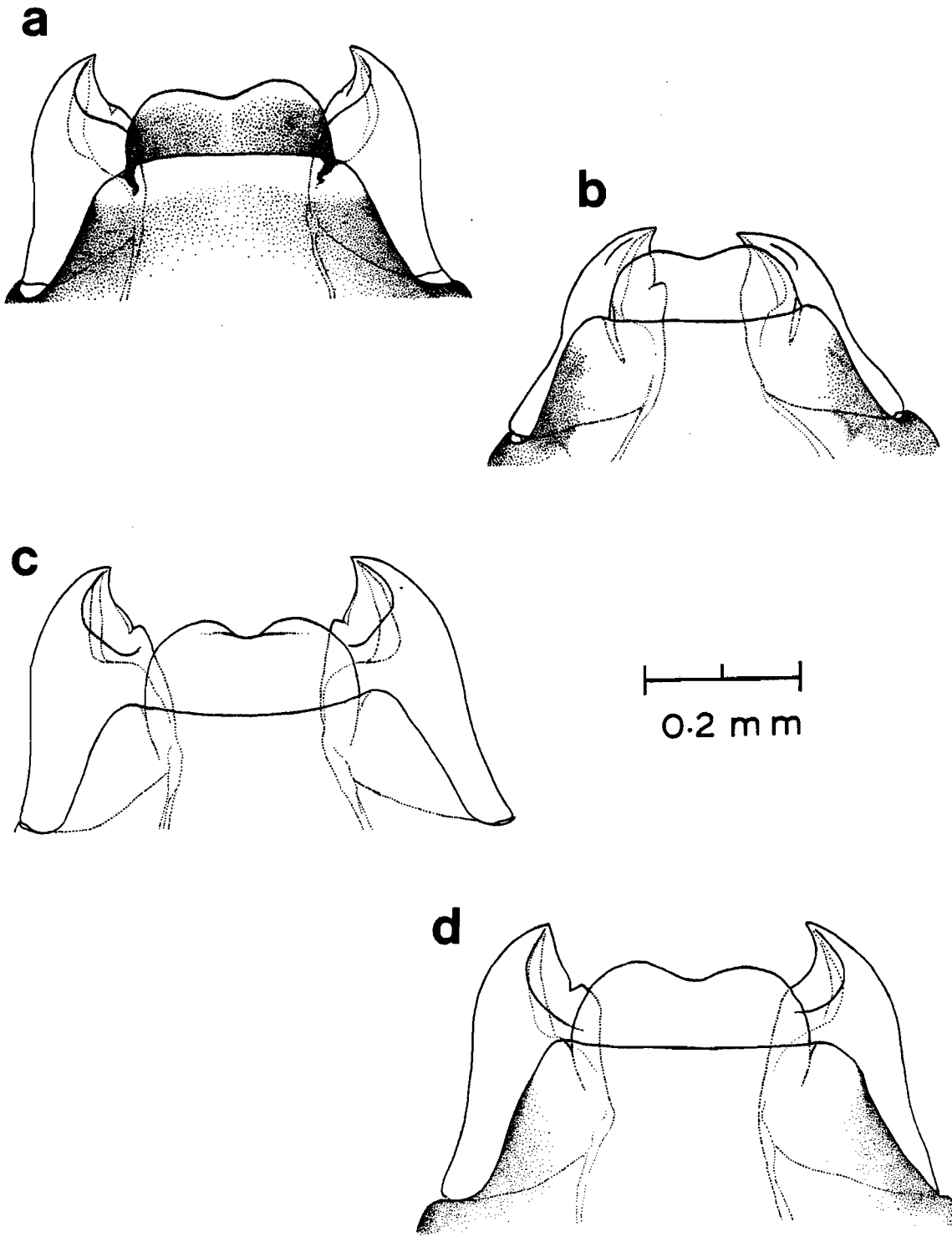

a
b
c
0·2 mm
d

Figure 13 Spermathecae of Meleoma spp.

a. M. schwarzi

b. M. dolicharthra

c. M. signoretti

d. M. emuncta

[based on a specimen collected by

a) [B. Wright], Rock Creek Canyon, Colorado Springs, Colorado, 22.VII.1963; NSM

b) J.A. Garland, Penticton, British Columbia, 18.VIII.1976; LEM

c) J. Lovrity, Ste-Anne-de-Bellevue, Québec, 26.VI.1965; LEM

d) A.F. Winn, Charlevoix Co., Québec, 6.VIII.1918; LEM]

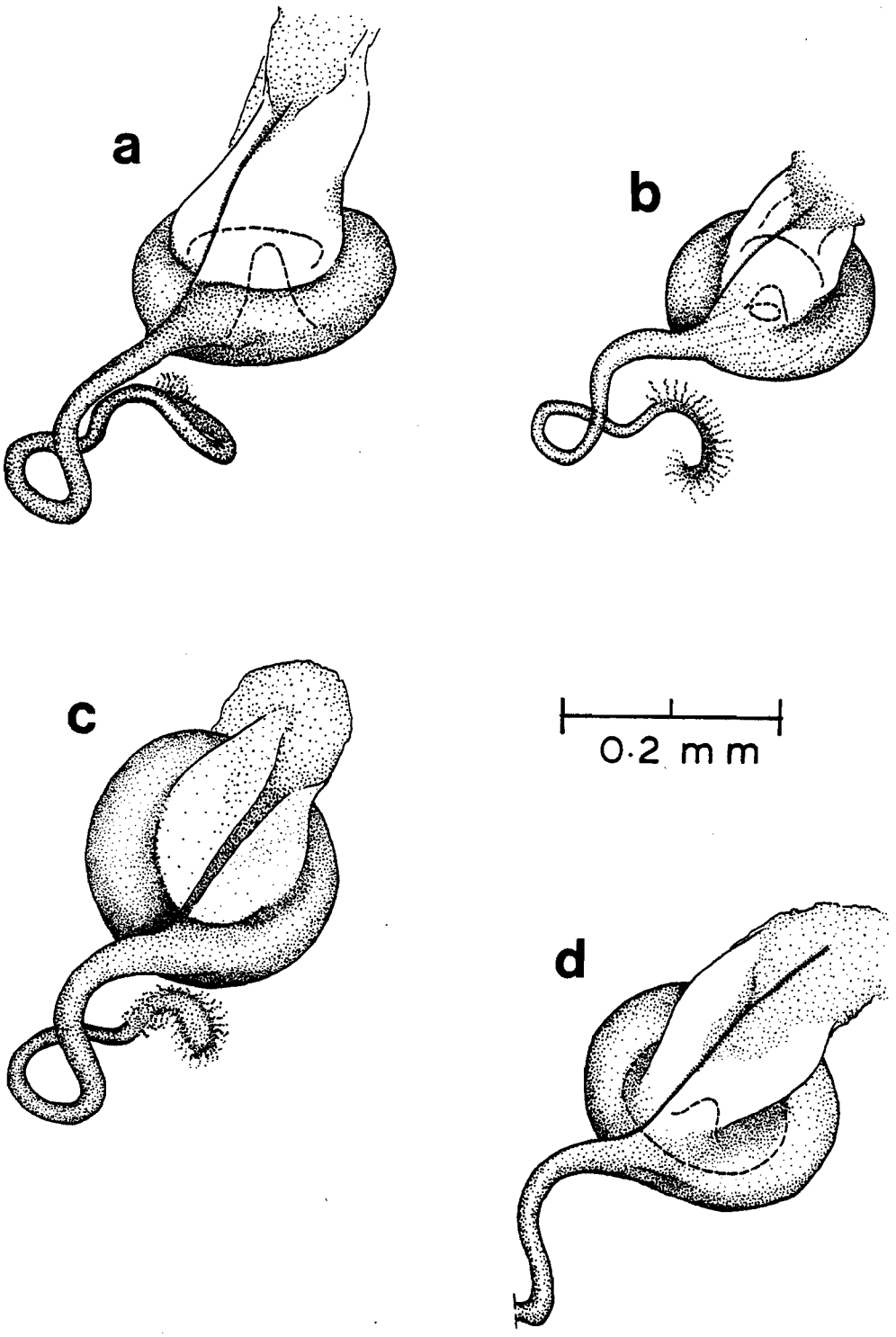

a
b
c
0·2 mm
d

Figure 14 Wing venation of *Eremochrysa* spp.

a. *E. fraterna*, male fore wing

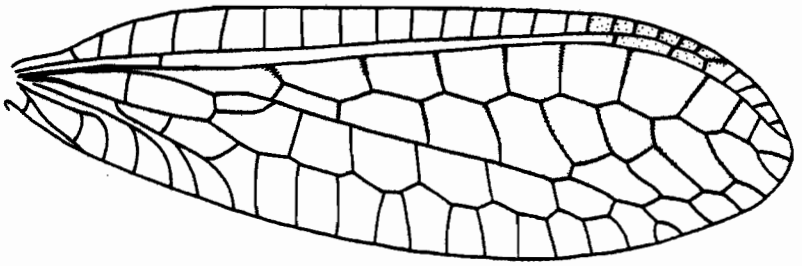
b. *ibid.*, hind wing

[based on a specimen collected by

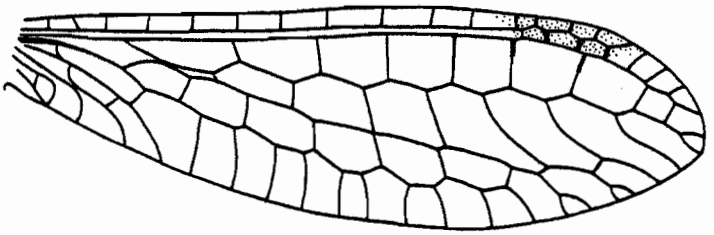
J.H. McDunnough, Seton Lake, British Columbia,

29.V.1926; CNC, determined by P.A. Adams]

a



b



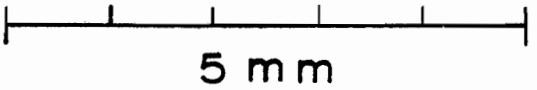


Figure 14 (continued)

c. E. fraterna, female fore wing

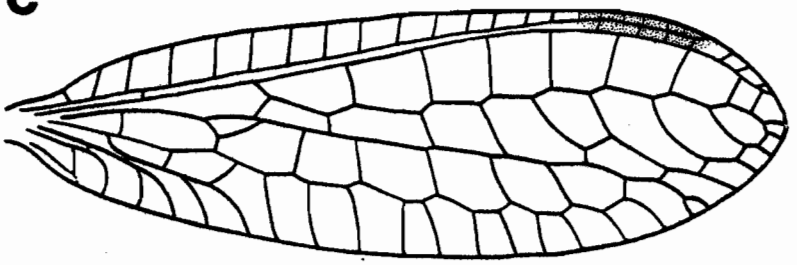
d. ibid., hind wing

[based on a specimen collected by

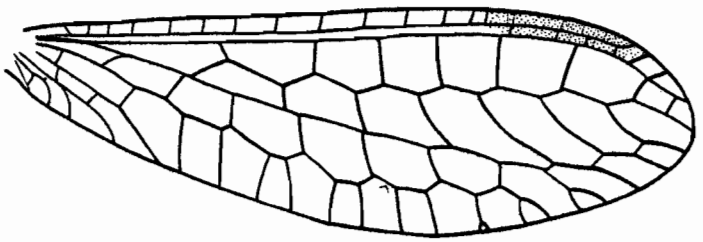
J.A. Garland, Penticton, British Columbia,

29.VII.1976; LEM]

c



d



5 mm

Figure 15 Pretarsal claws of Eremochrysa spp.

a. E. canadensis, male mesothoracic leg

b. E. ?canadensis, male mesothoracic leg

c. E. punctinervis, female metathoracic leg

[based on a specimen collected by

a) F.O. Morrison, Weirs Beach, New Hampshire, VIII.1968; LEM

b) J.A. Garland, Penticton, British Columbia, 16.VII.1976; LEM

c) J.A. Garland, Penticton, British Columbia, 4.IX.1976; LEM]

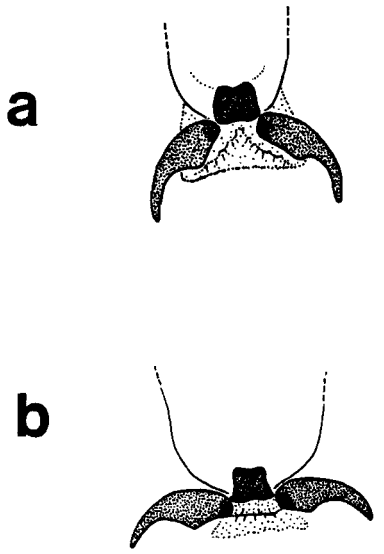

a
b
c
0·2 m m

Figure 16 *Eremochrysa ?canadensis*: male head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

16.VII.1976; LEM]

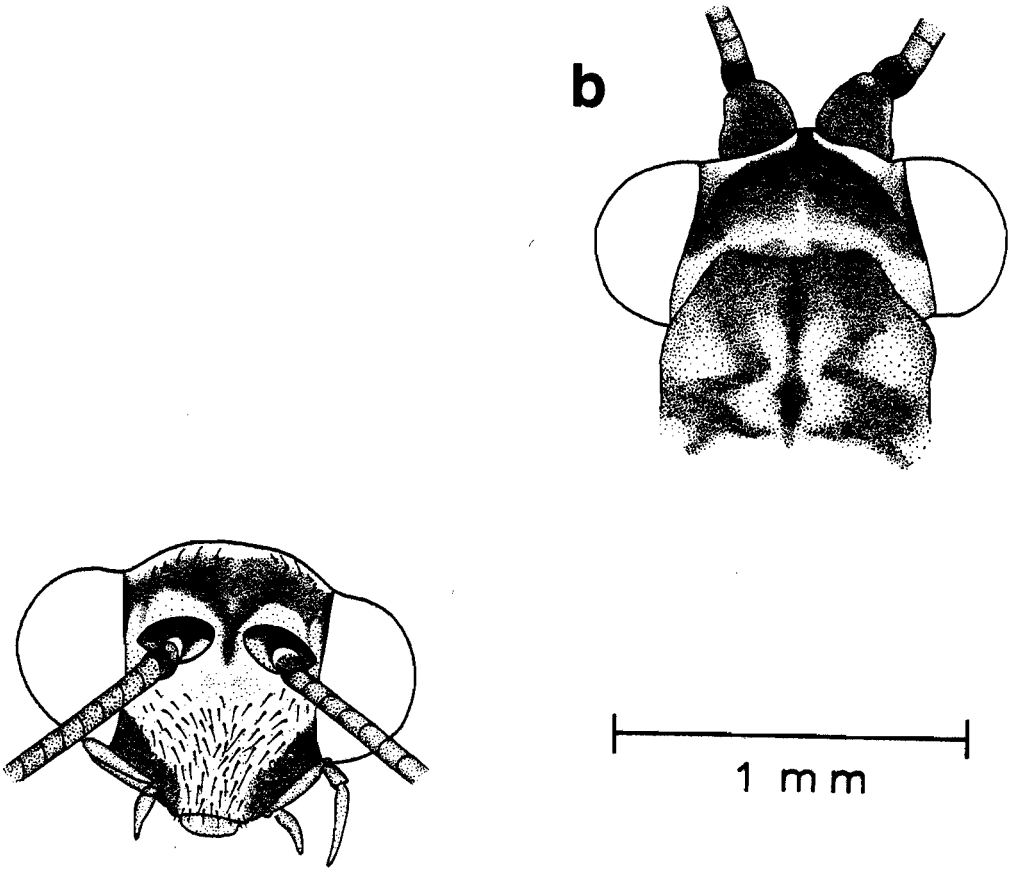

b
a
1 mm
c

Figure 17 Eremochrysa canadensis: female head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by
L.J. Milne, Knowlton, Québec,
29.VII.1930; CNC,
determined by P.A. Adams]

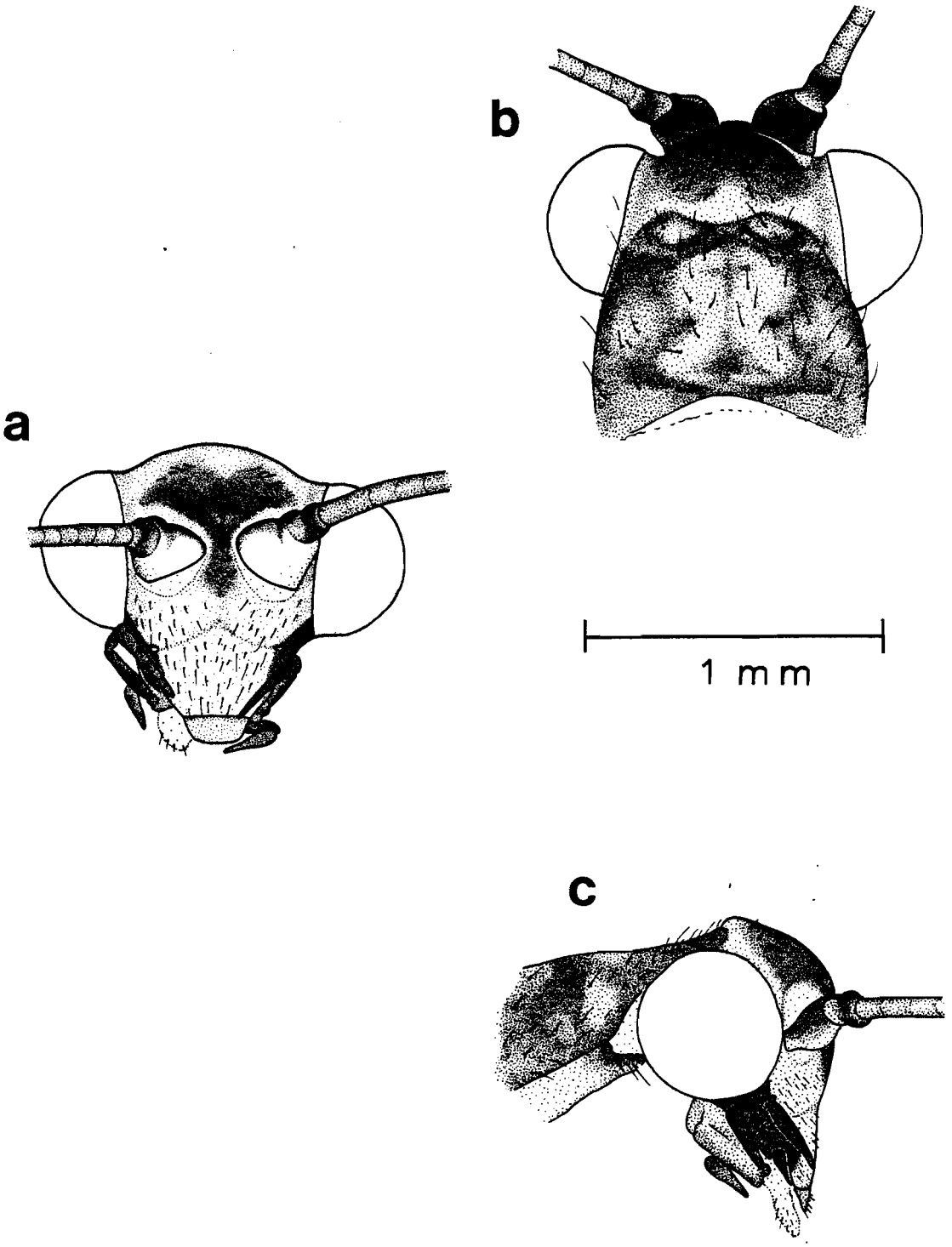

a
b
c
1 mm

Figure 18 Eremochrysa canadensis: male abdomen

a. New Hampshire

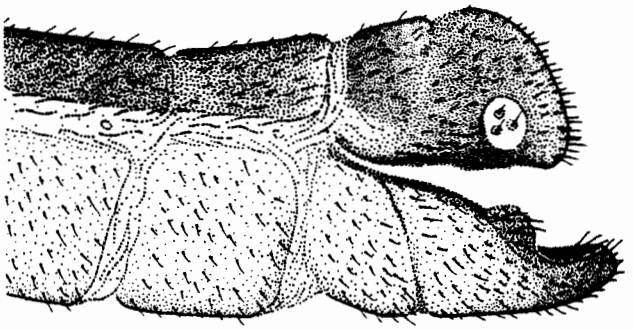
b. [?] British Columbia

[based on a specimen collected by

a) F.O. Morrison, Weirs Beach, New Hampshire, VIII.1968; LEM

b) J.A. Garland, Penticton, British Columbia, 16.VII.1976; LEM]

a



1 mm

b

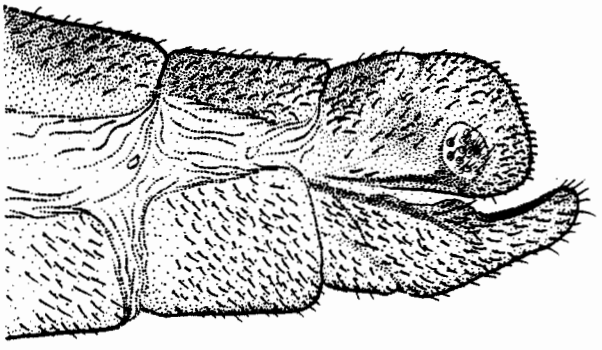


Figure 19 Eremochrysa canadensis: male structures

a. terminalia everted

b. mediuncus of a.

c. terminalia everted

d. mediuncus of c.

[based on a specimen collected by

a, b) F.O. Morrison, Weirs Beach, New Hampshire, VIII.1968; LEM

c, d) J.A. Garland, Penticton, British Columbia, 16.VII.1976; LEM]

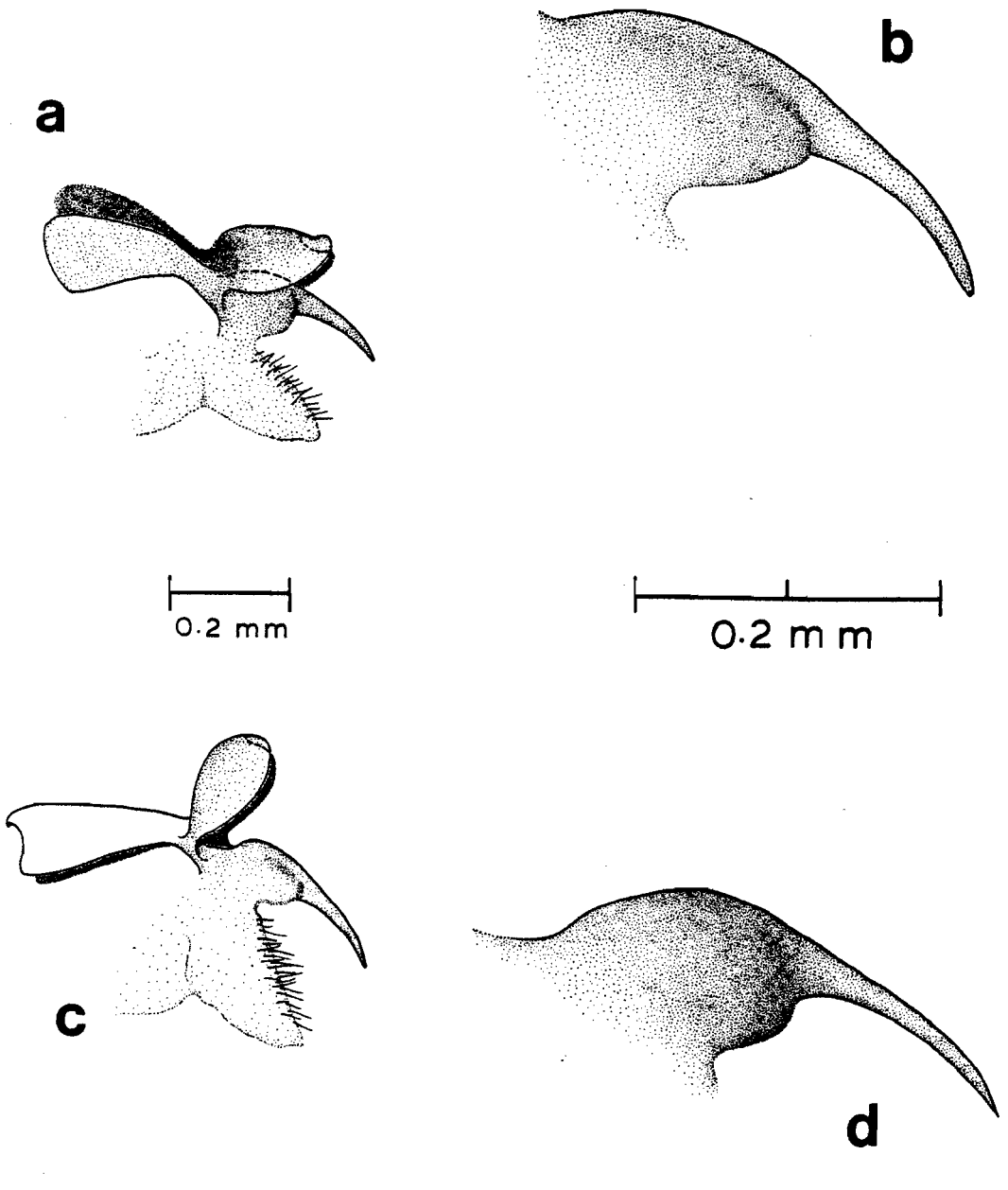

a
b
0.2 mm
0.2 mm
c
d

Figure 20 Eremochrysa canadensis: gonapsis

a. New Hampshire (damaged)

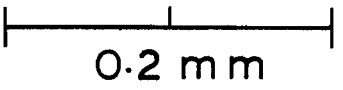
b. British Columbia

[based on a specimen collected by

a) F.O. Morrison, Weirs Beach, New Hampshire, VIII.1968; LEM

b) J.A. Garland, Penticton, British Columbia, 16.VII.1976; LEM]

a



b

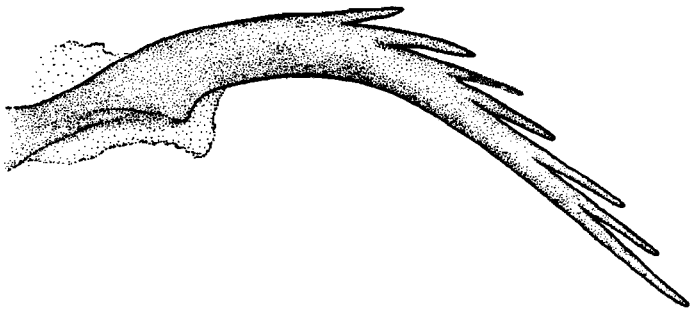
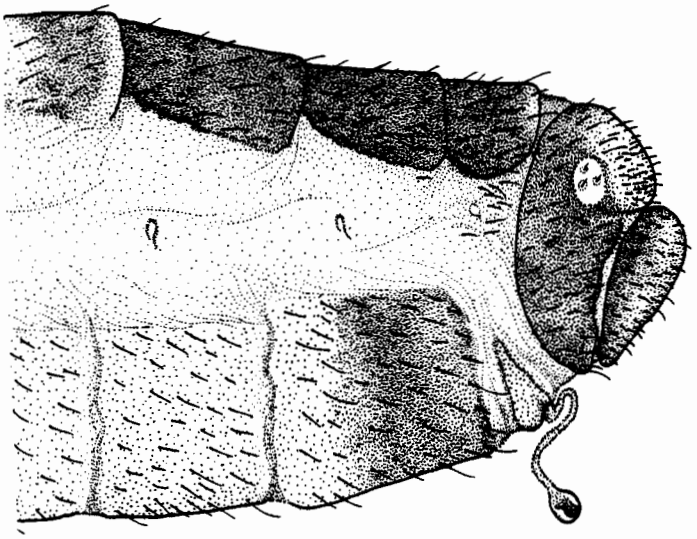


Figure 21 Eremochrysa canadensis: female abdomen

[based on a specimen collected by
L.J. Milne, Knowlton, Québec.
29.VII.1930; CNC,
determined by P.A. Adams]



1 mm

Figure 22 *Eremochrysa canadensis*: female structures

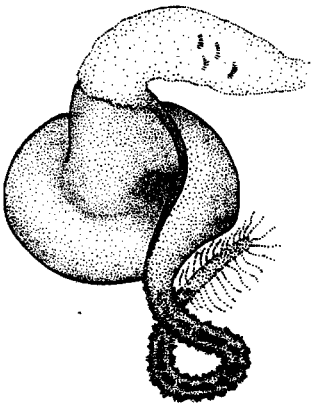
a. spermatheca

b. subgenitale, ental aspect

c. *ibid.*, ectal aspect

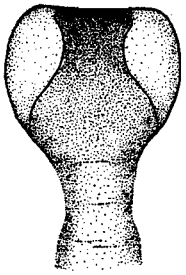
[based on a specimen collected by
L.J. Milne, Knowlton, Québec,
29.VII.1930; CNC,
determined by P.A. Adams]

a



0·2 mm

b



c

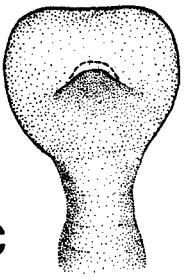


Figure 23 Eremochrysa fraterna: male head

a. frontal

b. dorsal

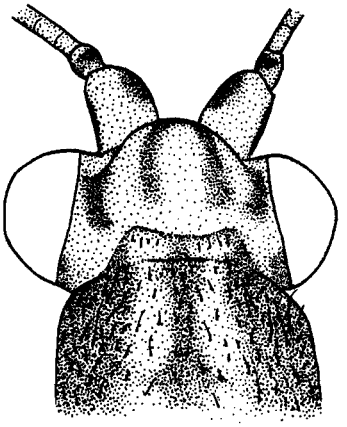
c. lateral

[based on a specimen collected by

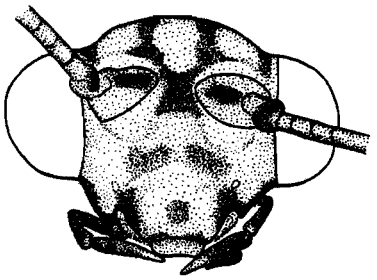
J.A. Garland, Penticton, British Columbia,

11.VI.1977; LEM]

b



a



1 mm

c

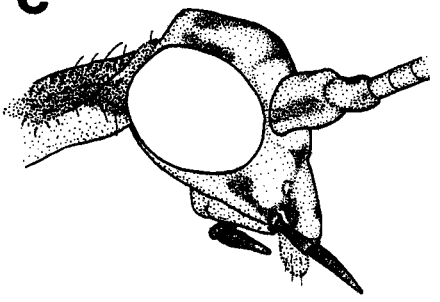
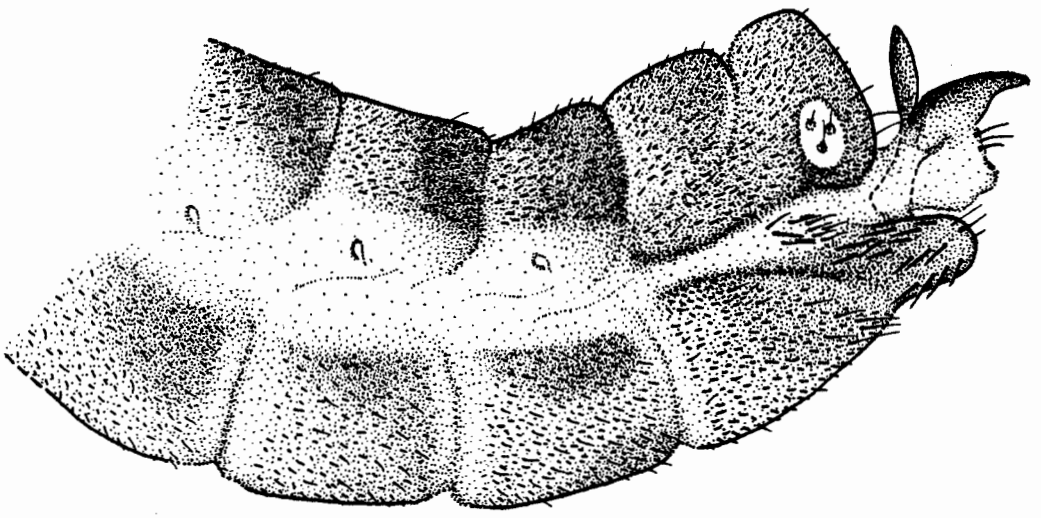


Figure 24 Eremochrysa fraterna: male abdomen

[based on a specimen collected by
J.A. Garland, Penticton, British Columbia,
11.VI.1977; LEM]



1 mm

Figure 25 Eremochrysa fraterna: male structures

a. terminalia everted

b. gonapsis

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

11.VI.1977; LEM]

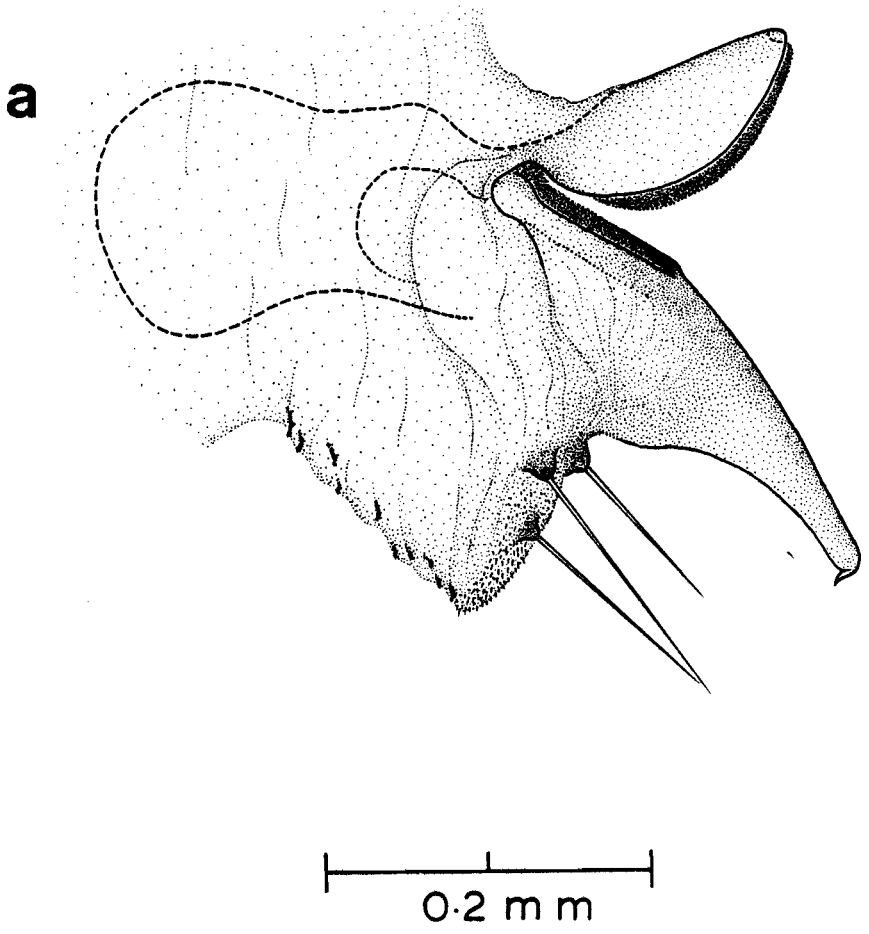

a
0·2 m m
b

Figure 26 Eremochrysa fraterna: mediuncus

a. McIntyre Creek, Oliver, British Columbia

b. Seton Lake, Lillooet, British Columbia

c. Vaseux Lake, Oliver, British Columbia

d. Oliver, British Columbia

[based on a specimen collected by

a) L.A. Kelton, 27.V.1959; CNC

b) J.H. McDunnough, 29.V.1926; CNC

c) R.E. Leech, 15.V.1959; CNC

d) L.A. Kelton, 25.V.1959; CNC

determined by P.A. Adams]

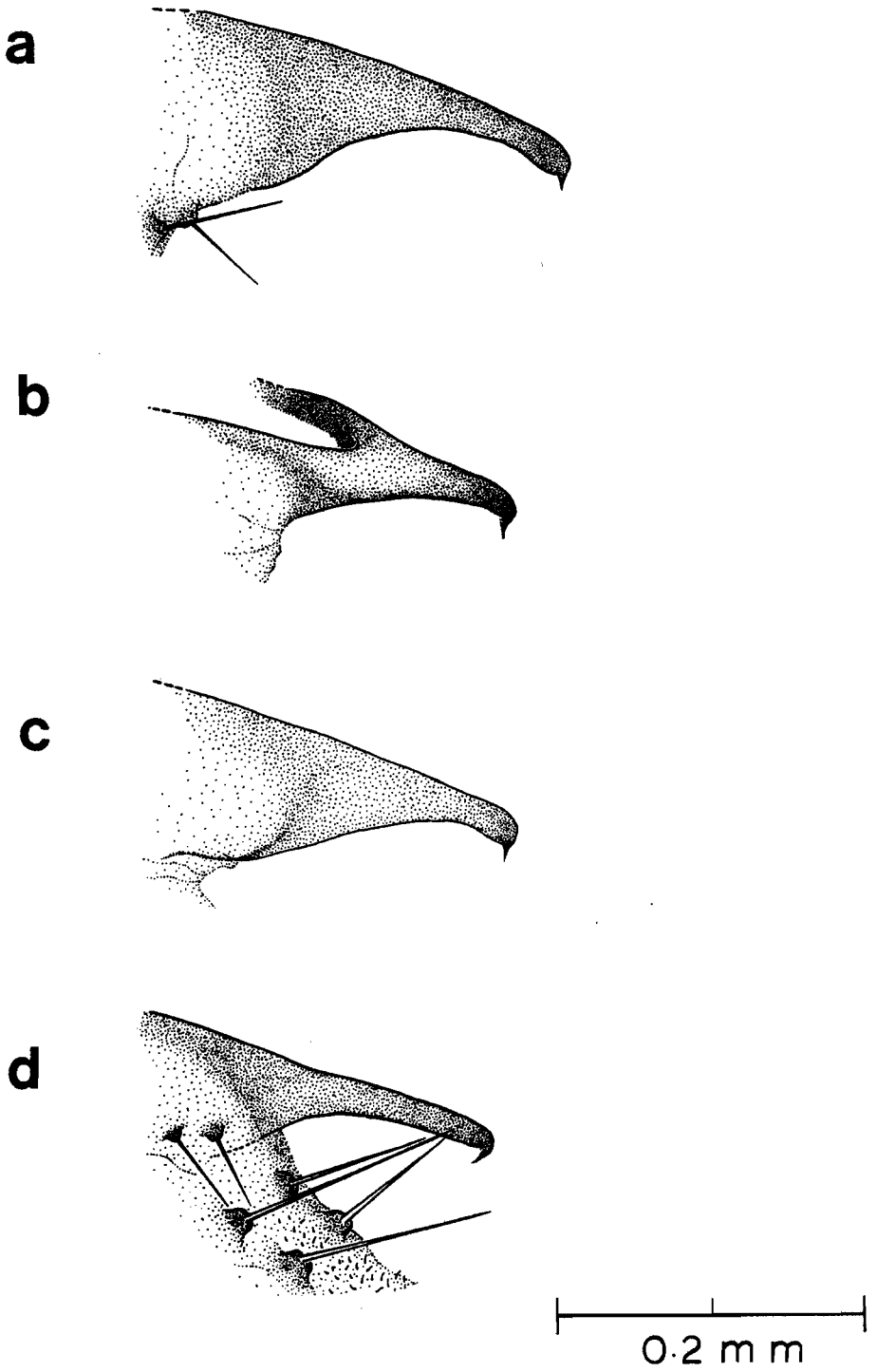

a
b
c
d
0·2 m m

Figure 27 Eremochrysa fraterna: female head

a. frontal

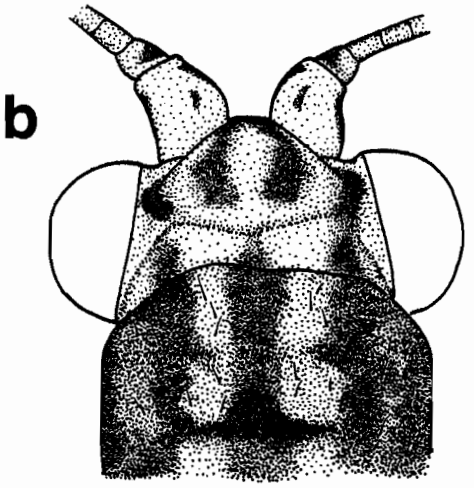
b. dorsal

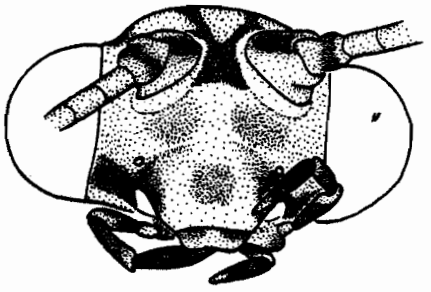
c. lateral

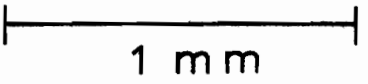
[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

5.VI.1976; LEM]


b


a


1 mm

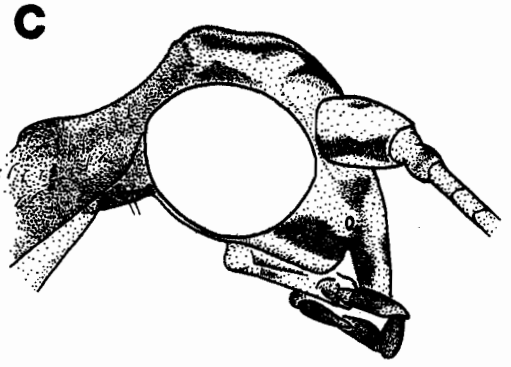

c

Figure 28 Eremochrysa fraterna: female structures

a. spermatheca

b. subgenitale, ental aspect

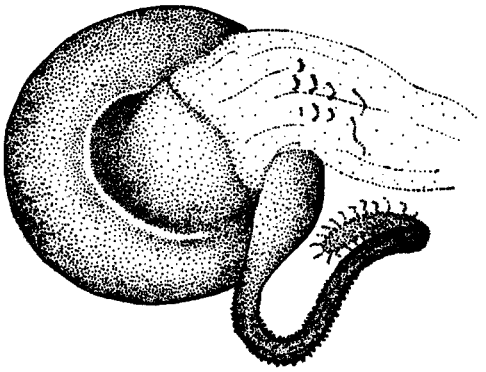
c. ibid., ectal aspect

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

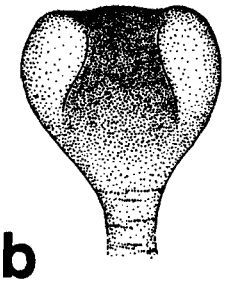
28.VII.1976; LEM]

a



0·2 mm

b



c

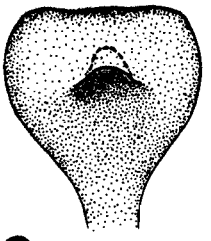


Figure 29 Eremochrysa punctinervis: male head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by
J.H. McDunnough, Seton Lake, Lillooet, British
Columbia, 9.VI.1926; CNC, determined as
E. fraterna by P.A. Adams]

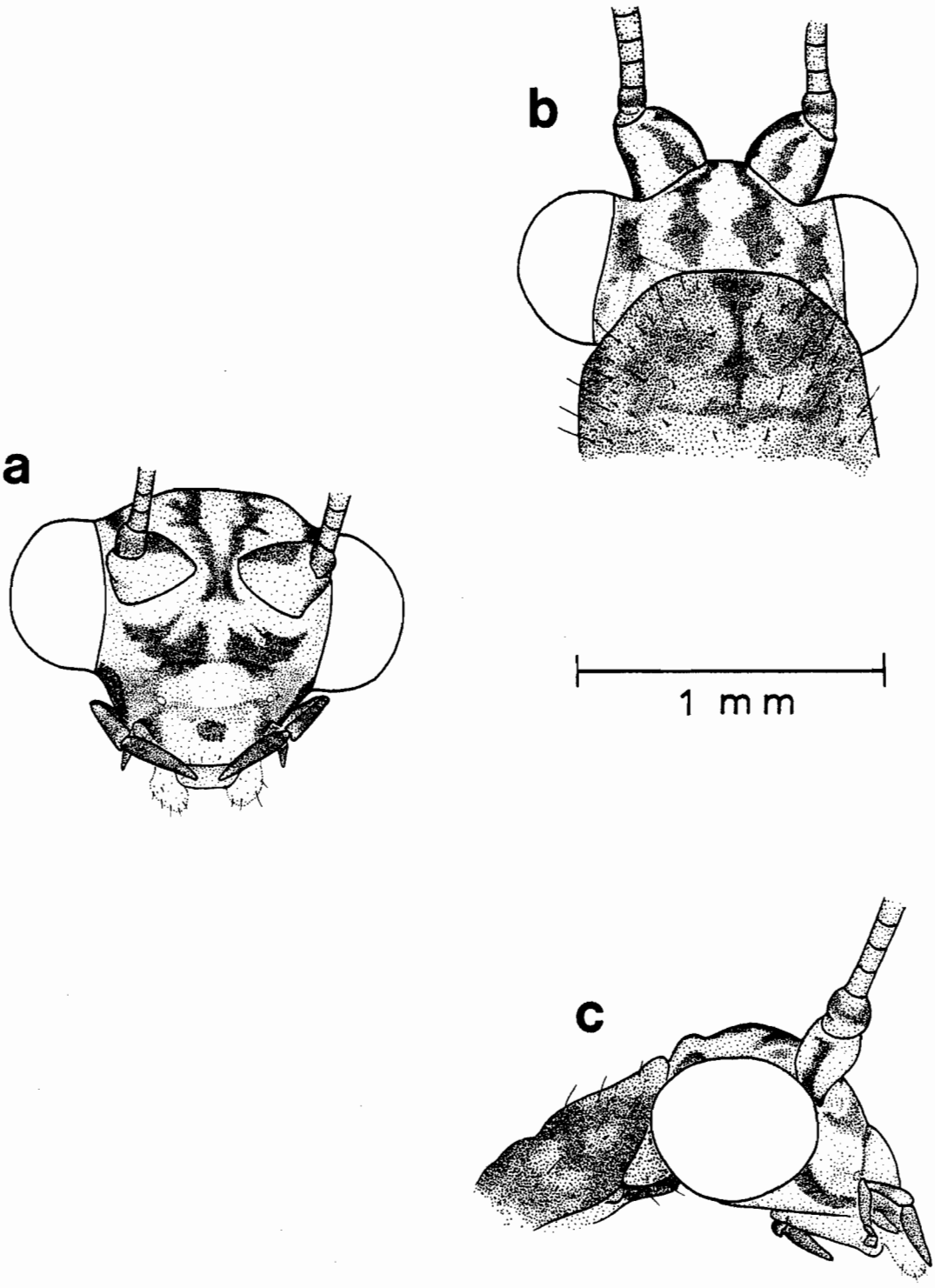

a
b
1 mm
c

Figure 30 Eremochrysa punctinervis: abdomen

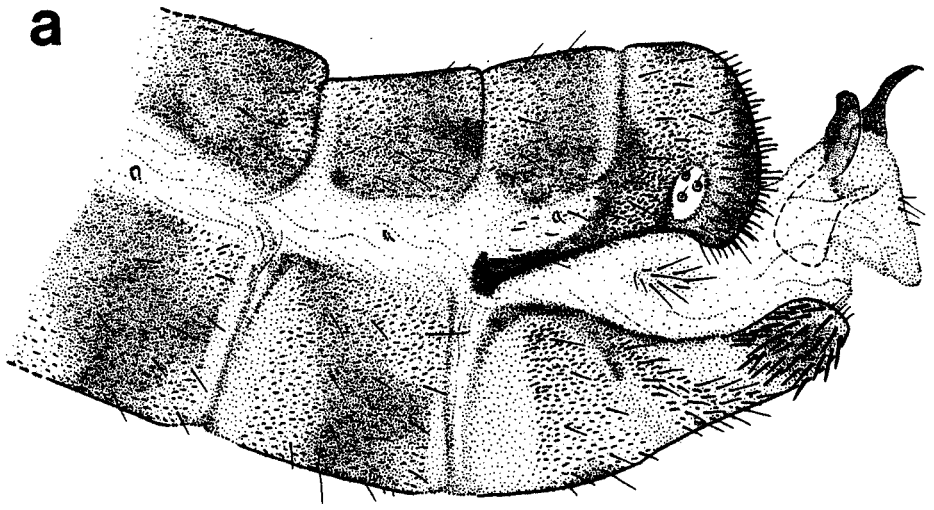
a. male

b. female

[based on a specimen collected by

a) J.H. McDunnough, Seton Lake, Lillooet, British Columbia, 9.VI.1926; CNC, determined as E. fraterna by P.A. Adams

b) C.B. Garrett, Oliver, British Columbia, 23.V.1923; CNC, determined by P.A. Adams]



1 mm

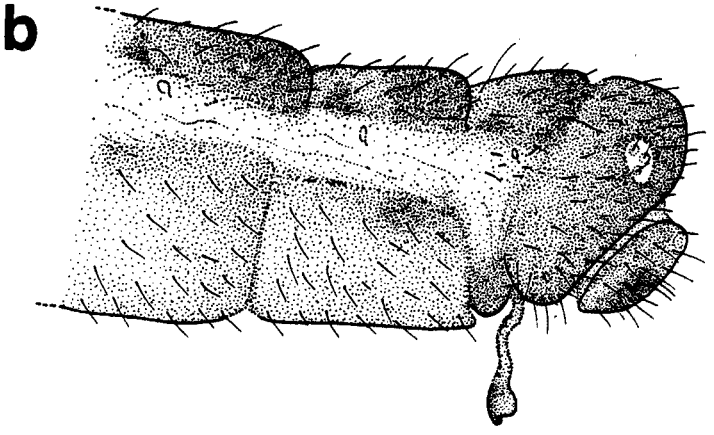


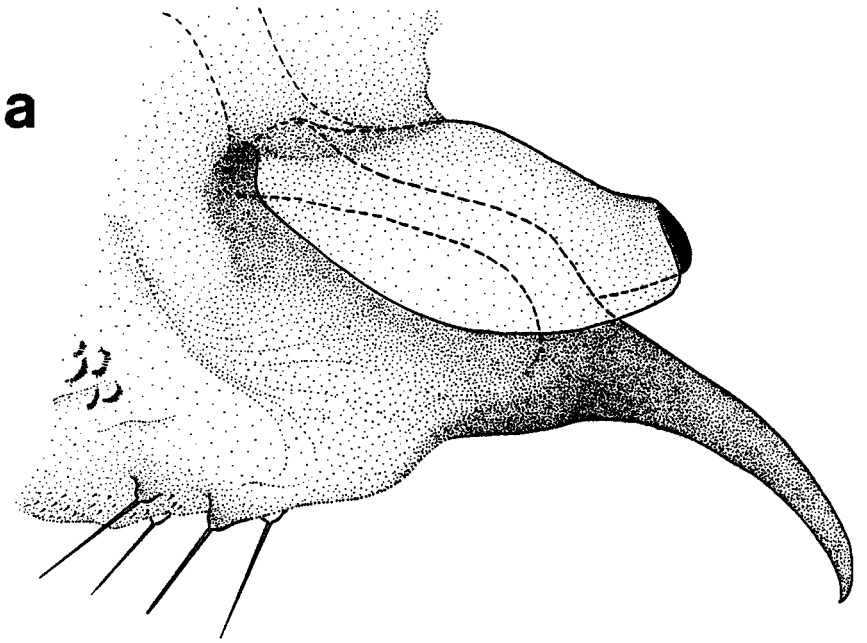
Figure 31 Eremochrysa punctinervis: male structures

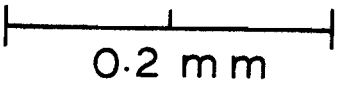
a. terminalia with structures everted

b. gonapsis

[based on a specimen collected by

J.H. McDunnough, Seton Lake, Lillooet, British Columbia, 9.VI.1926; CNC, determined as E. fraterna by P.A. Adams]


a


0·2 mm

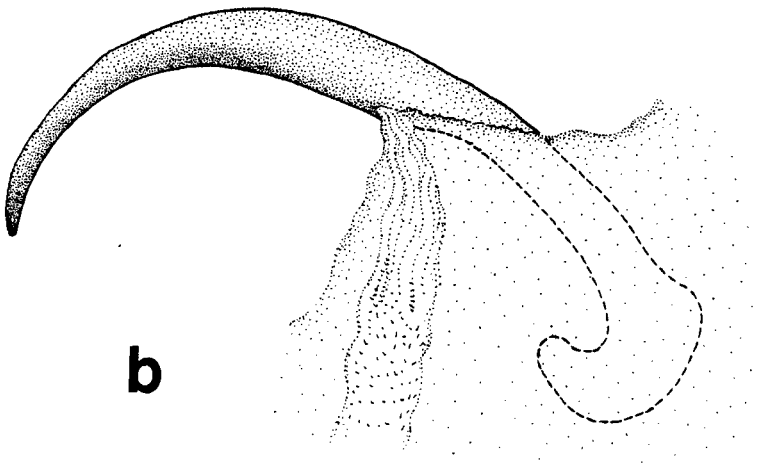

b

Figure 32 Eremochrysa punctinervis: mediuncus

a. Oliver, British Columbia

b. ibid., another specimen

c. Rawlins, Wyoming

d. Thousand Palms, California

[based on a specimen collected by

a, b) D.F. Hardwick, 12.VIII.1963; CNC

c) H. Howden, 5.VII.1961; CNC

d) W.R. Richards, 3.VIII.1955; CNC

determined by P.A. Adams]

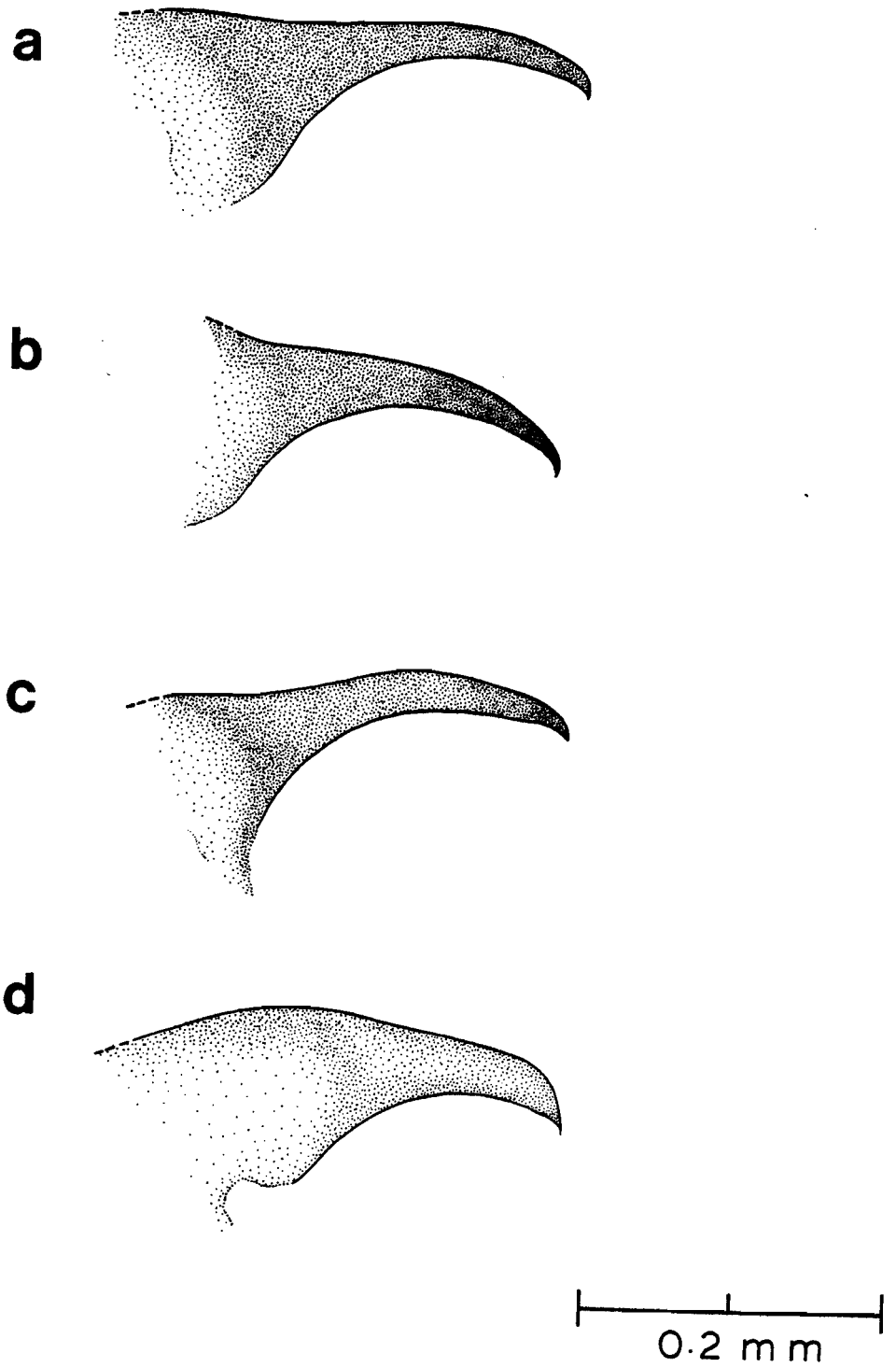

a
b
c
d
0·2 mm

Figure 33 Eremochrysa punctinervis: female head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

2.VIII.1976; LEM]

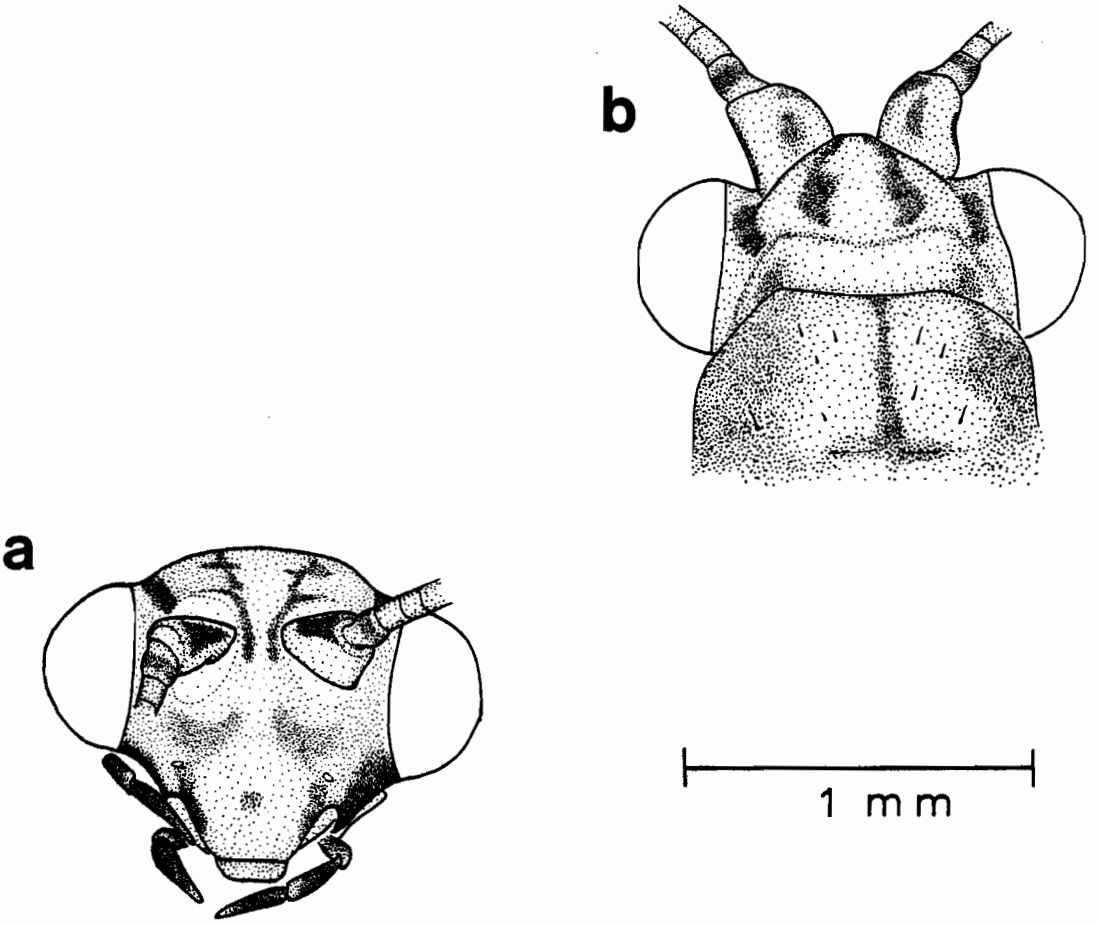

b
a
1 mm
c

Figure 34 Eremochrysa punctinervis: female structures

a. spermatheca; Penticton

b. spermatheca; South Okanagan

c. spermatheca; Oliver

d. subgenitale, ental aspect of c.

e. ibid., ectal aspect of c.

[based on a specimen collected by

a) J.A. Garland, Penticton, British Columbia, 4.IX.1976; LEM

b) D. Logan, South Okanagan, British Columbia, VIII.1962; CNC, determined by P.A. Adams

c, d, e) C.B. Garrett, Oliver, British Columbia, 23.V.1923; CNC, determined by P.A. Adams]

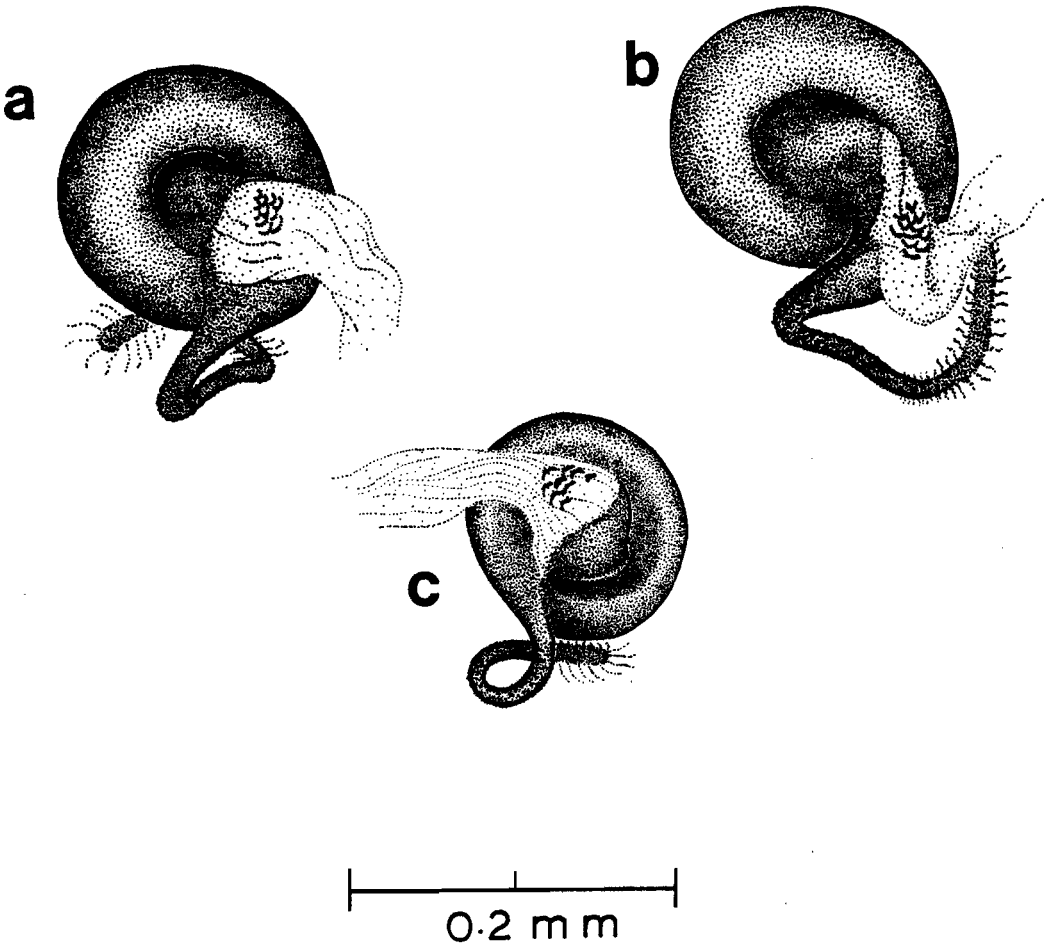

a
b
c
0·2 mm
d
e

Figure 35 Mandibles of Eremochrysa spp.

a. E. canadensis, male

b. E. ?canadensis, male

c. E. yosemite, male

d. E. fraterna, male

e. E. punctinervis, male

[based on a specimen collected by

a) F.O. Morrison, Weirs Beach, New Hampshire, VIII.1968; LEM

b) J.A. Garland, Penticton, British Columbia, 16.VII.1976; LEM

c) D.F. Hardwick, Apple Valley, California, 24.V.1955; CNC, determined by P.A. Adams

d) J.A. Garland, Penticton, British Columbia, 11.VI.1977; LEM

e) E.C. Becker & H. Howden, Kerrville, Texas, 13.IV.1959; CNC, determined by P.A. Adams]

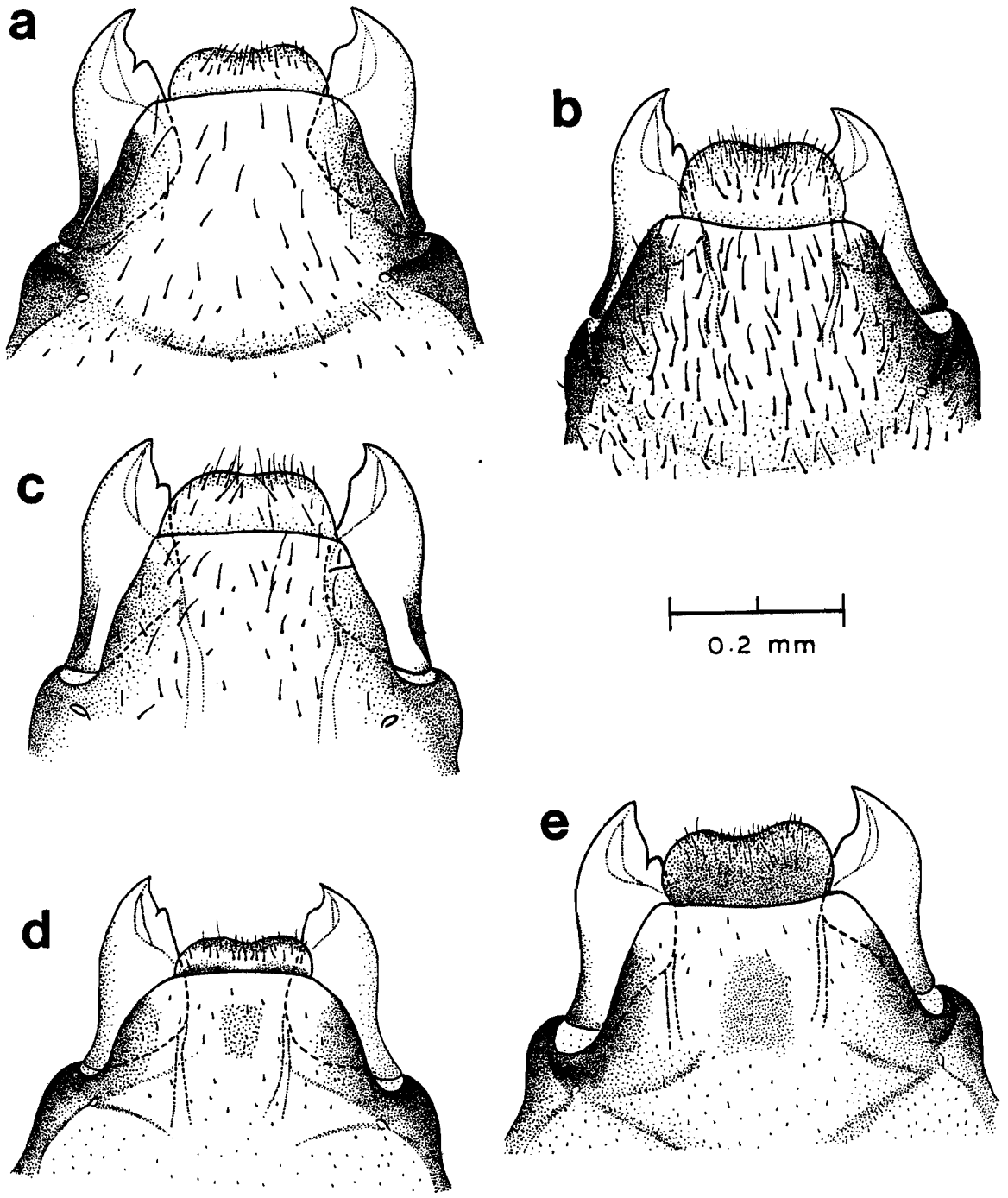

a
b
c
0.2 mm
e
d

Figure 36 Chrysopiella brevisetosa: wing

a. fore wing

b. hind wing

[based on a specimen collected by

E.H. Strickland, Drumheller, Alberta,

14.VI.1946; UAE, Paratype male]

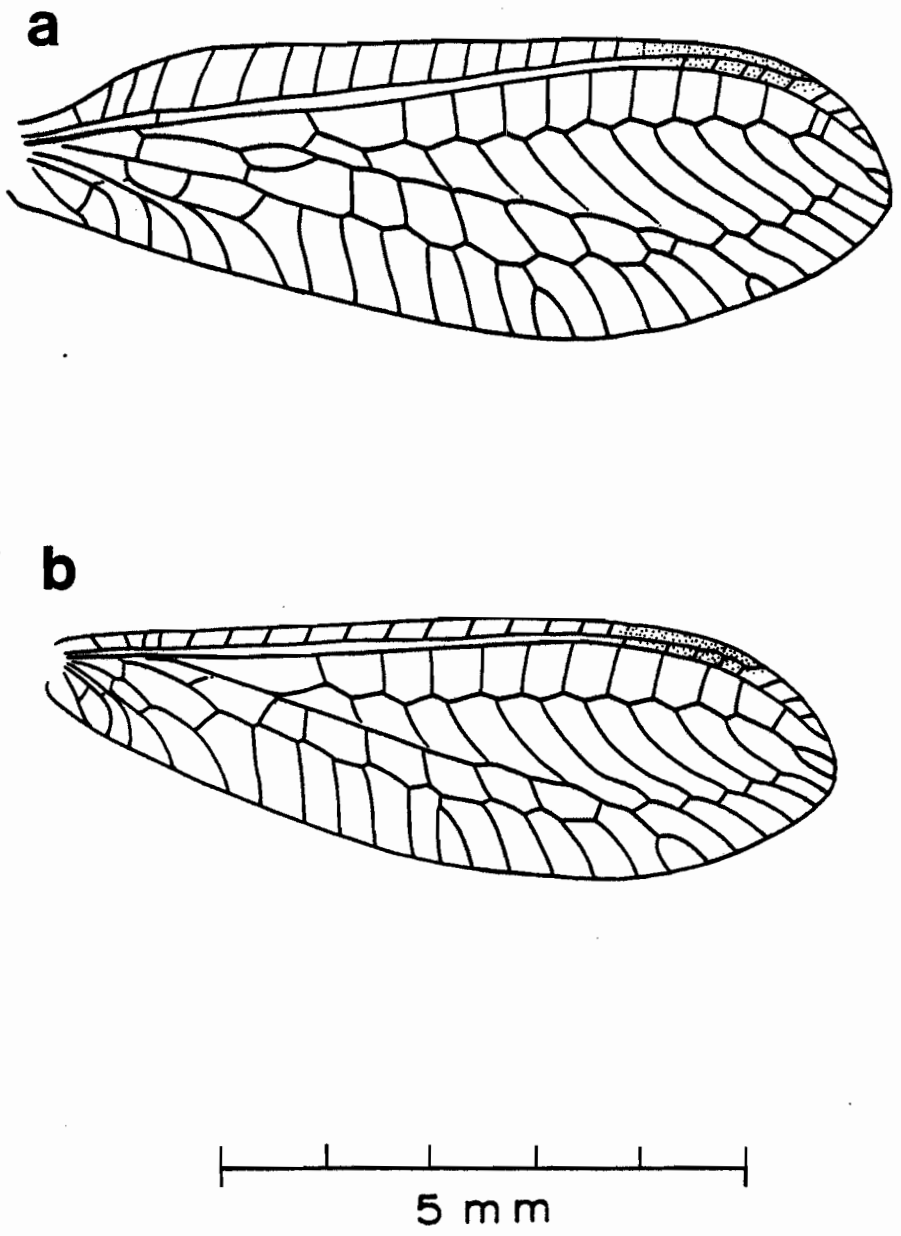

a
b
5 mm

Figure 37 Chrysopiella brevisetosa: pretarsal claws

a. mesothoracic leg, ventral aspect

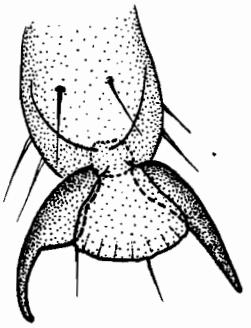
b. ibid., lateral aspect

[based on a specimen collected by

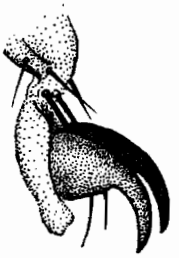
E.H. Strickland, Drumheller, Alberta,

14.VI.1946; UAE, Paratype male]

a



b



0·2 mm

Figure 38 Chrysopiella brevisetosa: head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

E.H. Strickland, Drumheller, Alberta,

14.VI.1946; UAE, Paratype male]

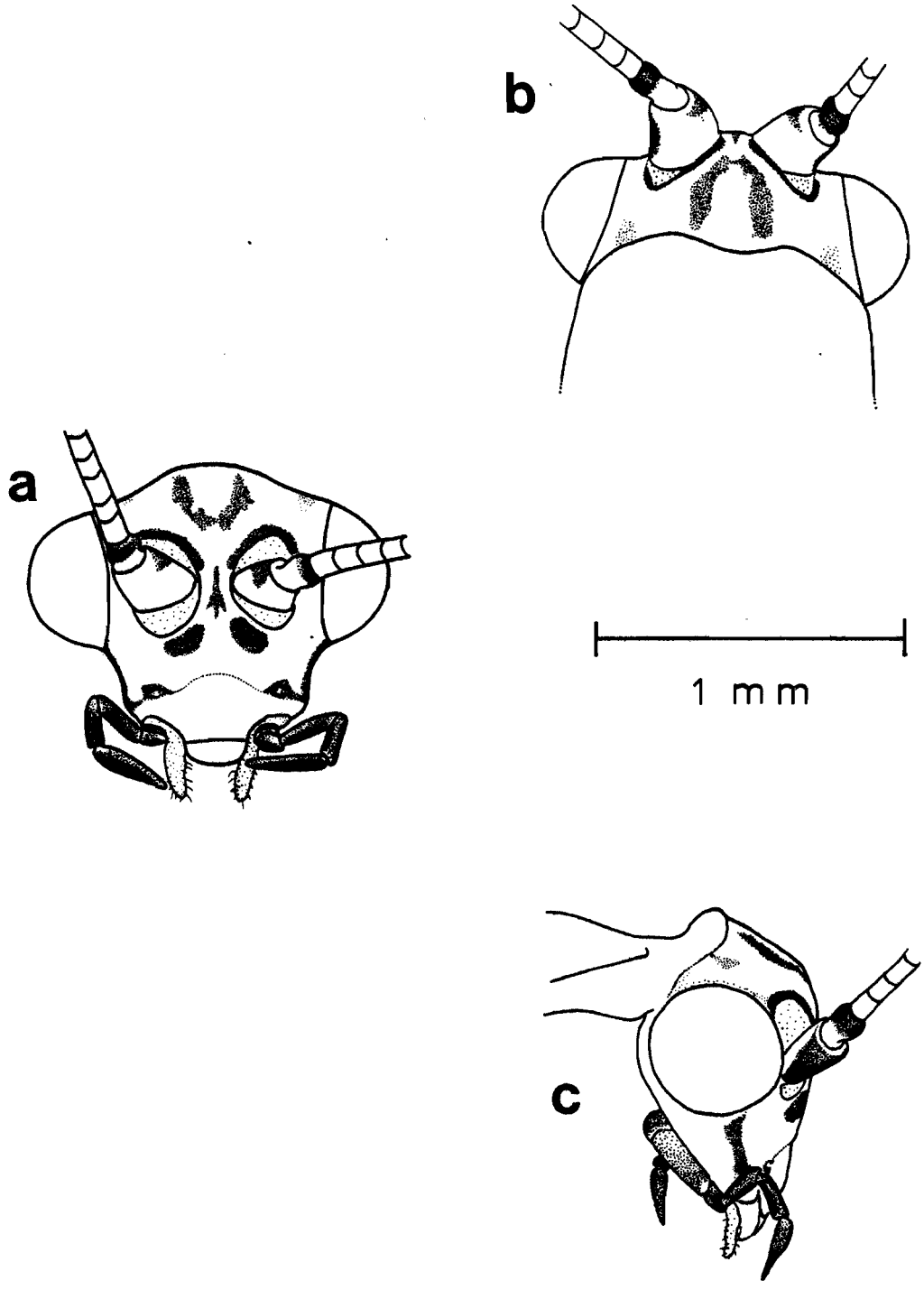

b
a
1 mm
c

Figure 38 (continued)

d. para-frontal

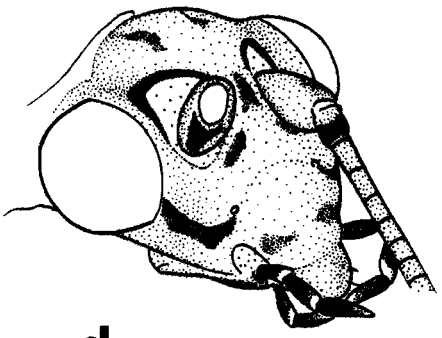
e. dorsal

f. frontal

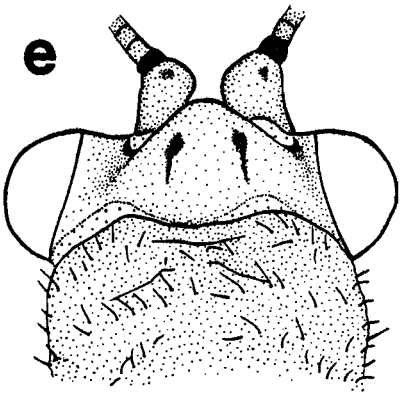
[based on a specimen collected by

d, e) M. Crazier, Jensen, Utah, 22.V.1954;
CNC, Paratype female

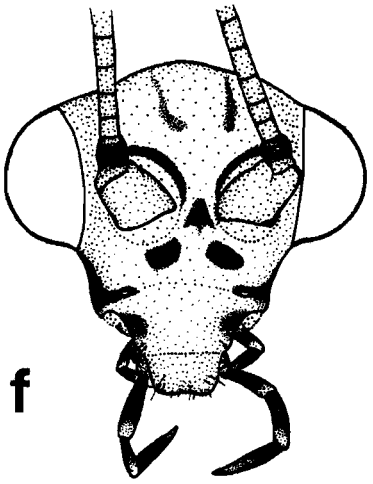
f) M. Crazier, Jensen, Utah, 22.V.1954;
CNC, Paratype male]



d



e



f

Figure 39 Chrysopiella brevisetosa: male structures

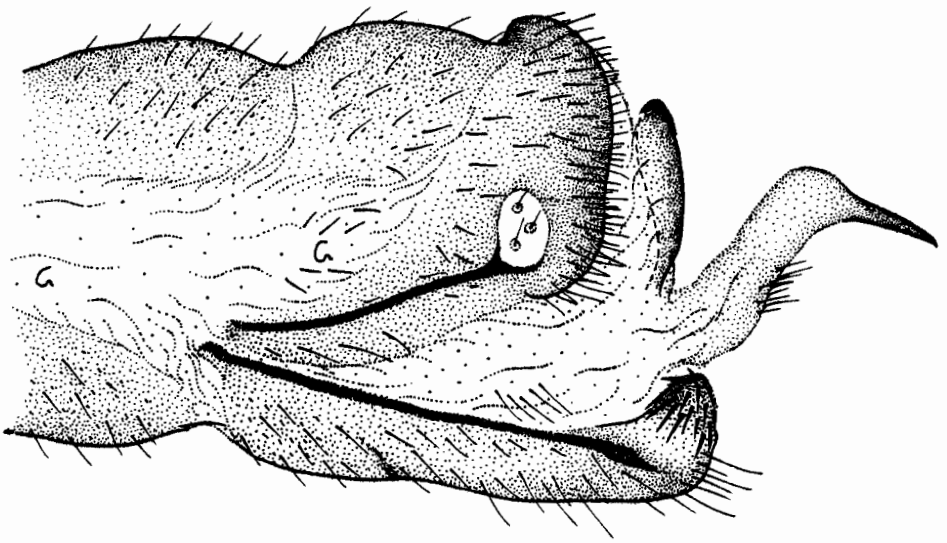
a. terminalia with structures everted

[based on a specimen collected by

M. Crazier, Jensen, Utah, 22.V.1954;

CNC, Paratype]

a



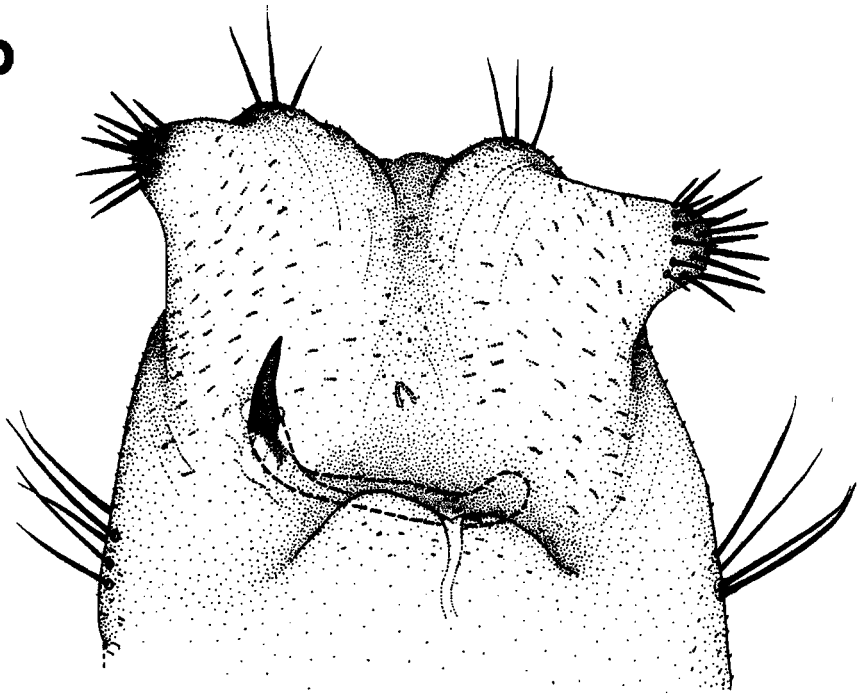
1 mm

Figure 39 (continued)

b. gonapsis

[based on a specimen collected by
E.H. Strickland, Drumheller, Alberta,
14.VI.1946; UAE, Paratype]

b



0·2 mm

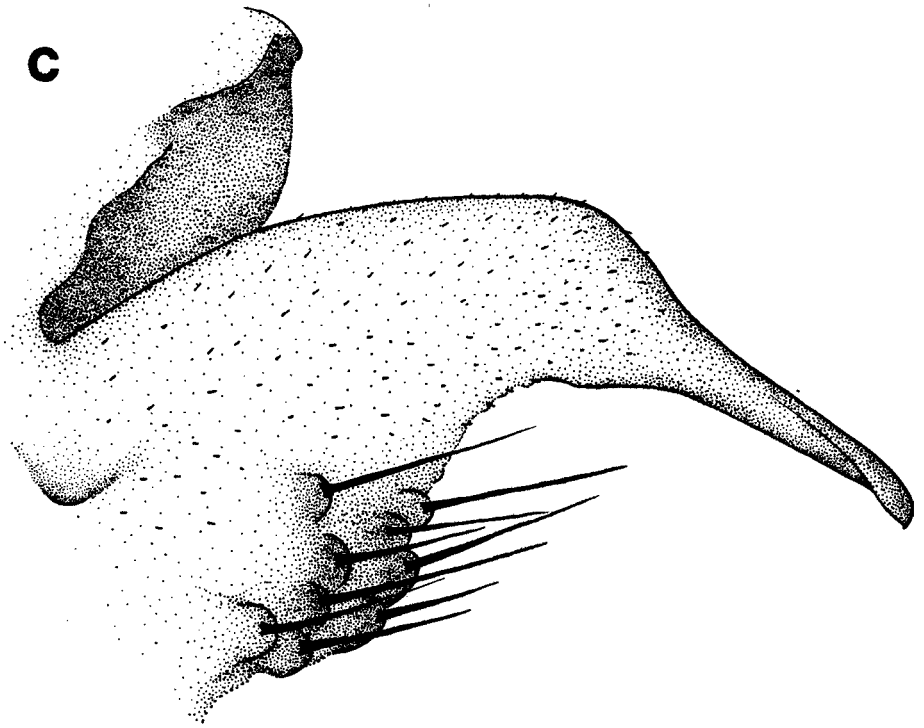
Figure 39 (continued)

c. terminalia with structures everted

[based on a specimen collected by

E.H. Strickland, Drumheller, Alberta,

14.VI.1946; UAE, Paratype]



0·2 mm

Figure 40 Chrysopiella brevisetosa: female structures

a. terminalia with subgenitale unclasped

[based on a specimen collected by

M. Crazier, Jensen, Utah, 22.V.1954;

CNC, Paratype]

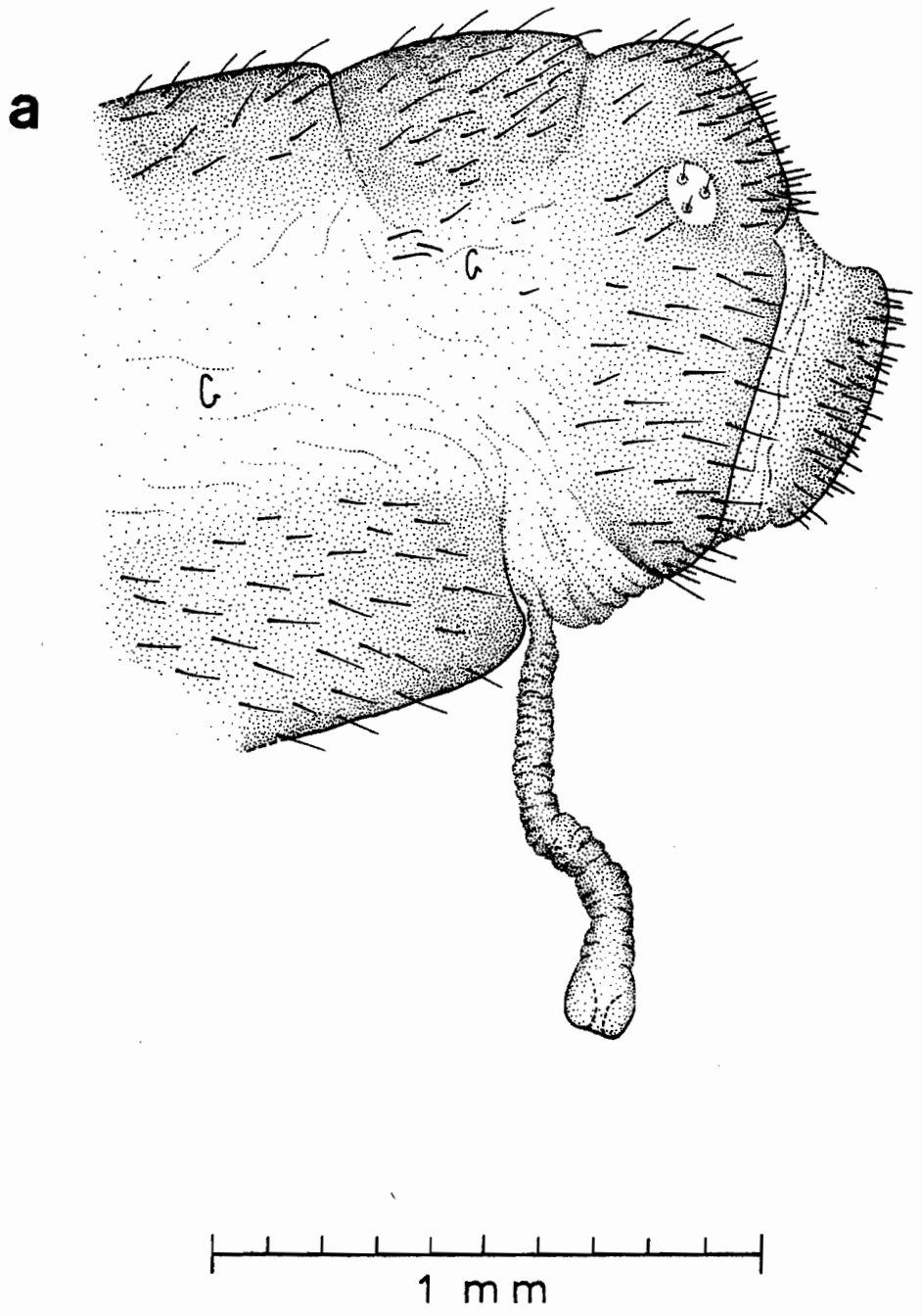

a
C
C
1 mm

Figure 40 (continued)

b. subgenitale, entral aspect

c. ibid., ectal aspect

d. spermatheca

[based on a specimen collected by

M. Crazier, Jensen, Utah, 22.V.1954;

CNC, Paratype]

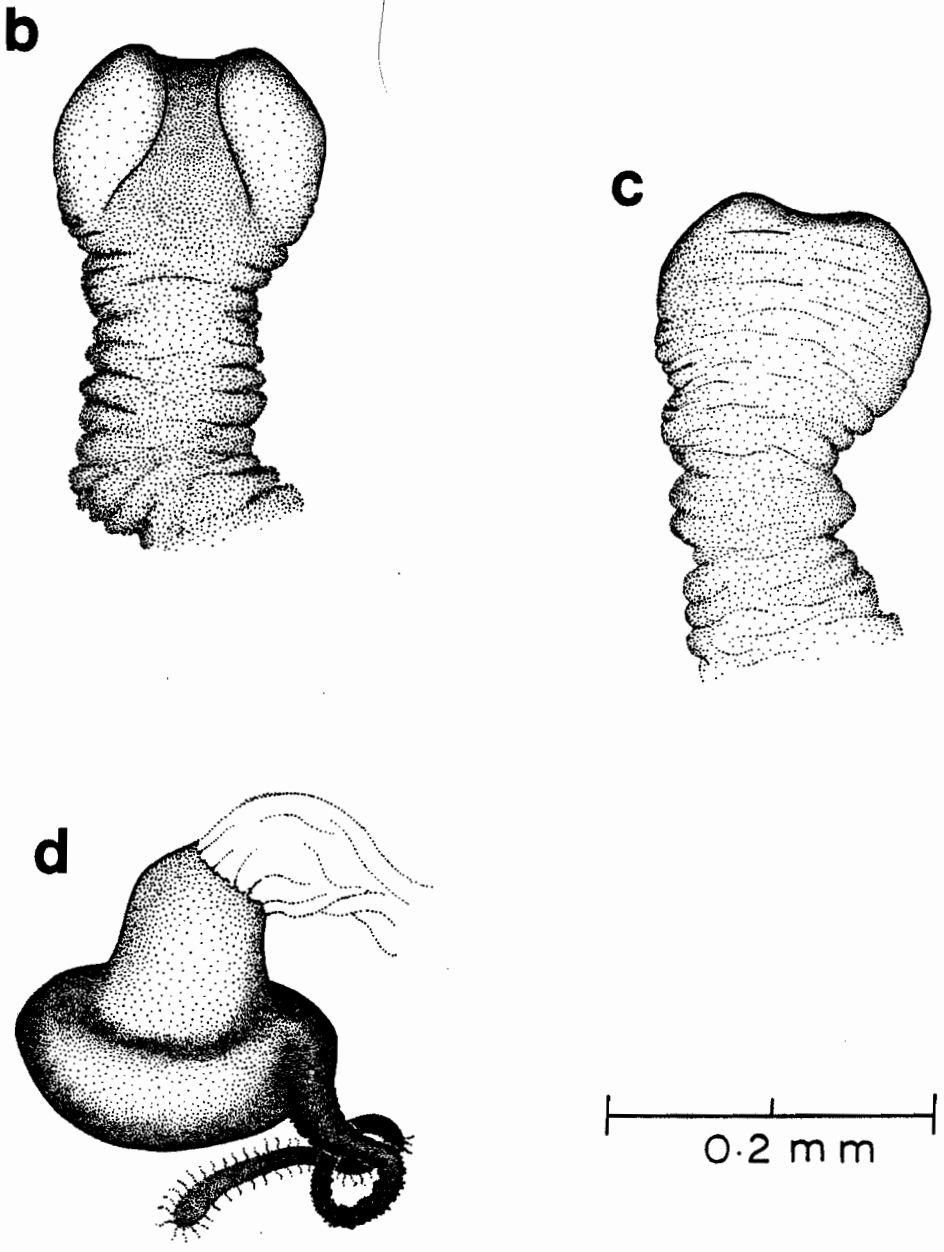

b
c
d
0·2 mm

Figure 41 Mandibles of Chrysopiella brevisetosa

a. in situ

b. ibid., magnified

[based on a specimen collected by

E.H. Strickland, Drumheller, Alberta,

14.VI.1946; UAE, Paratype male]

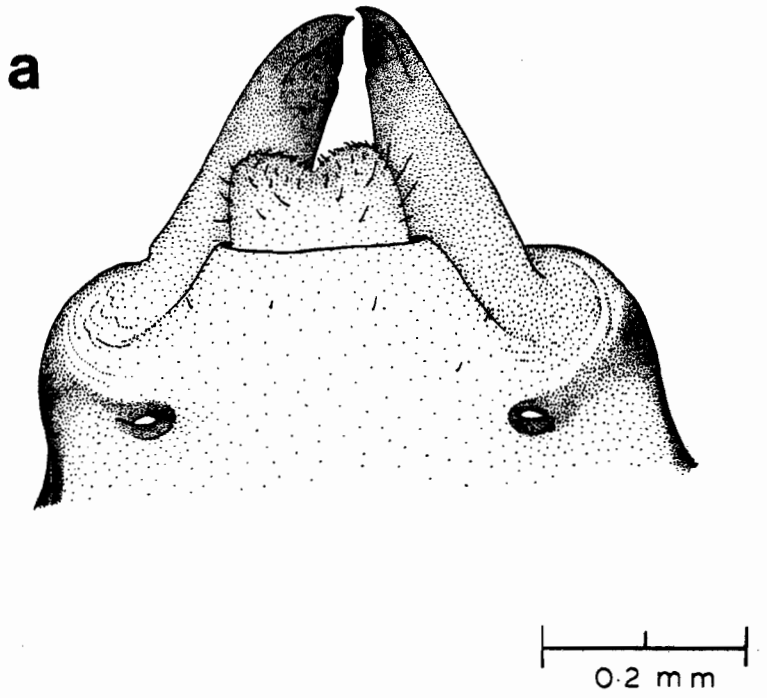

a
0·2 mm
b
0·2 mm

Figure 42 Chrysopa nigricornis: male head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

22.IX.1976; LEM]

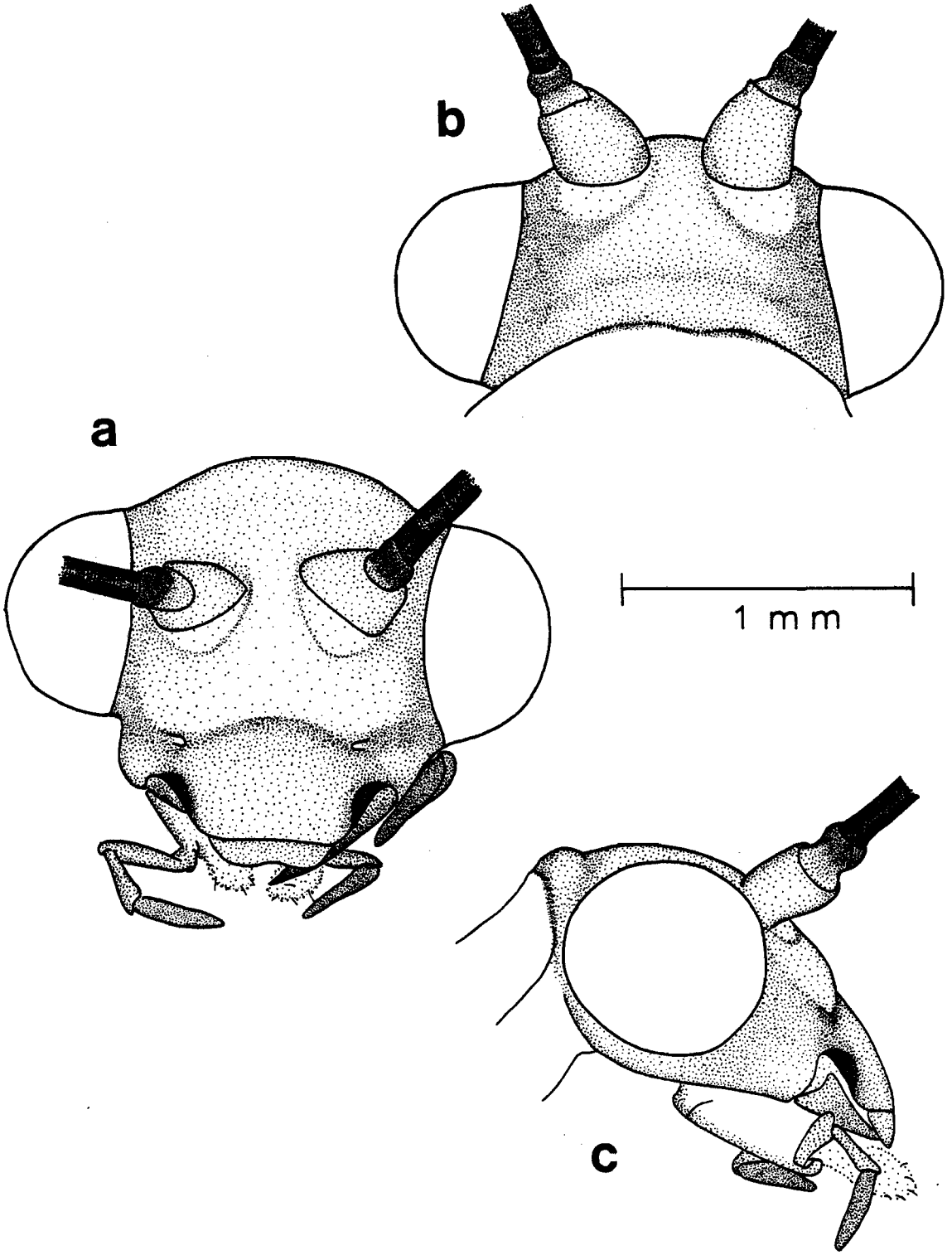

b
a
1 mm
c

Figure 43 Chrysopa nigricornis: female head

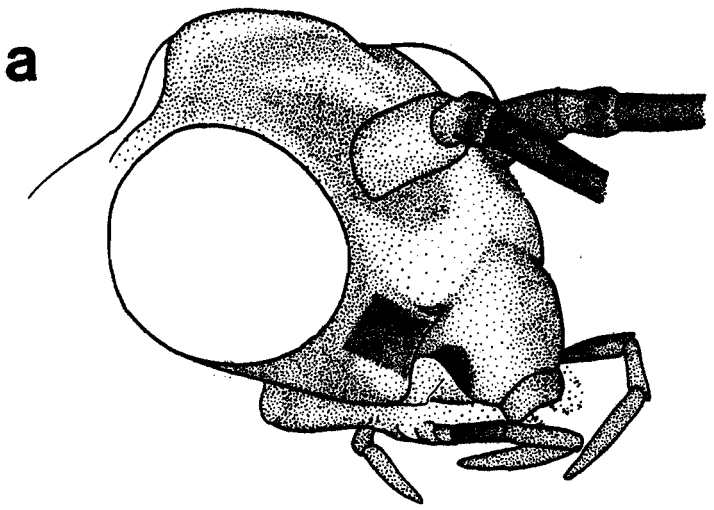
a. Penticton, British Columbia

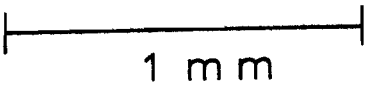
b. ibid., another specimen

[based on a specimen collected by

a) J.A. Garland, 6.VI.1976; LEM

b) J.A. Garland, 8.VI.1976; LEM]


a


1 mm

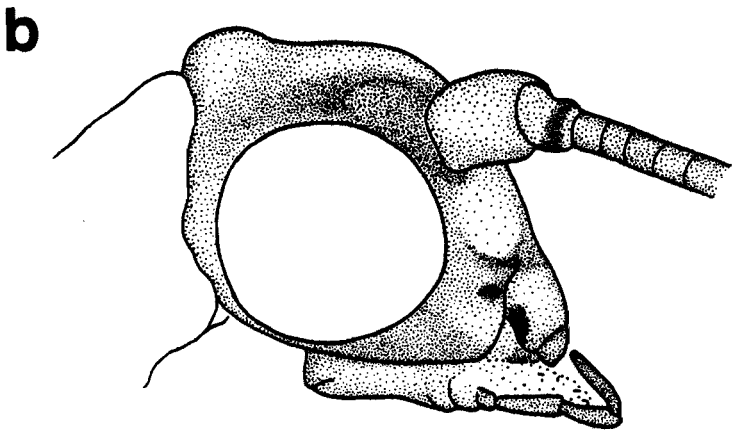

b

Figure 43 (continued)

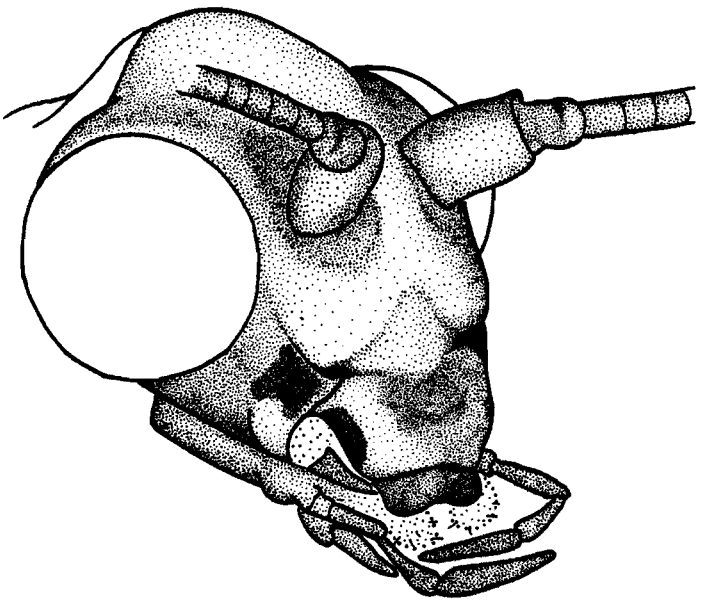
c. Penticton, British Columbia

d. ibid., another specimen

[based on a specimen collected by

c, d) J.A. Garland, 8.VI.1976; LEM]

c



1 mm

d

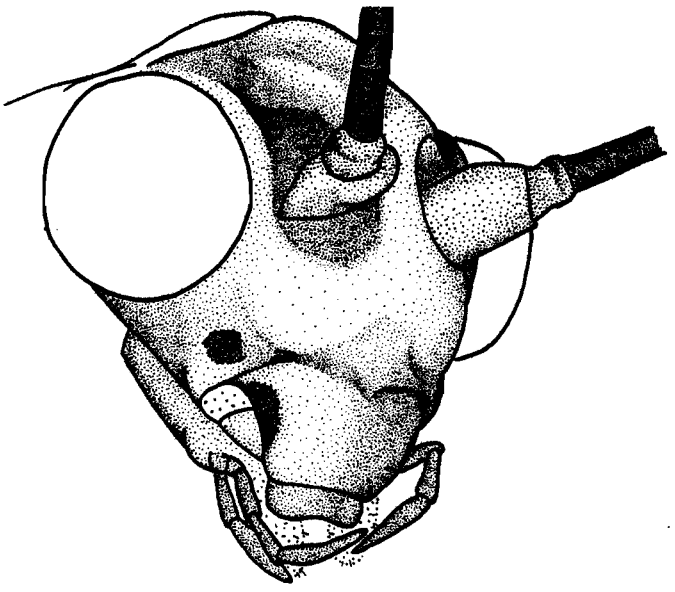


Figure 44 Chrysopa nigricornis: head of C. crotchi

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

Crotch, Victoria, British Columbia,

VII; MCZ, Type 22975, female]

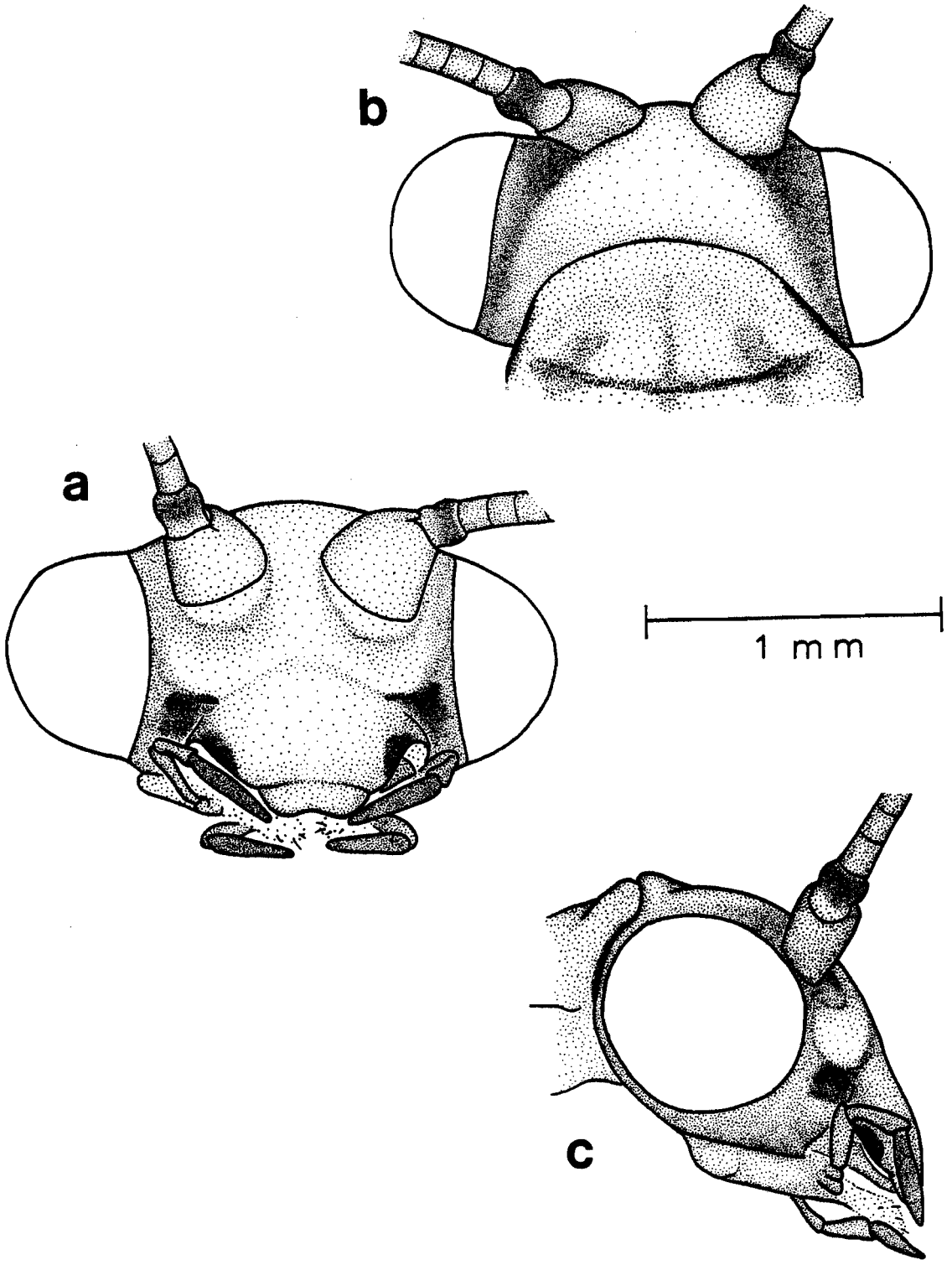
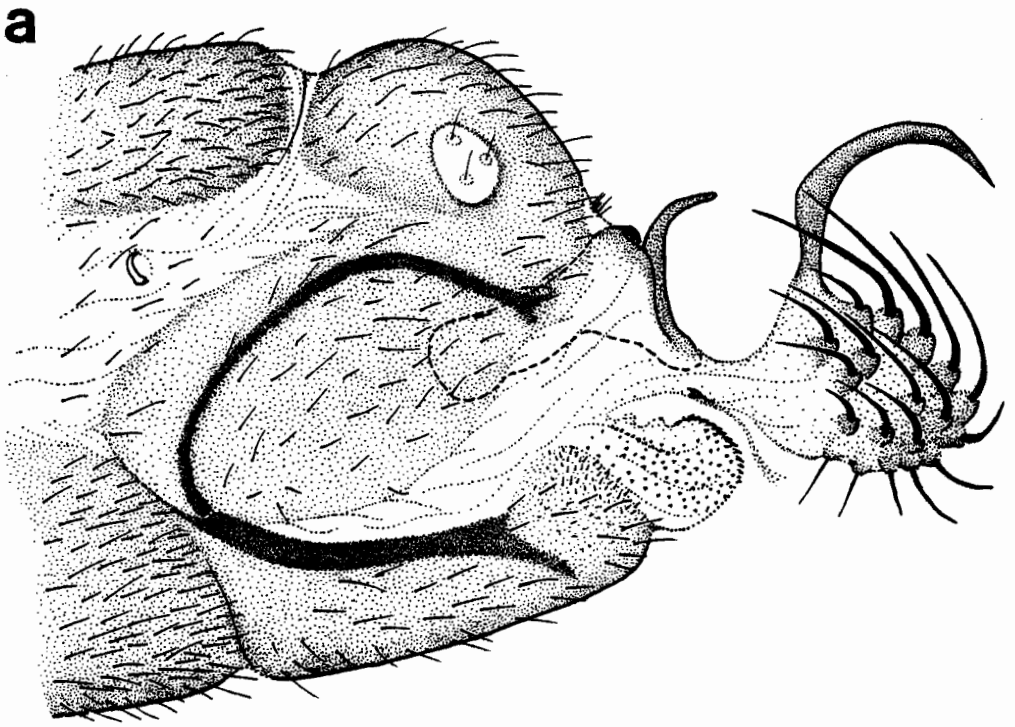

b
a
1 mm
c

Figure 45 Chrysopa nigricornis: male structures

a. terminalia with structures everted

[based on a specimen collected by

B. Rolseth, Ottawa, Ontario, 5.VII.1967; UAE]


a

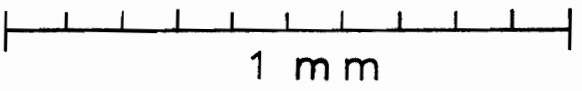
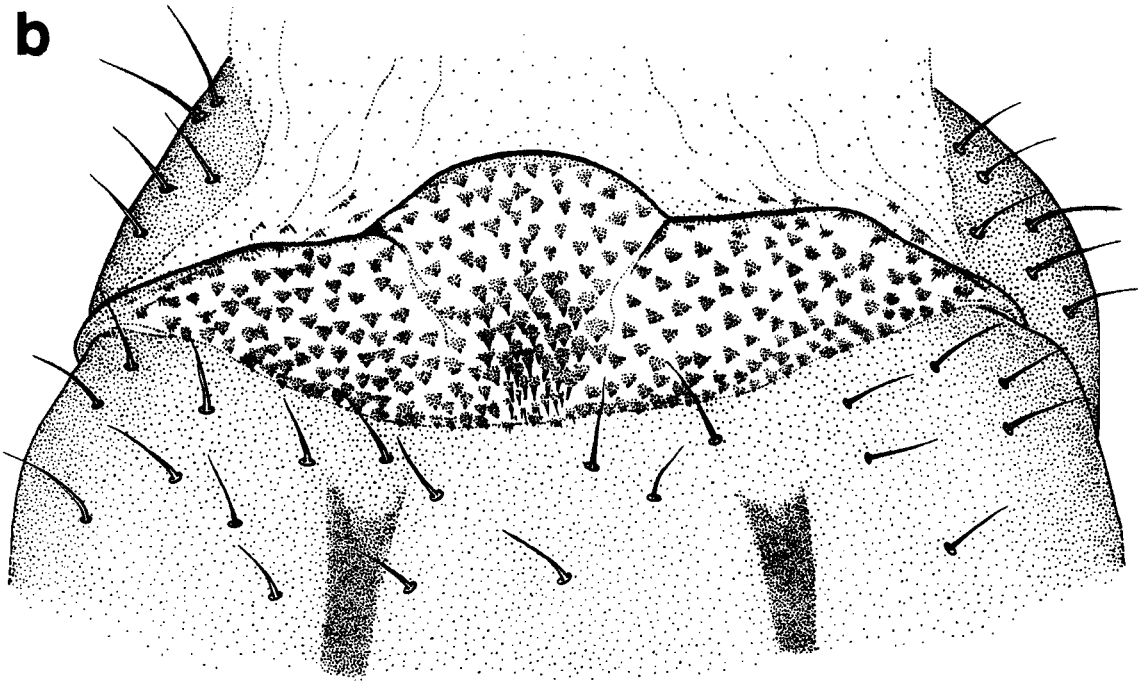

1 mm

Figure 45 (continued)

b. gonocristae

[based on a specimen collected by

B. Rolseth, Ottawa, Ontario, 5.VII.1967; UAE]



0·2 mm

Figure 45 (continued)

c. mediuncus, dorsal aspect

d. ibid., lateral aspect

[based on a specimen collected by

W.L. Putman, Niagara-on-the-Lake, Ontario,

5.VIII.1931; UG]

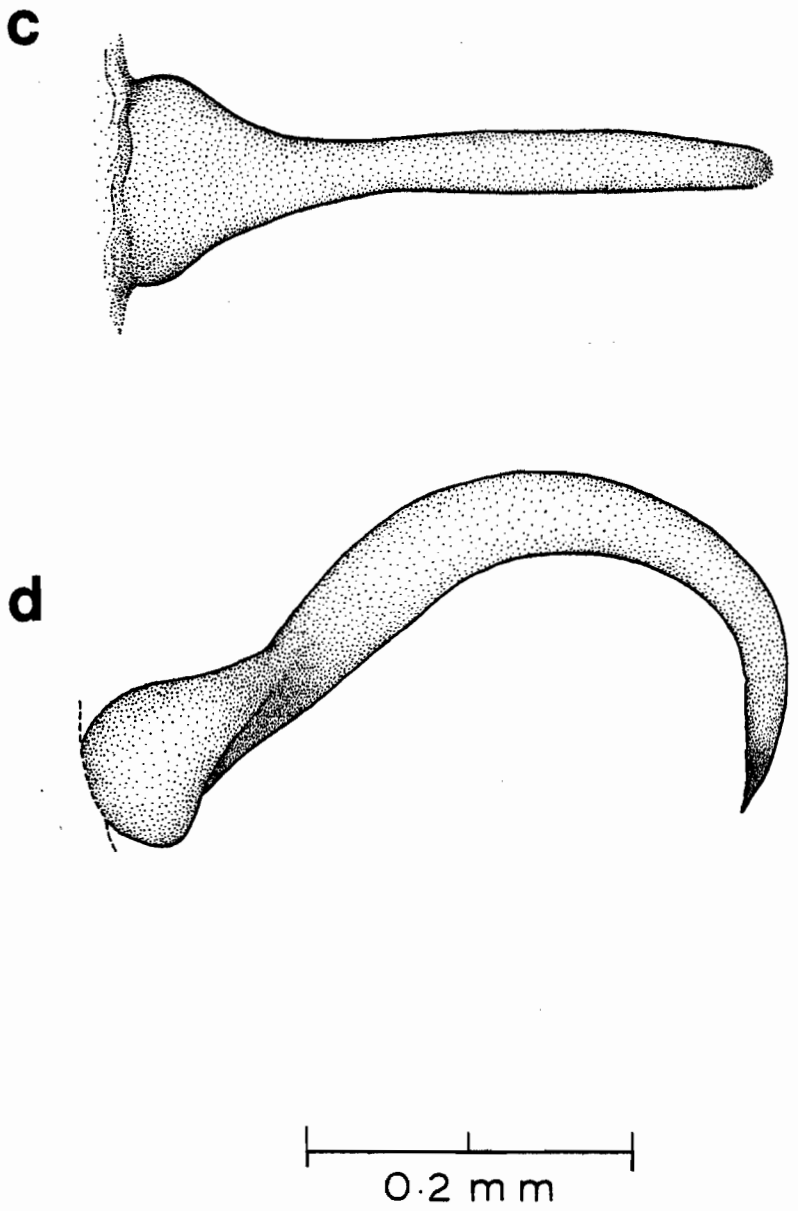

c
d
0·2 mm

Figure 45 (continued)

e. entoprocessus, lateral aspect

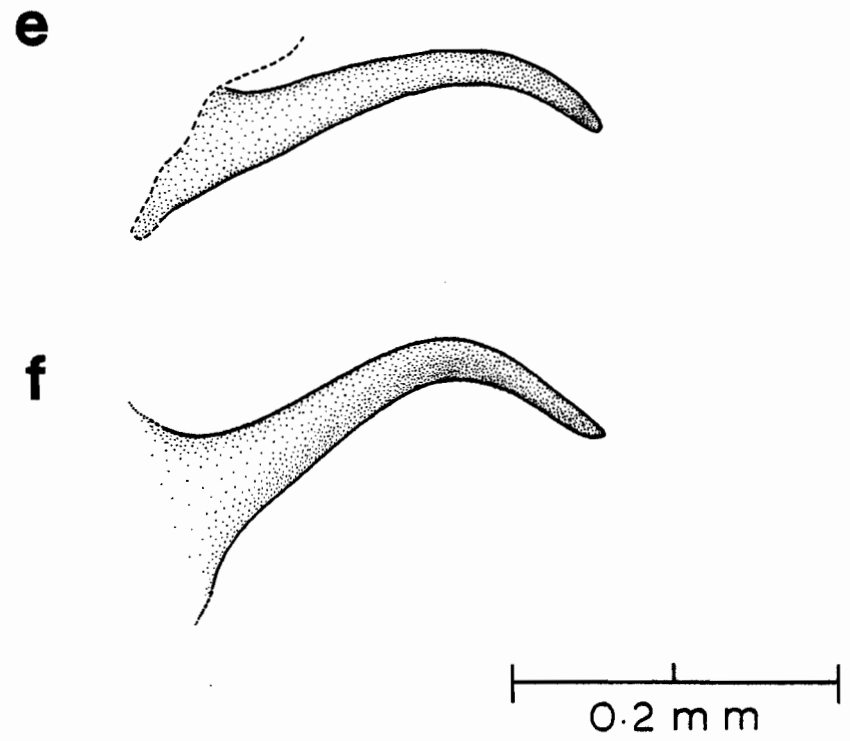
f. ibid., another specimen

g. gonarcus, dorsal aspect

[based on a specimen collected by

e) W.L. Putman, Niagara-on-the-Lake, Ontario, 5.VIII.1931; UG

f, g) B. Rolseth, Ottawa, Ontario, 5.VII.1967; UAE]


e
f
0·2 mm

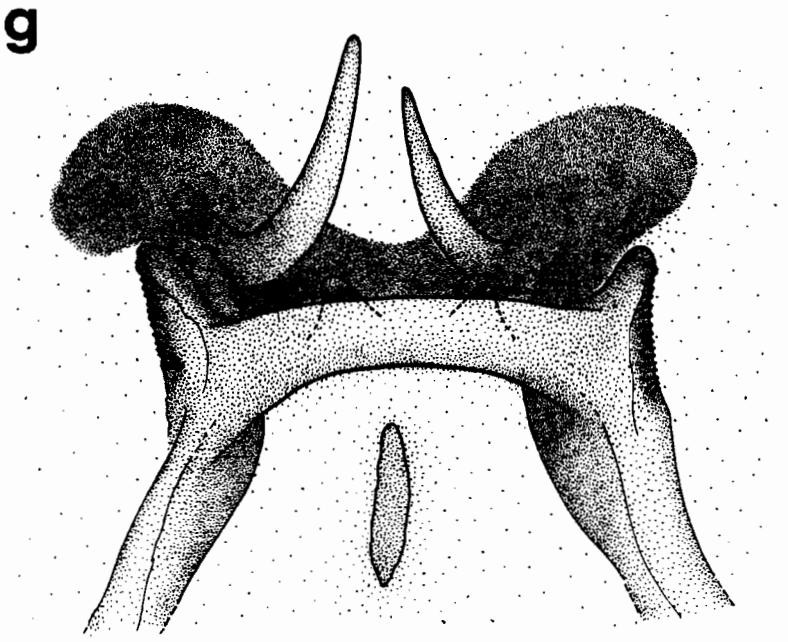

g

Figure 46 Chrysopa nigricornis: female structures

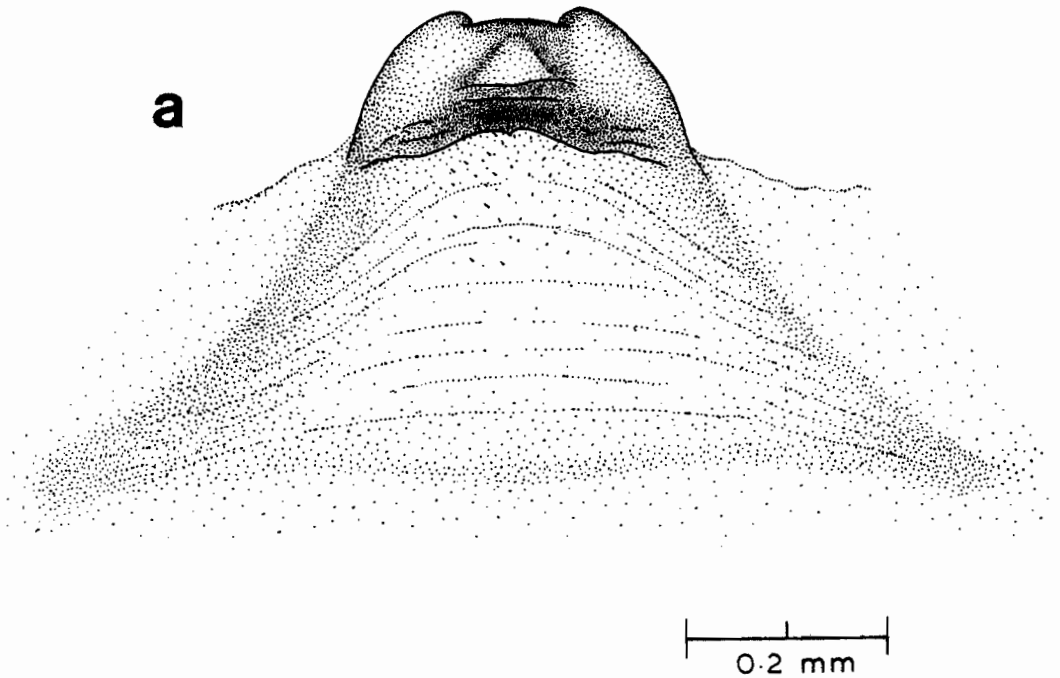
a. subgenitale, ventral aspect

b. ibid., apical lobe

[based on a specimen collected by

J.L. McHugh, Vancouver, British Columbia,

9.IX.1935; MCZ]


a
0·2 mm

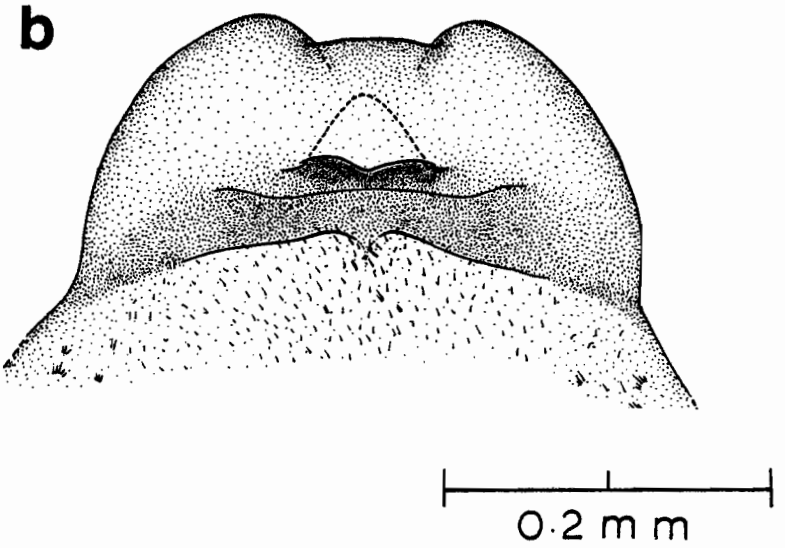

b
0·2 mm

Figure 46 (continued)

c. spermatheca

[based on a specimen collected by

J.L. McHugh, Vancouver, British Columbia,

9.IX.1935; MCZ]

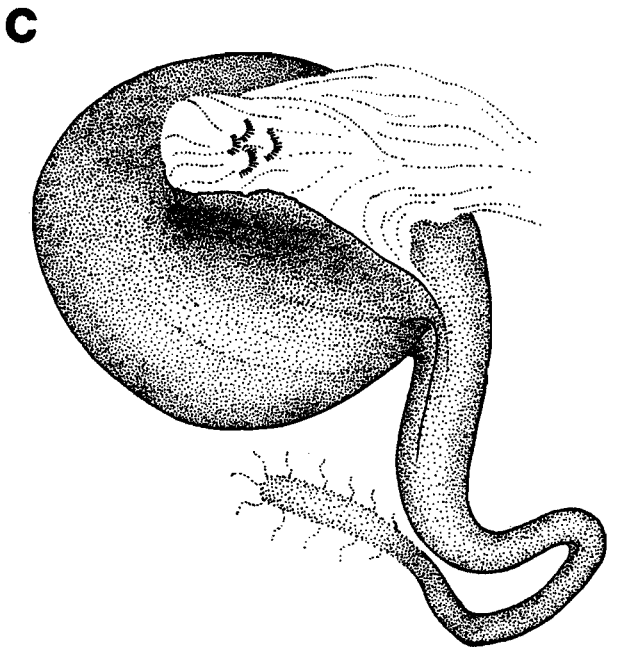

c
0·2 mm

Figure 47 Chrysopa nigricornis: structures of C. crotchi

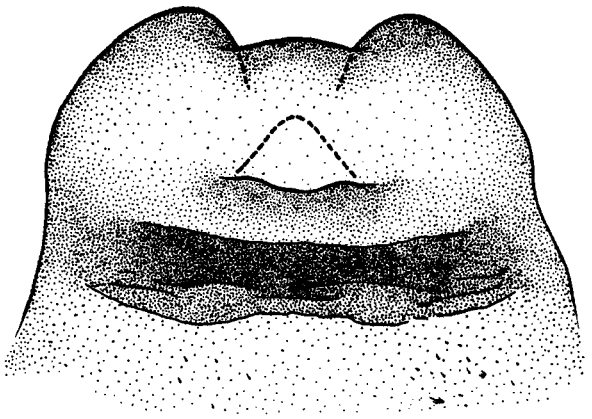
a. subgenitale

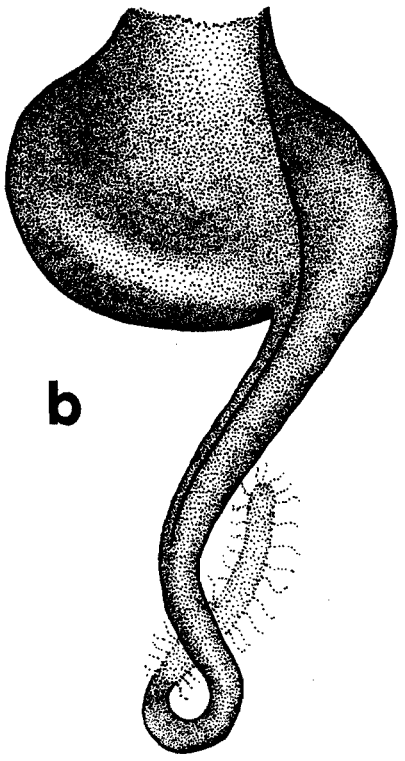
b. spermatheca

[based on a specimen collected by

Crotch, Victoria, British Columbia,

VII; MCZ, Type 22975]


a


b

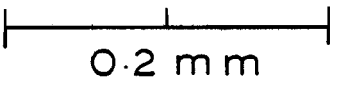

0·2 mm

Figure 48 Chrysopa quadripunctata: male head

a. frontal

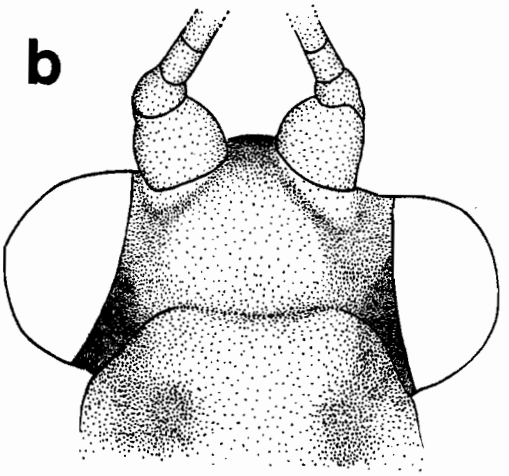
b. dorsal

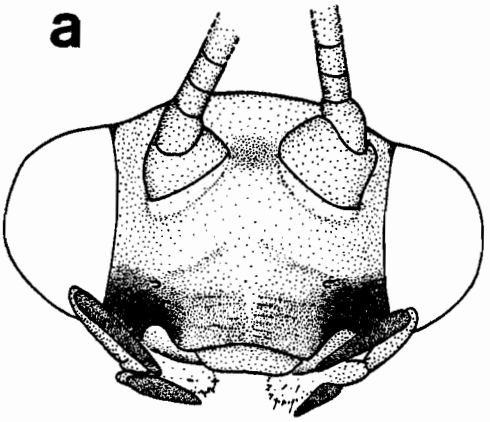
c. lateral

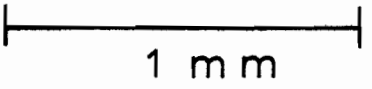
[based on a specimen collected by

J.C.E. Riotte & I. Smith, Chaffeys Locks,

Ontario, 2.VII.1963; ROM]


b


a


1 mm

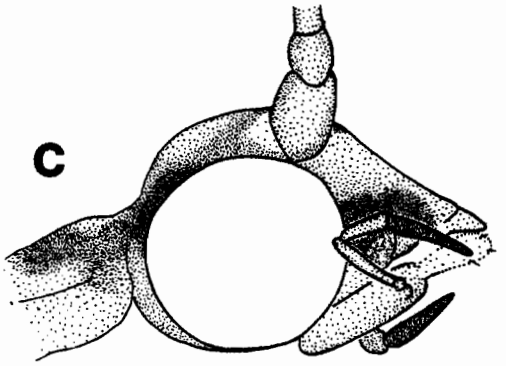

c

Figure 49 Chrysopa quadripunctata: male structures

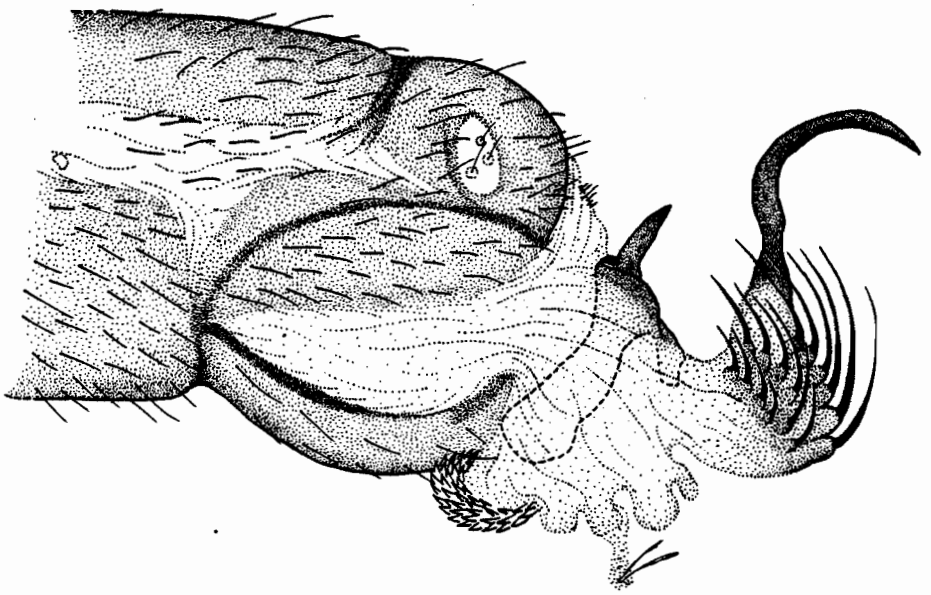
a. terminalia with structures everted

[based on a specimen collected by

J.C.E. Riotte & I. Smith, Chaffeys Locks,

Ontario, 5.VII.1963; ROM]

a



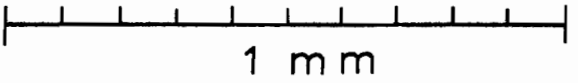


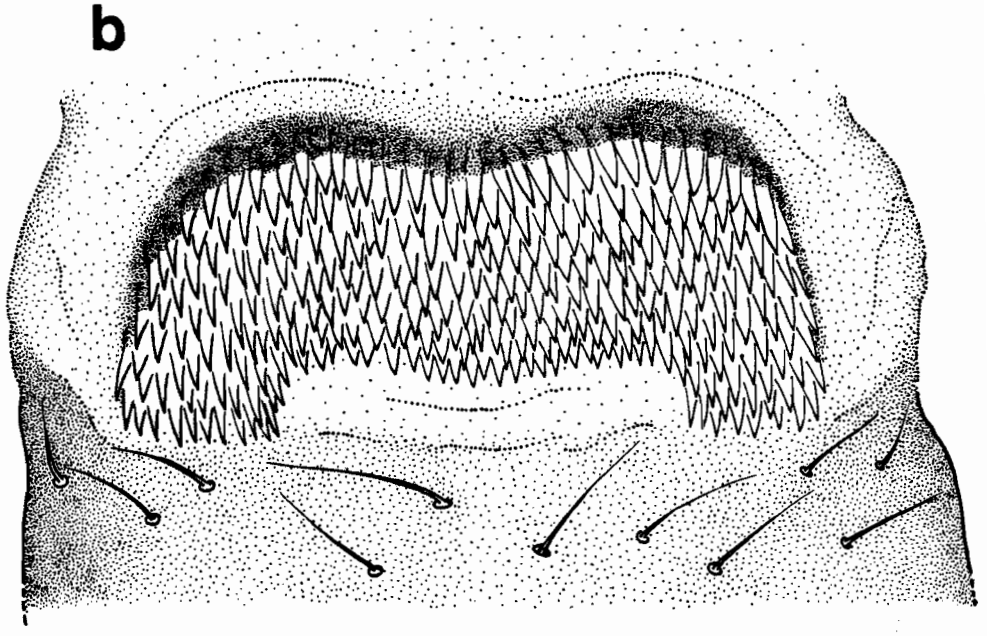
Figure 49 (continued)

b. gonocristae

[based on a specimen collected by

J.C.E. Riotte & I. Smith, Chaffeys Locks,

Ontario, 5.VII.1963; ROM]



0·2 mm

Figure 49 (continued)

c. mediuncus, dorsal aspect

d. ibid., lateral aspect

[based on a specimen collected by
J.C.E. Riotte & I. Smith, Chaffeys Locks,
Ontario, 2.VII.1963; ROM]

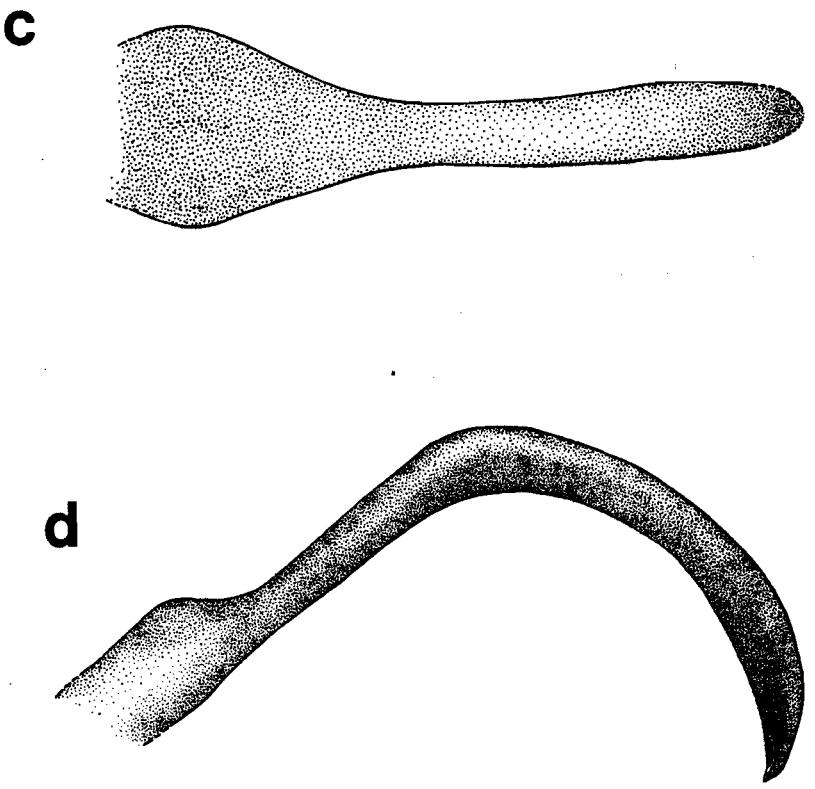

c
d
0·2 mm

Figure 49 (continued)

e. entoprocessus

f. gonarcus

[based on a specimen collected by

J.C.E. Riotte & I. Smith, Chaffeys Locks,

Ontario, 5.VII.1963; ROM]

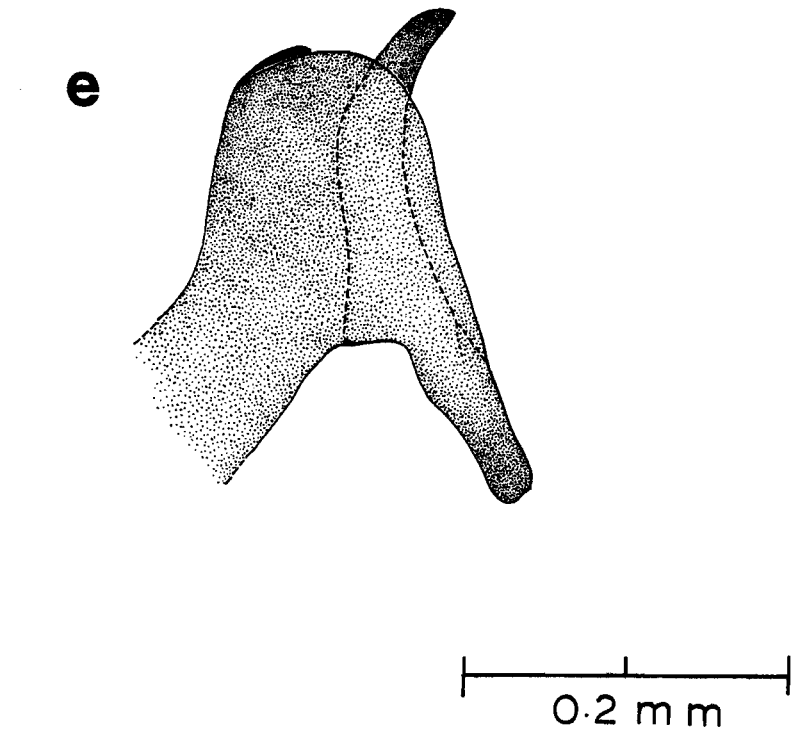

e
0·2 m m
f

Figure 50 Chrysopa quadripunctata: female structures

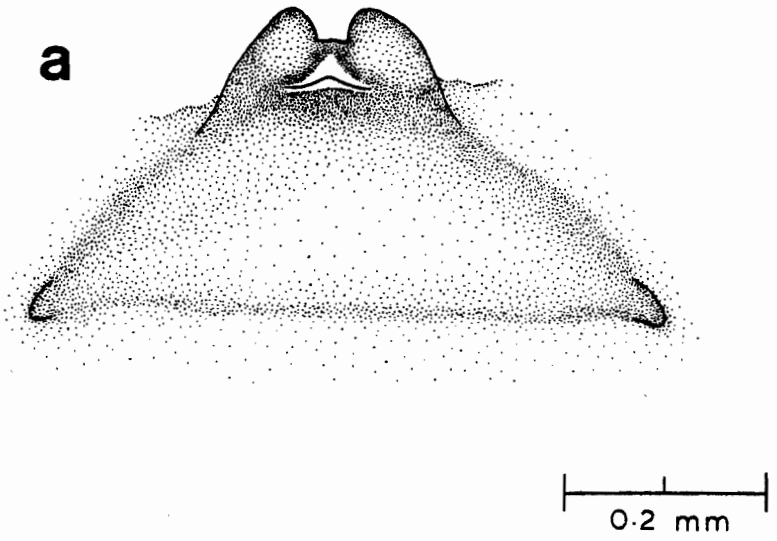
a. subgenitale

b. ibid., apical lobe

[based on a specimen collected by

J.C.E. Riotte & I. Smith, Toronto, Ontario,

23.VI.1962; ROM]


a
0·2 mm

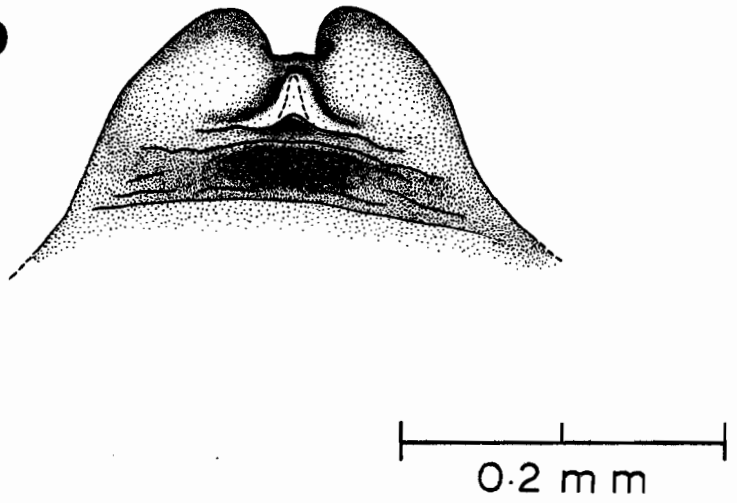

b
0·2 mm

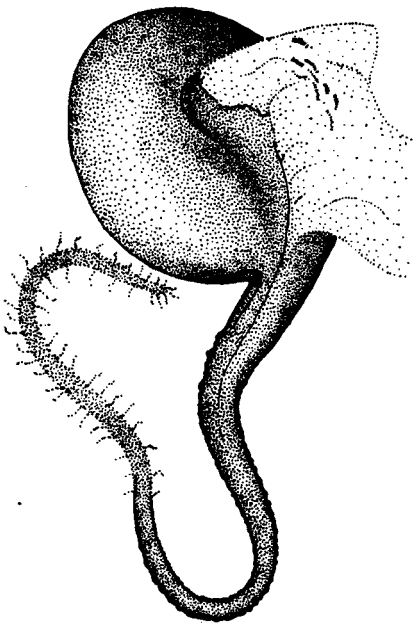
Figure 50 (continued)

c. spermatheca

[based on a specimen collected by

J.C.E. Riotte & I. Smith, Toronto, Ontario,

23.VI.1962; ROM]


c

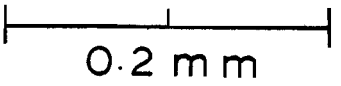

0·2 mm

Figure 51 Chrysopa coloradensis: female head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

4.VIII.1976; LEM]

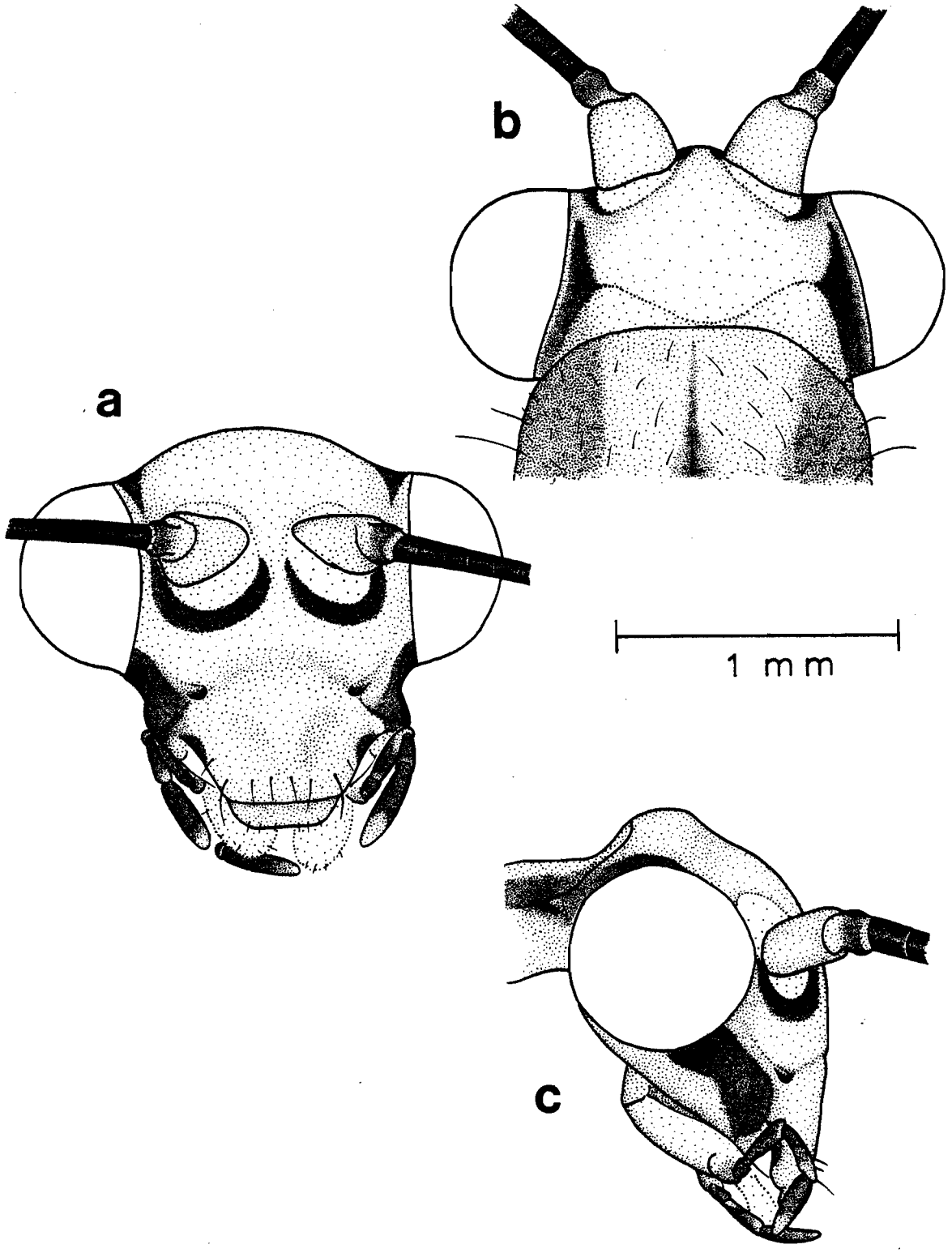

b
a
1 mm
c

Figure 52 Chrysopa coloradensis: male structures

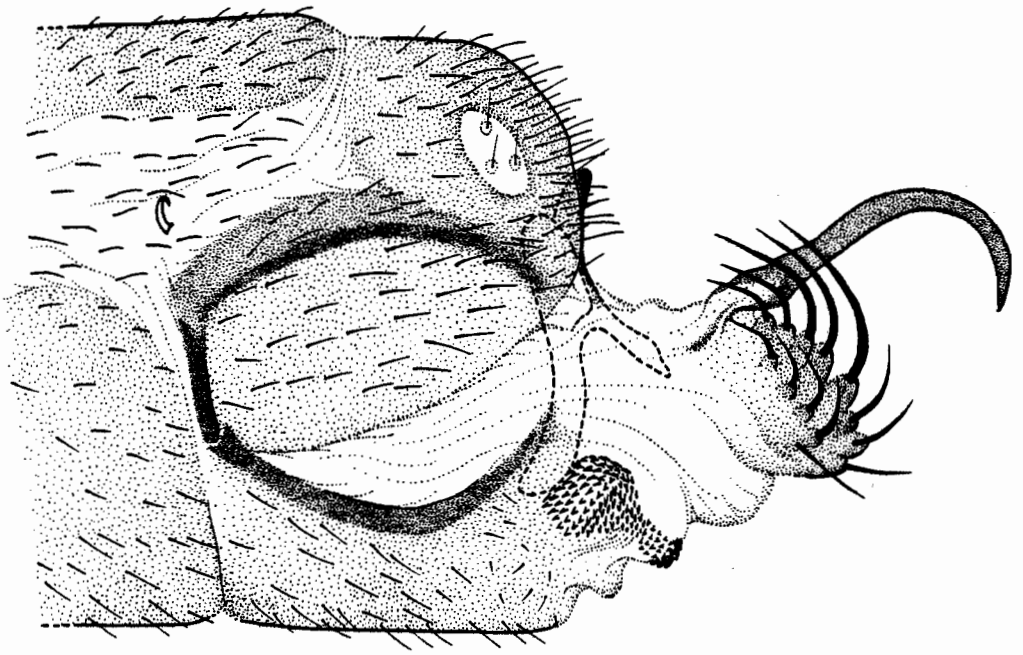
a. terminalia with structures e-erted

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

4.VIII.1976; LEM]

a



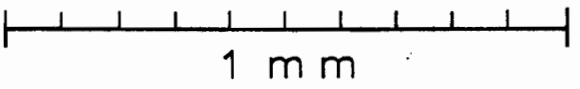


Figure 52 (continued)

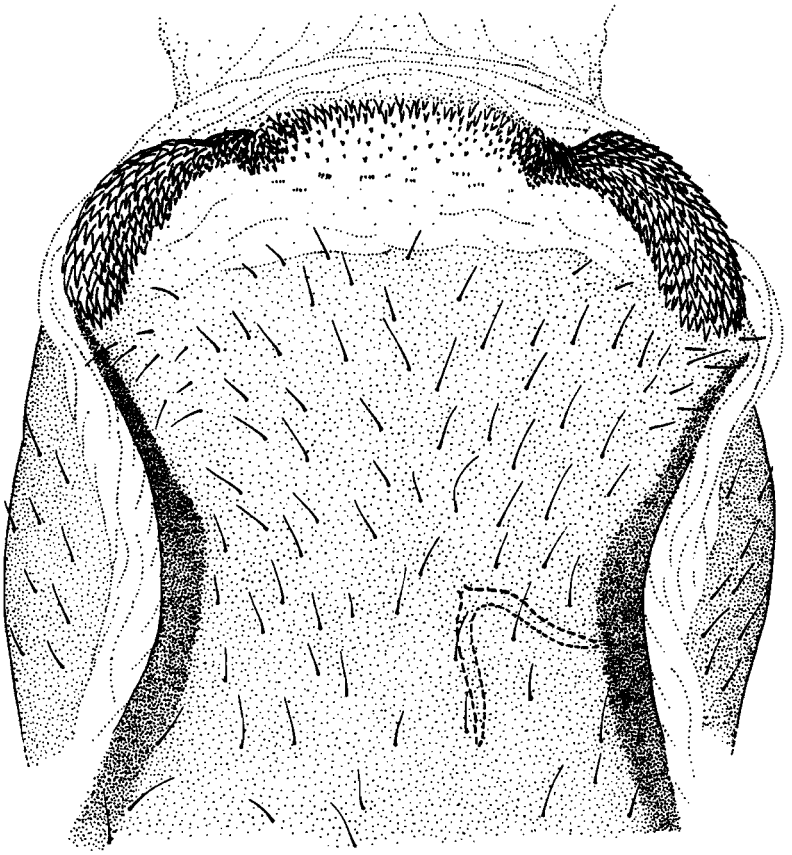
b. gonocristae

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

4.VIII.1976; LEM]

b



0·2 mm

Figure 52 (continued)

c. mediuncus, dorsal aspect

d. ibid., lateral aspect

e. ibid., ventral aspect

[based on a specimen collected by
J.A. Garland, Penticton, British Columbia,
4.VIII.1976; LEM]

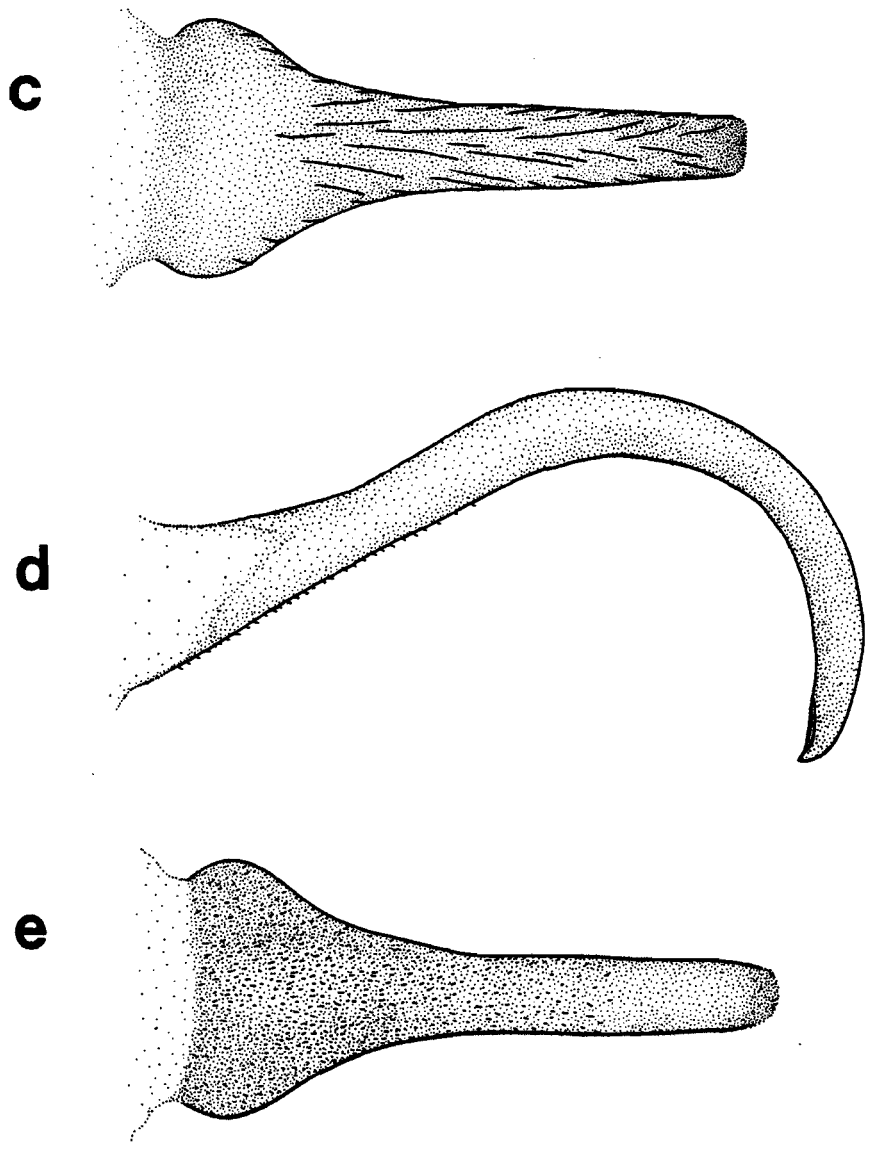

c
d
e
0.2 mm

Figure 52 (continued)

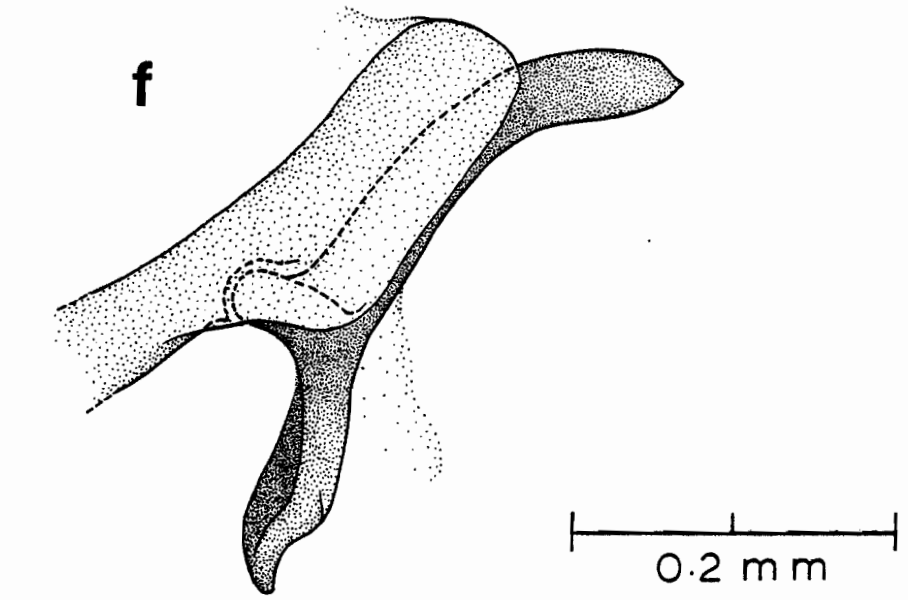
f. entoprocessus, lateral aspect

g. gonarcus, dorsal aspect

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

4.VIII.1976; LEM]


f
0·2 mm

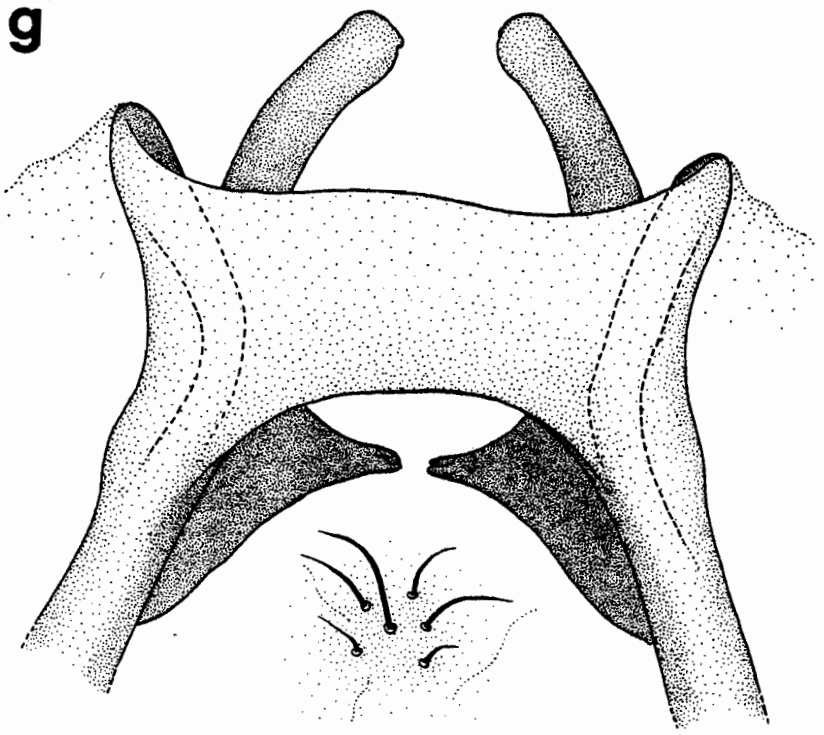

g

Figure 53 Chrysopa coloradensis: female structures

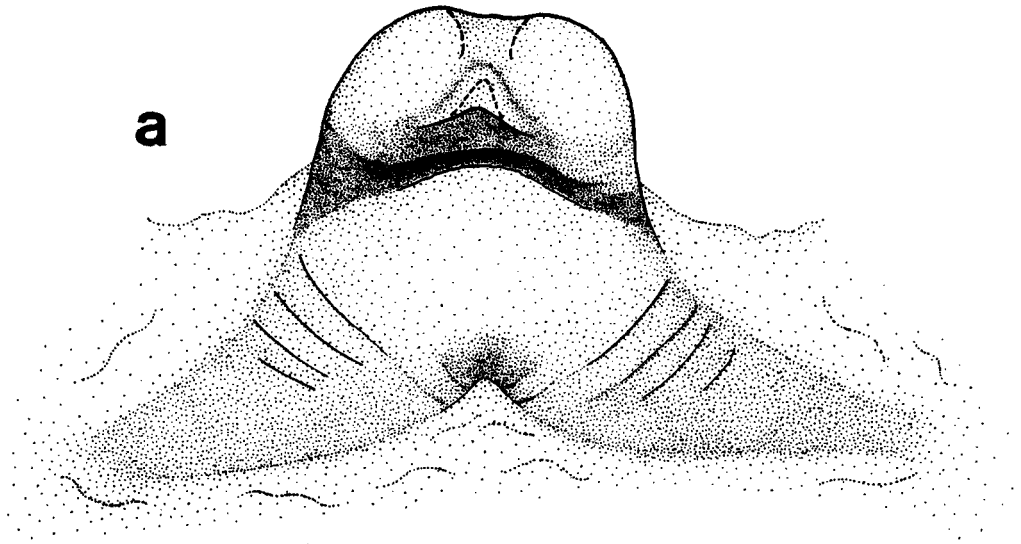
a. subgenitale

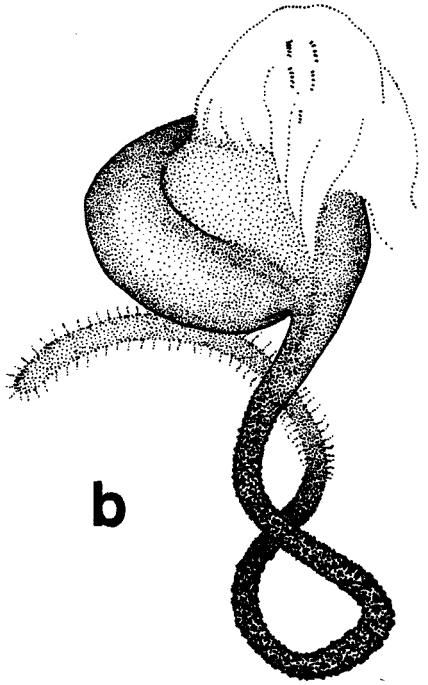
b. spermatheca

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

10.VIII.1976; LEM]


a


b

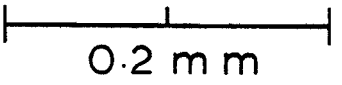

0·2 mm

Figure 54 Chrysopa excepta: female head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by
A.R. Brooks, Elbow, Saskatchewan,
1.VIII.1951; CNC, determined
by P.A. Adams]

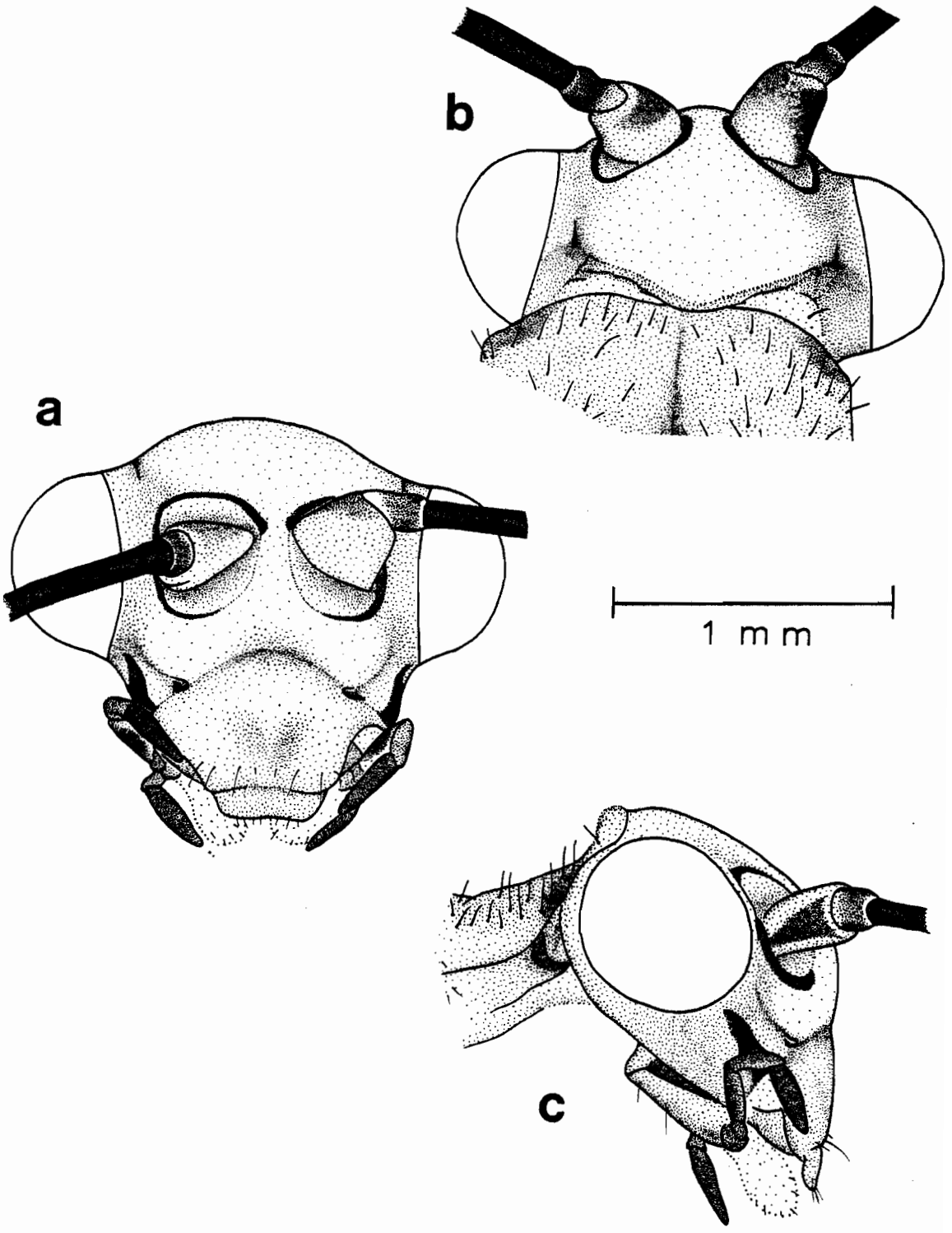

b
a
1 mm
c

Figure 55 Chrysopa excepta: variation in head

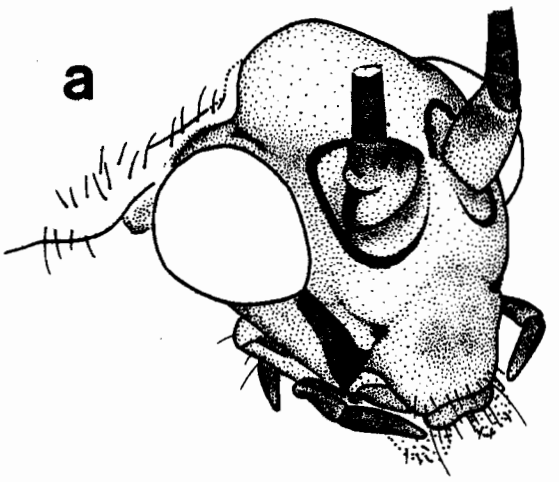
a. Lethbridge, Alberta; male

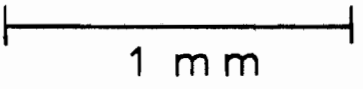
b. Nicola, British Columbia; female

[based on a specimen collected by

a) H.E. Gray, 7.VI.1922; CNC, determined by P.A. Adams

b) P.N. Vroom, 24.V.1922; CNC, determined by P.A. Adams]


a


1 mm

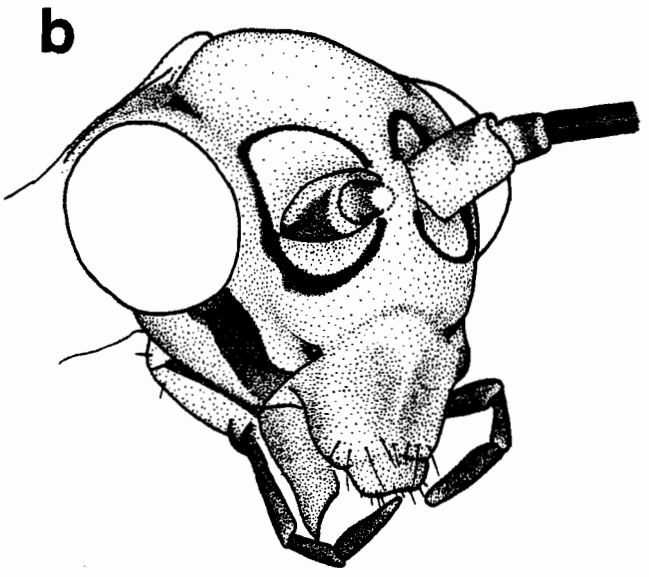
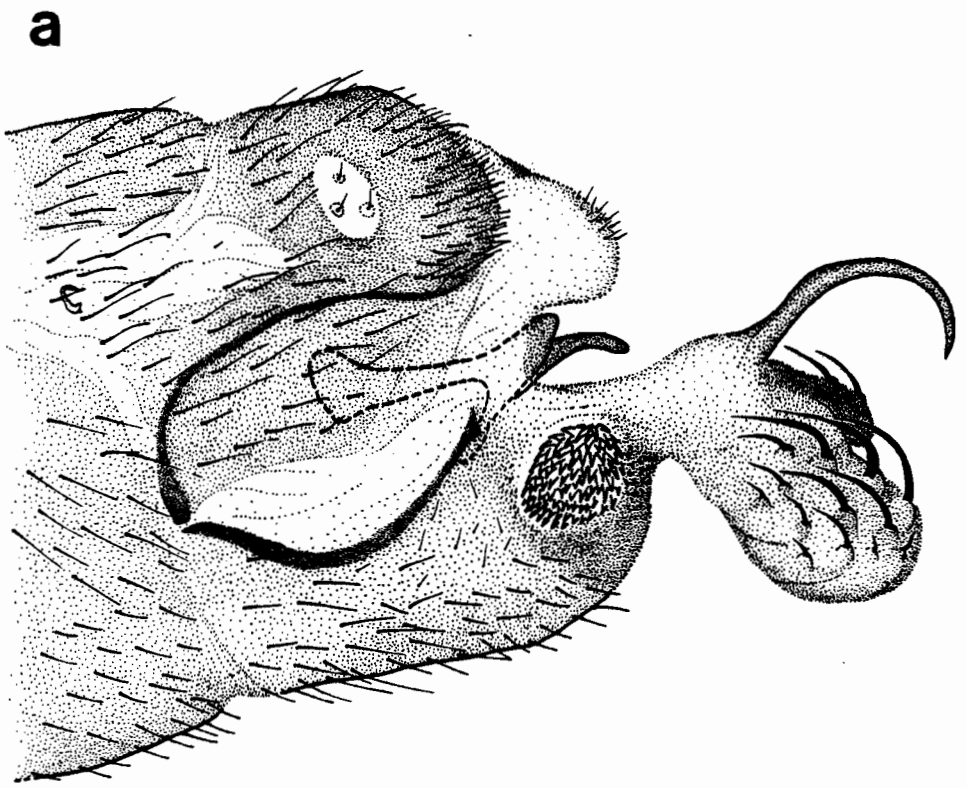

b

Figure 56 Chrysopa excepta: male structures

a. terminalia with structures everted

[based on a specimen collected by
A.R. Brooks, Elbow, Saskatchewan,
1.VIII.1951; CNC, determined
by P.A. Adams]


a

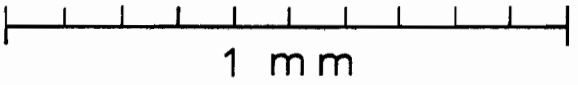
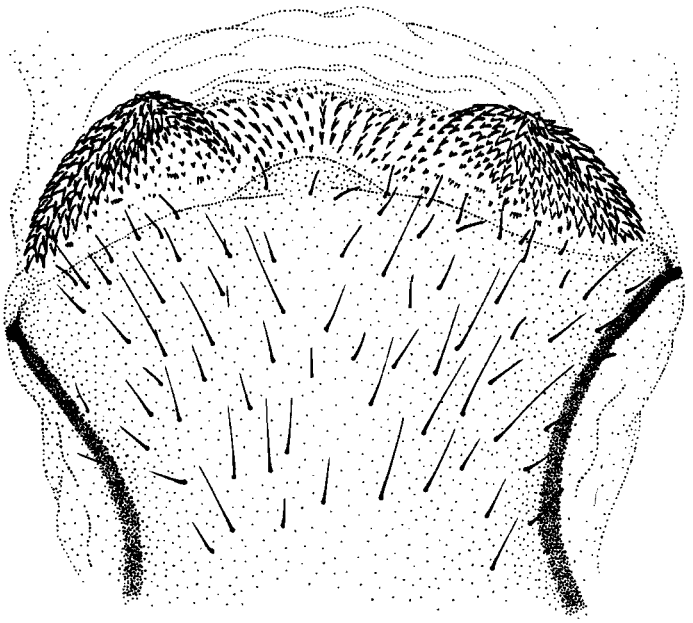

1 mm

Figure 56 (continued)

b. gonocristae

[based on a specimen collected by
A.R. & J. Brooks, Lumsden, Saskatchewan,
12.VII.1958; CNC, determined
by P.A. Adams]

b



0·2 mm

Figure 56 (continued)

c. mediuncus, dorsal aspect

d. ibid., lateral aspect

e. ibid., ventral aspect

[based on a specimen collected by
A.R. & J. Brooks, Lumsden, Saskatchewan,
12.VII.1958; CNC, determined
by P.A. Adams]

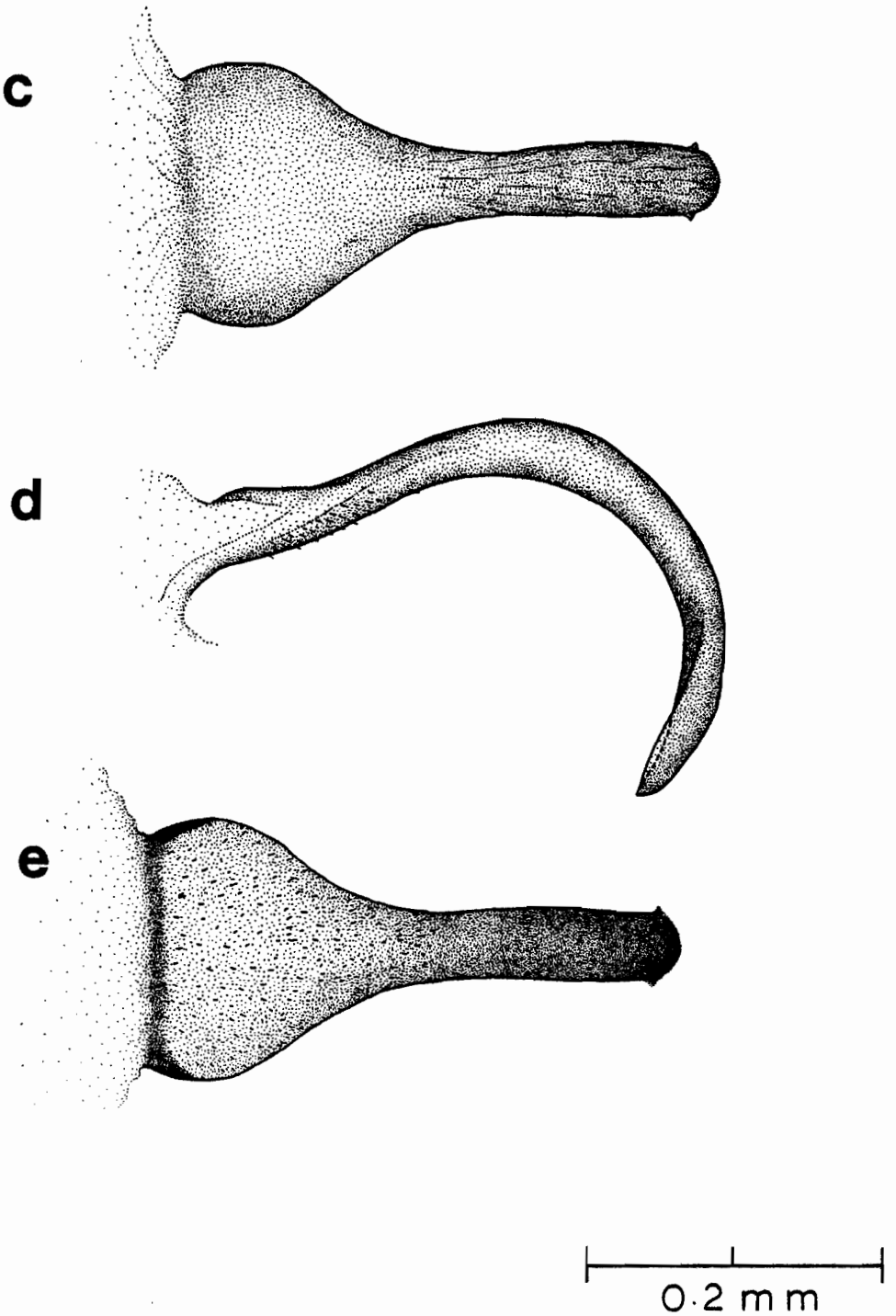
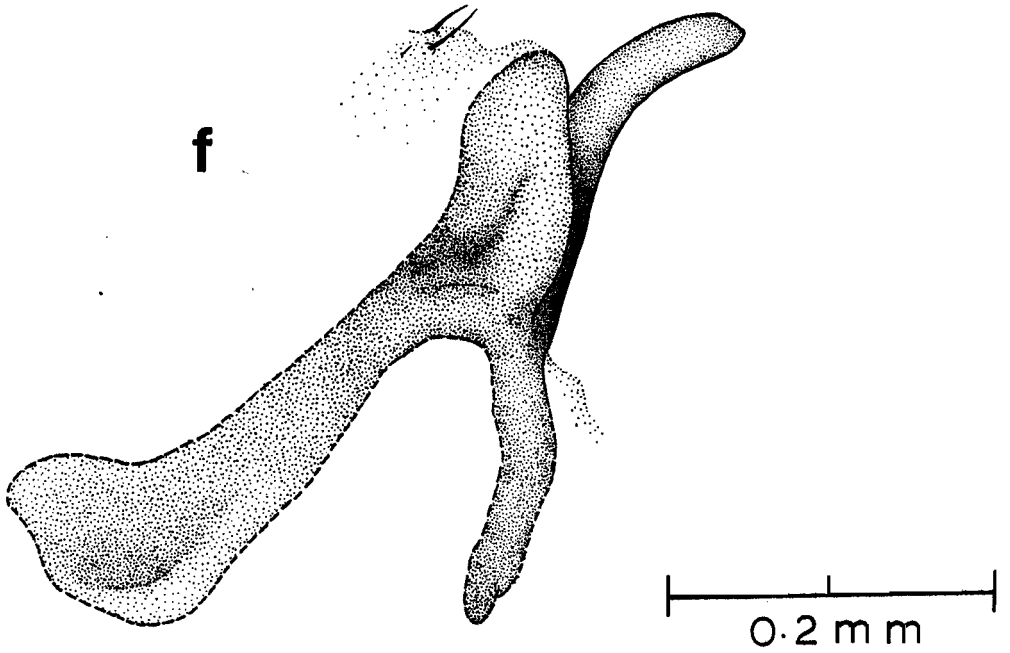

c
d
e
0·2 mm

Figure 56 (continued)

f. entoprocessus

g. gonarcus

[based on a specimen collected by
A.R. Brooks, Elbow, Saskatchewan,
1.VIII.1951; CNC, determined
by P.A. Adams]


f
0·2 mm

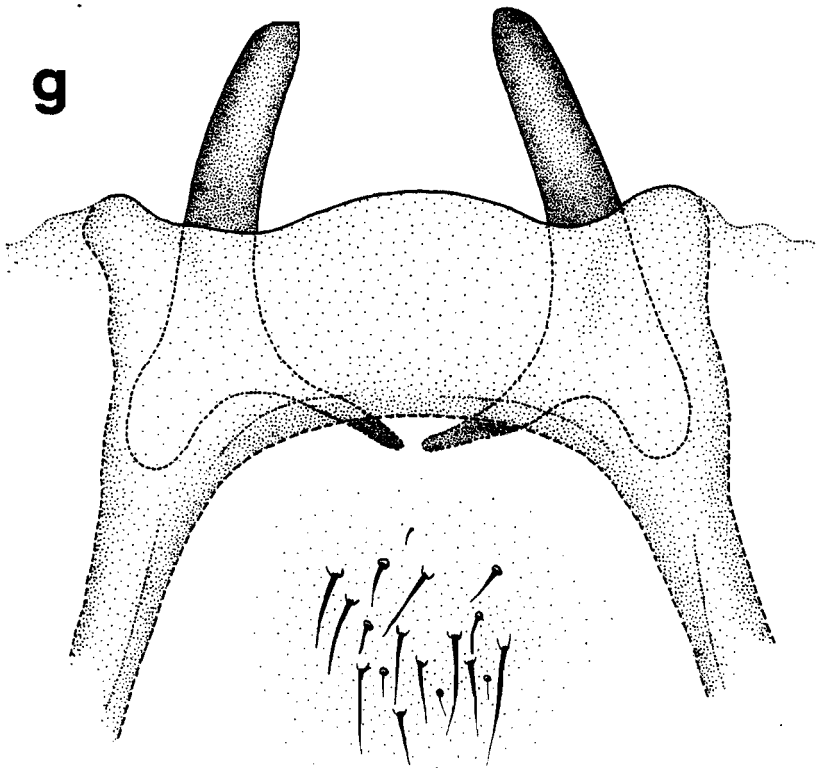
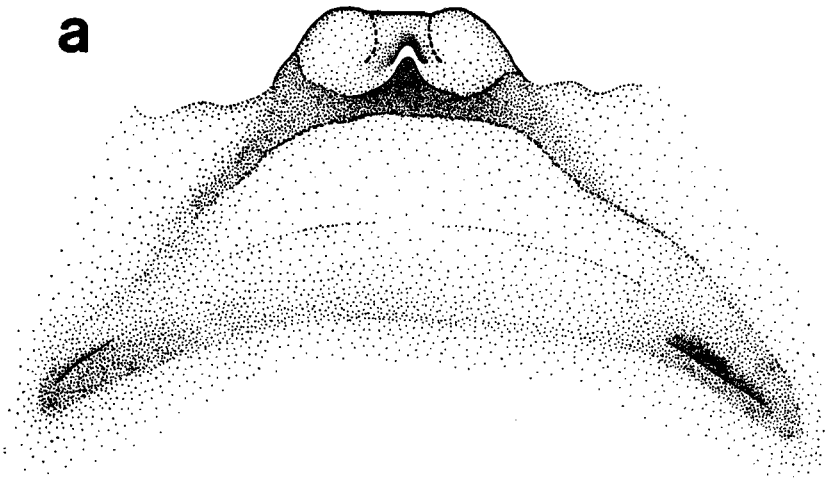

g

Figure 57 Chrysopa excepta: female structures

a. subgenitale

[based on a specimen collected by
A.R. Brooks, Elbow, Saskatchewan,
1.VIII.1951; CNC, determined
by P.A. Adams]



0·2 mm

Figure 57 (continued)

b. subgenitale

c. ibid., another specimen

[based on a specimen collected by

b) A.R. Brooks, Elbow, Saskatchewan,
1.VIII.1951; CNC, determined
by P.A. Adams

c) W.B. Anderson, Penticton, British Columbia,
7.VI.1919; CNC, determined
by P.A. Adams]

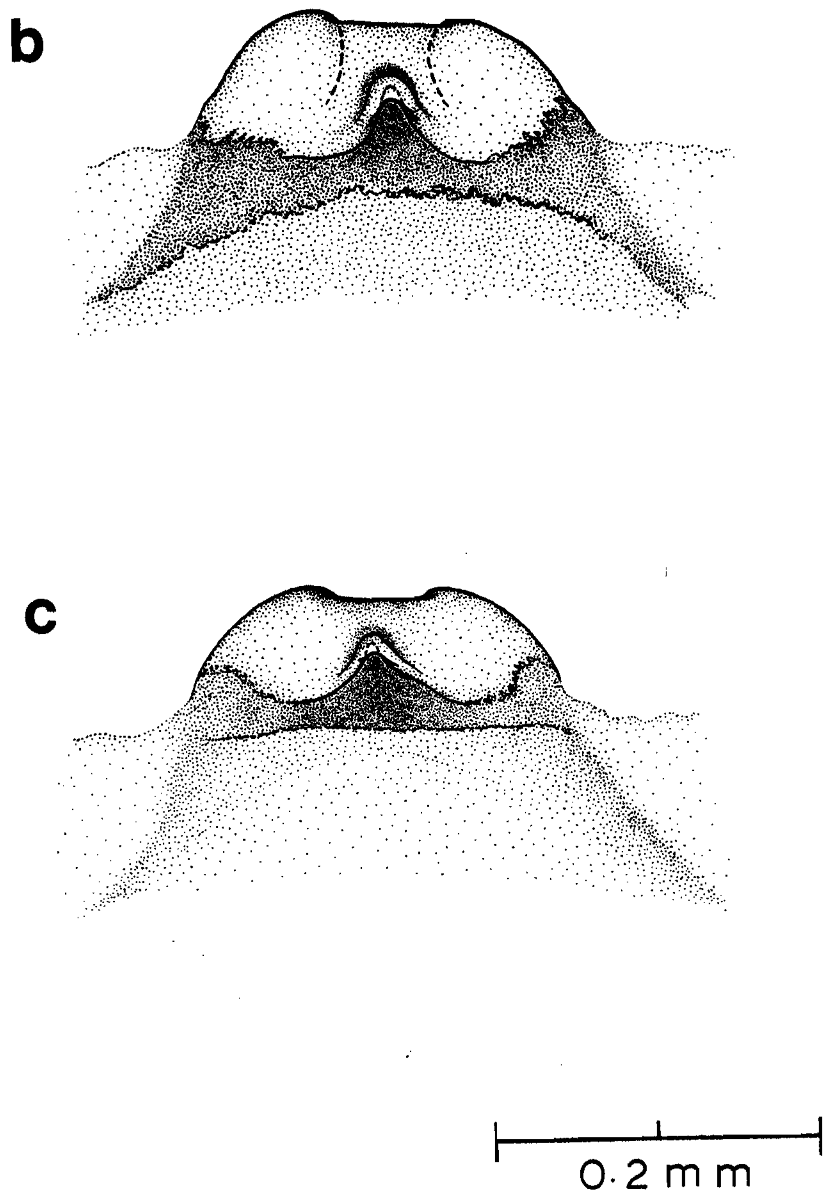

b
c
0·2 mm

Figure 57 (continued)

d. spermatheca

e. ibid., another specimen

[based on a specimen collected by

d) A.R. Brooks, Elbow, Saskatchewan,
1.VIII.1951; CNC, determined
by P.A. Adams

e) W.B. Anderson, Penticton, British Columbia,
7.VI.1919; CNC, determined
by P.A. Adams]

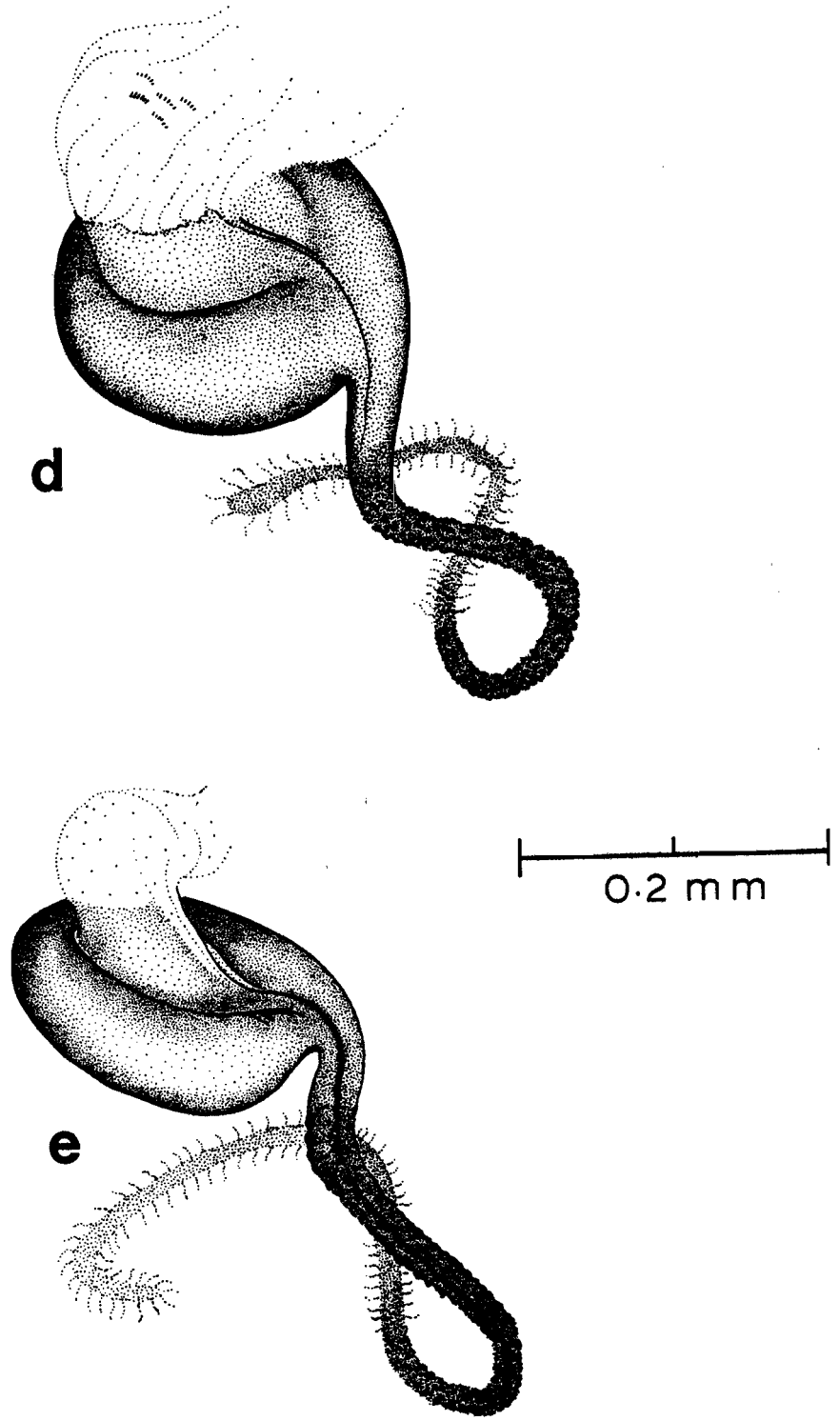

d
e
0·2 mm

Figure 58 Chrysopa oculata: female head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

7.VII.1976; LEM]

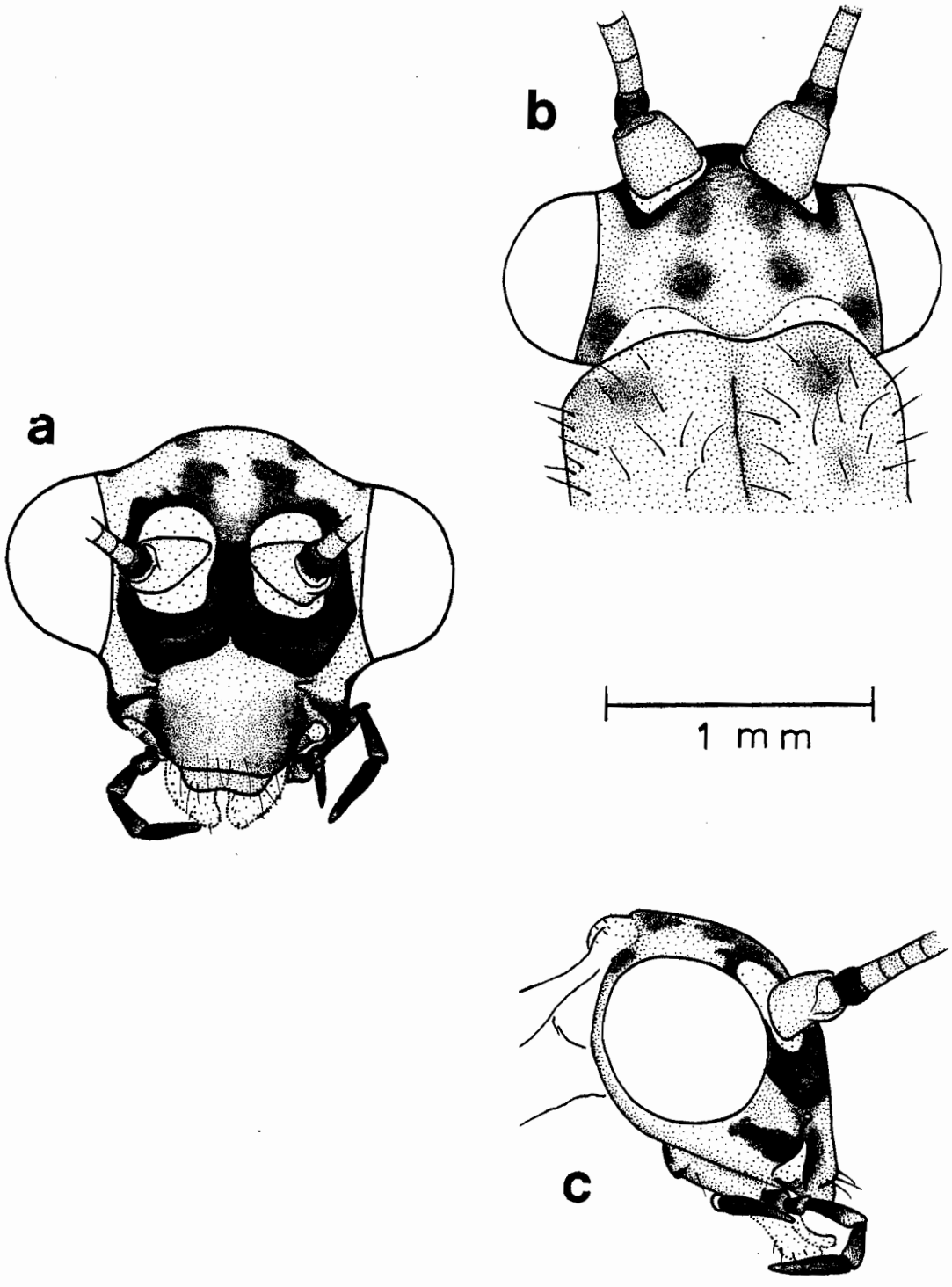

b
a
1 mm
c

Figure 59 Chrysopa oculata: variation in head

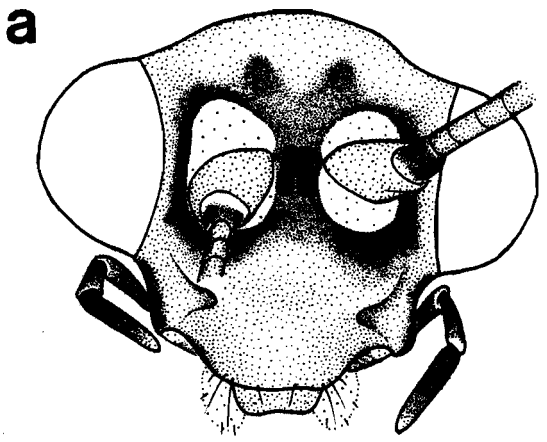
a. female, frontal

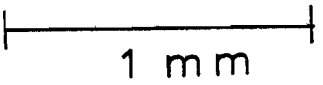
b. ibid., dorsal

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

10.IX.1976; LEM]


a


1 mm

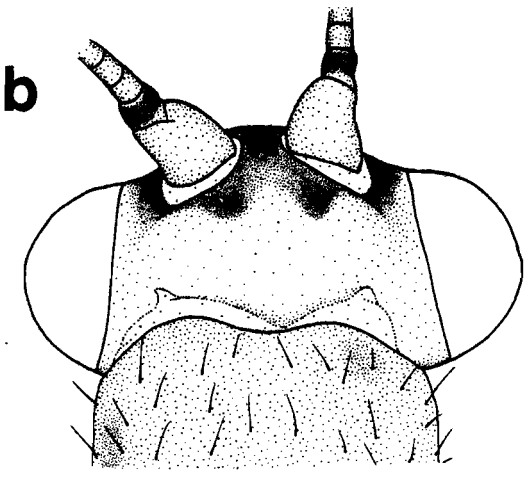

b

Figure 59 (continued)

c. female, dorsal

d. female, dorsal

e. female, dorsal

[based on a specimen collected by

c) J.A. Garland, Penticton, British Columbia, 14.VI.1977; LEM

d) J.A. Garland, Penticton, British Columbia, 30.VIII.1976; LEM

e) J.A. Garland, Penticton, British Columbia, 16.VII.1976; LEM]

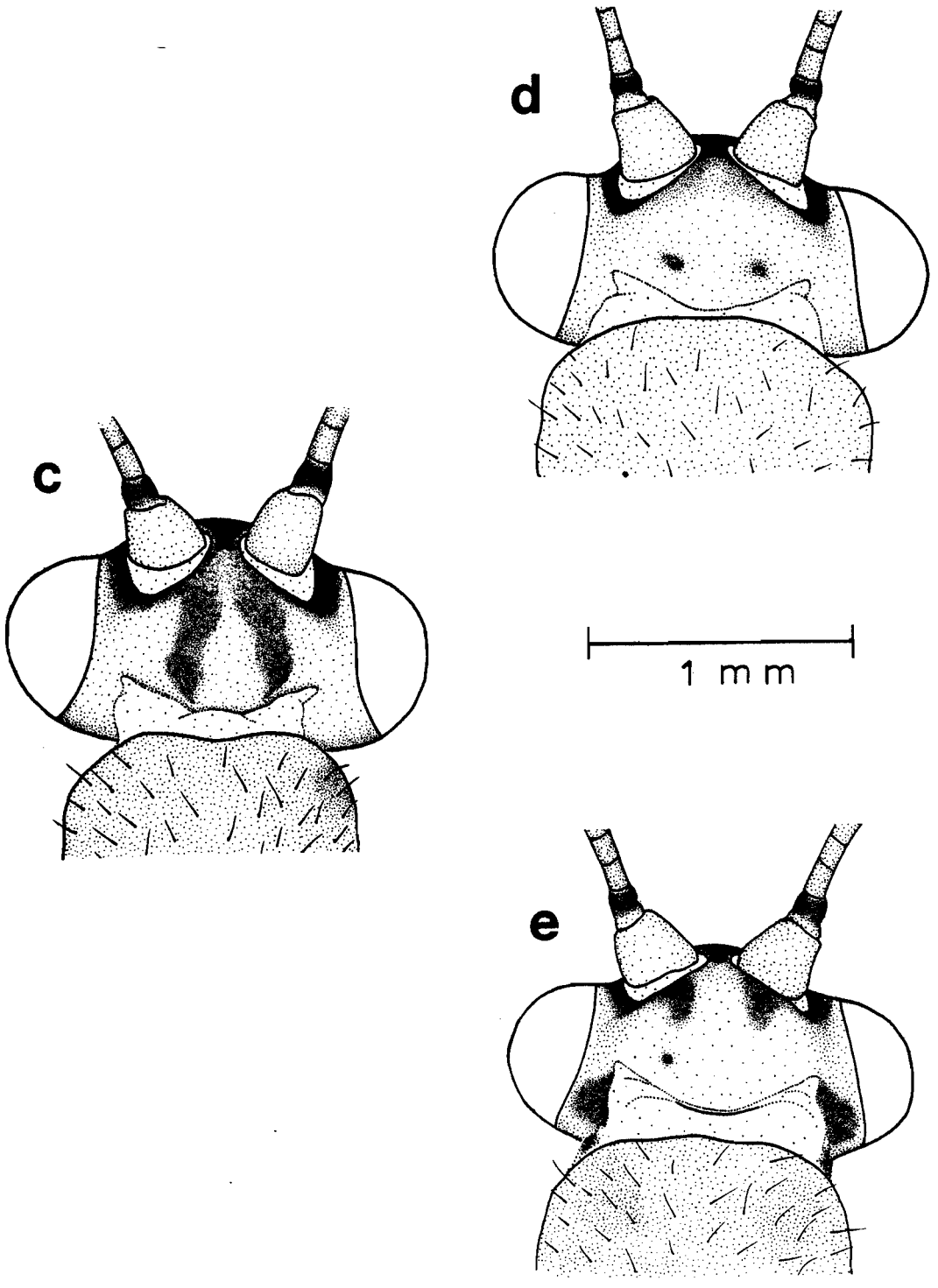

d
c
1 mm
e

Figure 60 Chrysopa oculata: male structures

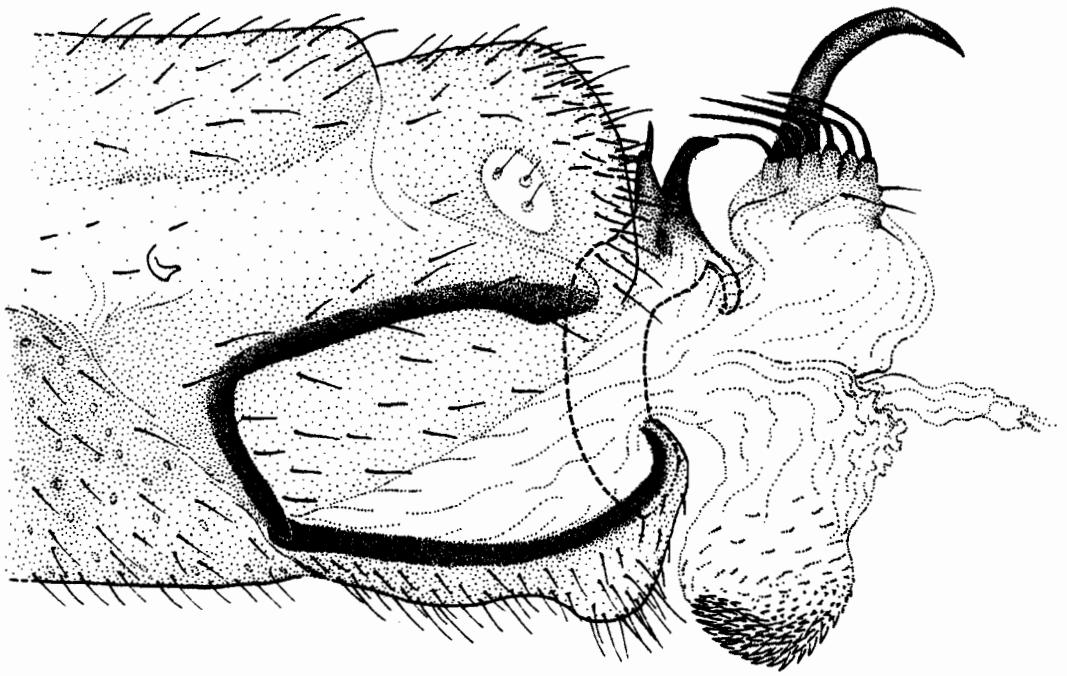
a. terminalia with structures everted

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

13.VII.1976; LEM]

a



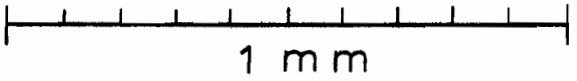


Figure 60 (continued)

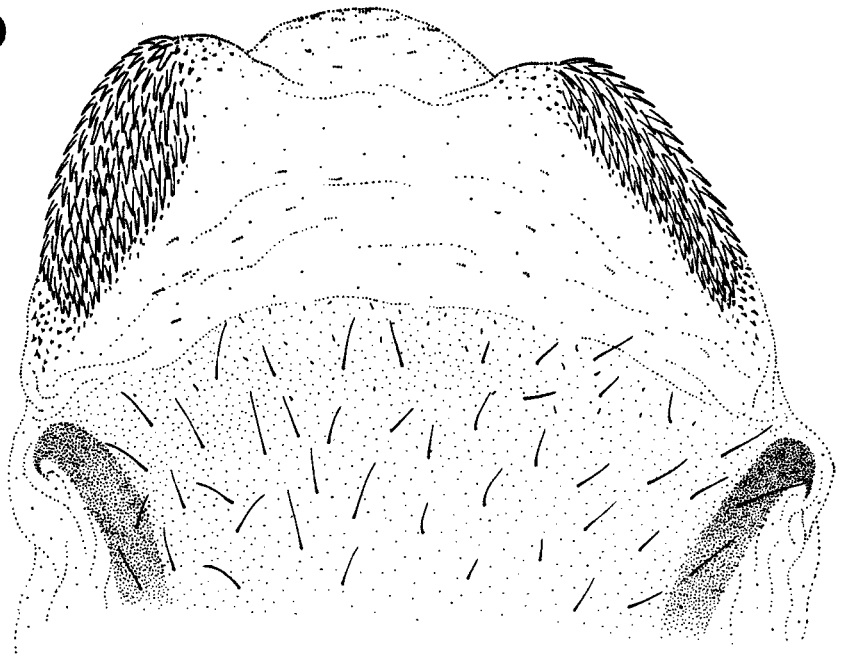
b. gonocristae

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

13.VII.1976; LEM]

b



0·2 m·m

Figure 60 (continued)

c. mediuncus, dorsal aspect

d. ibid., lateral aspect

e. ibid., ventral aspect

[based on a specimen collected by
J.A. Garland, Penticton, British Columbia,
13.VII.1976; LEM]

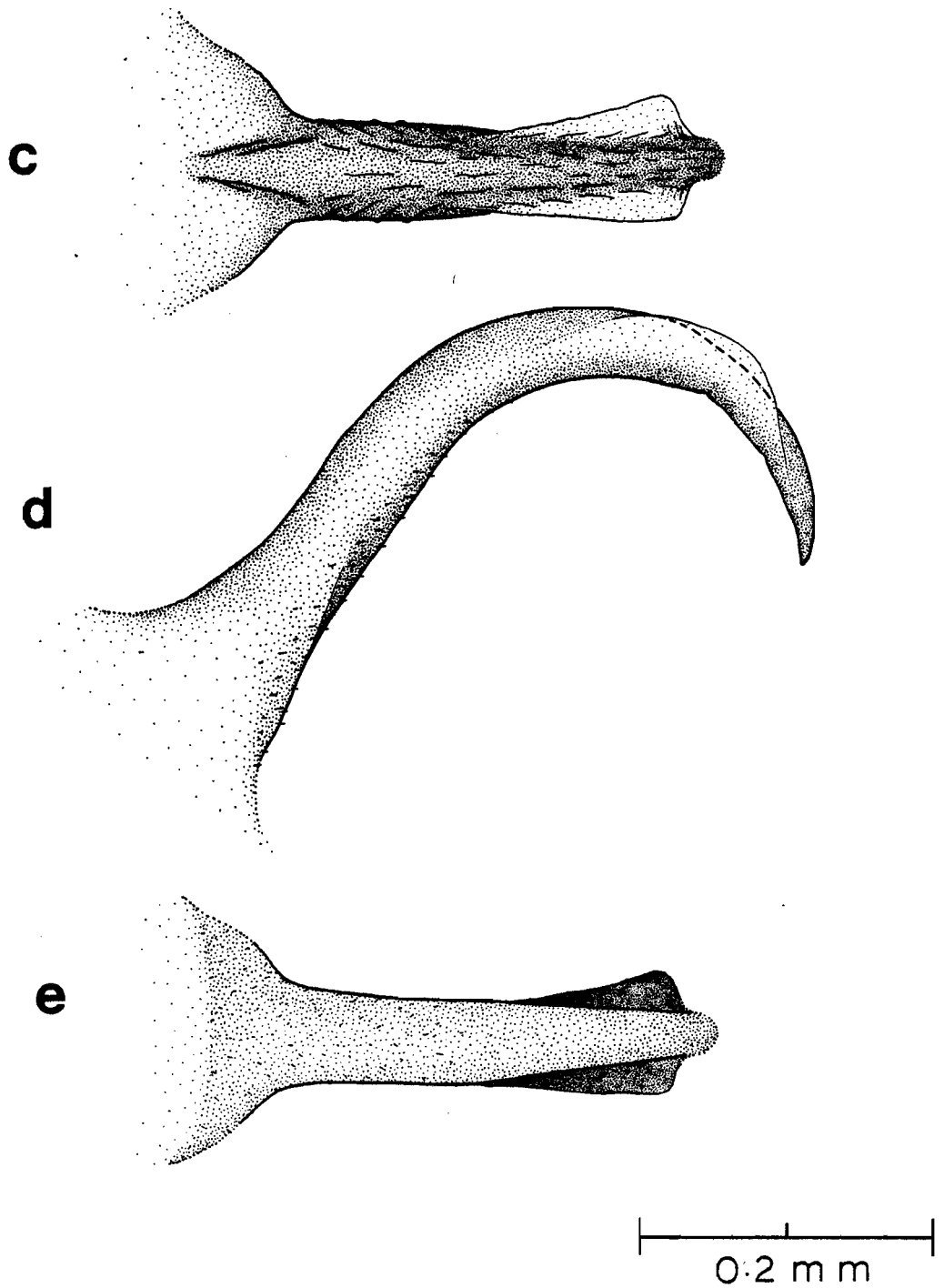

c
d
e
0·2 mm

Figure 60 (continued)

f. entoprocessus

g. gonarcus

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

13.VII.1976; LEM]

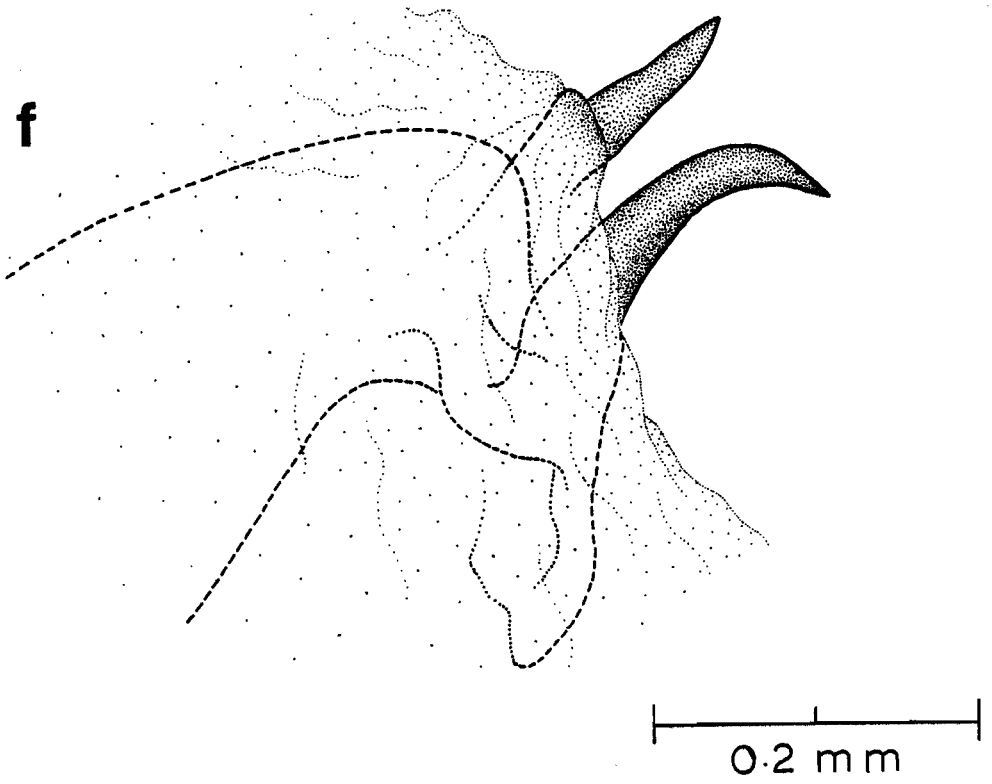

f
0·2 mm
g

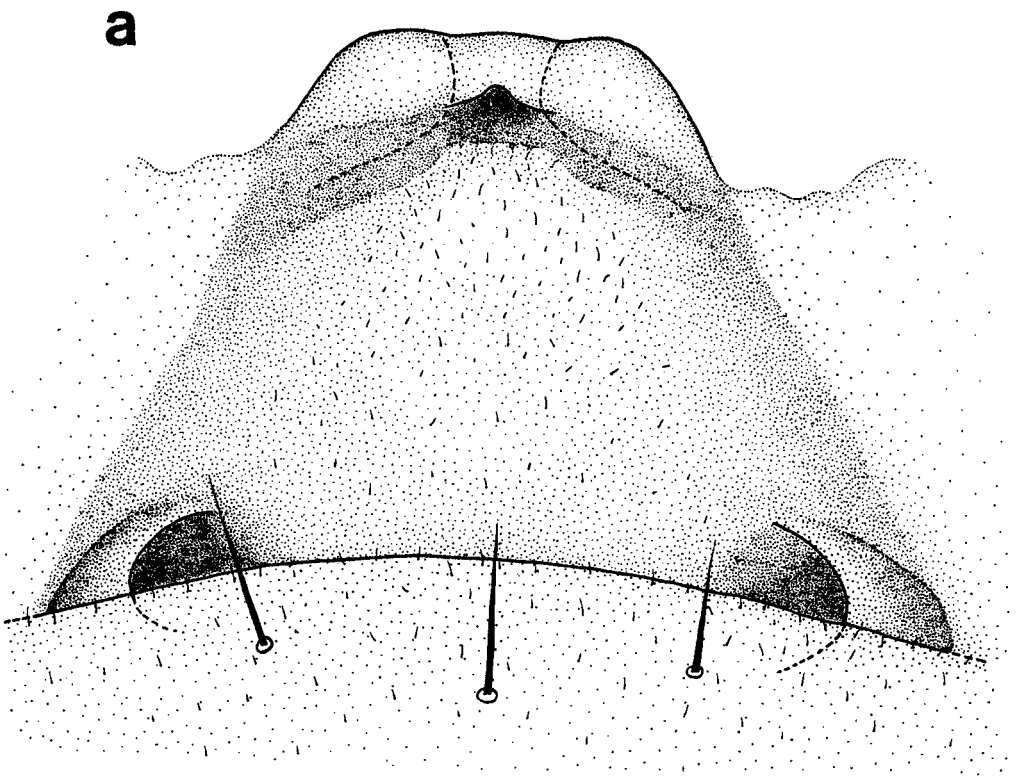
Figure 61 Chrysopa oculata: female structures

a. subgenitale

[based on a specimen collected by

J.A. Garland, Ile-Perrot, Québec,

20.VIII.1978; LEM]



0·2 mm

Figure 61 (continued)

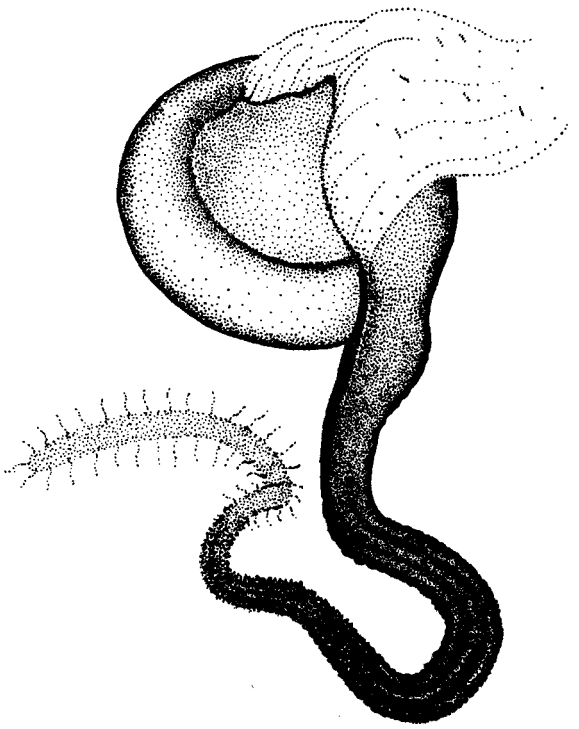
b. spermatheca

[based on a specimen collected by

J.A. Garland, Ile-Perrot, Québec,

20.VIII.1978; LEM]

b



0·2 mm

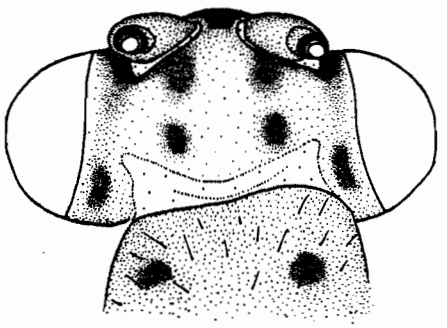
Figure 62 Chrysopa oculata: head of C. assimilis

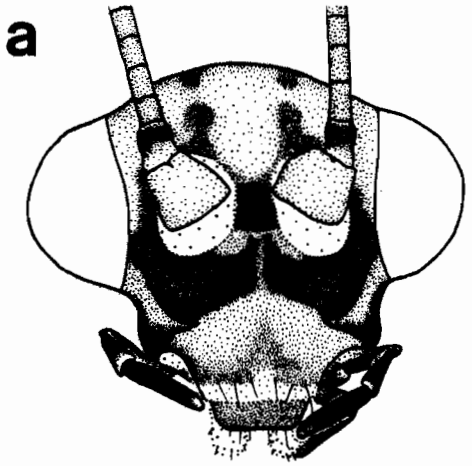
a. frontal

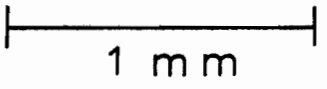
b. dorsal

c. lateral

[based on a specimen collected by
[unknown: collection N. Banks], Ashland, Oregon,
7.IX.1897; MCZ, Type 11376, male,
determined as C. oculata by
E.G. MacLeod 1963]


b


a


1 mm

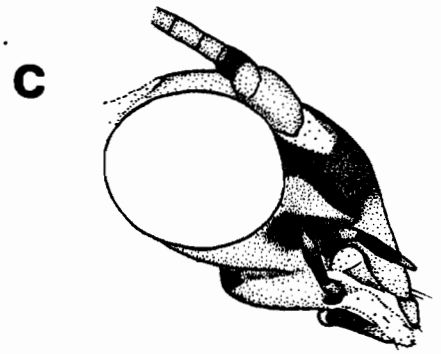

c

Figure 63 *Chrysopa oculata*: terminalia of *C. assimilis*

a. terminalia with structures everted

[based on a specimen collected by

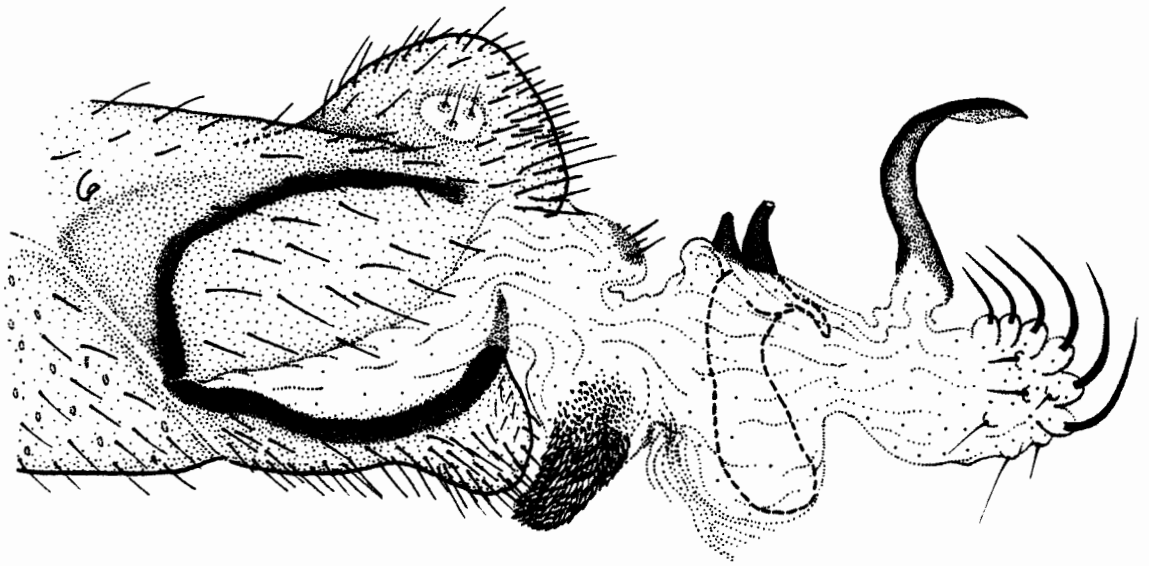
[unknown: collection N. Banks], Ashland, Oregon,

7.IX.1897; MCZ, Type 11376,

determined as *C. oculata* by

E.G. MacLeod 1963]

a



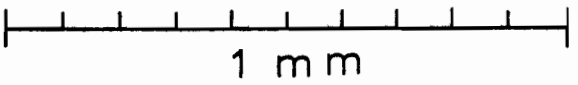
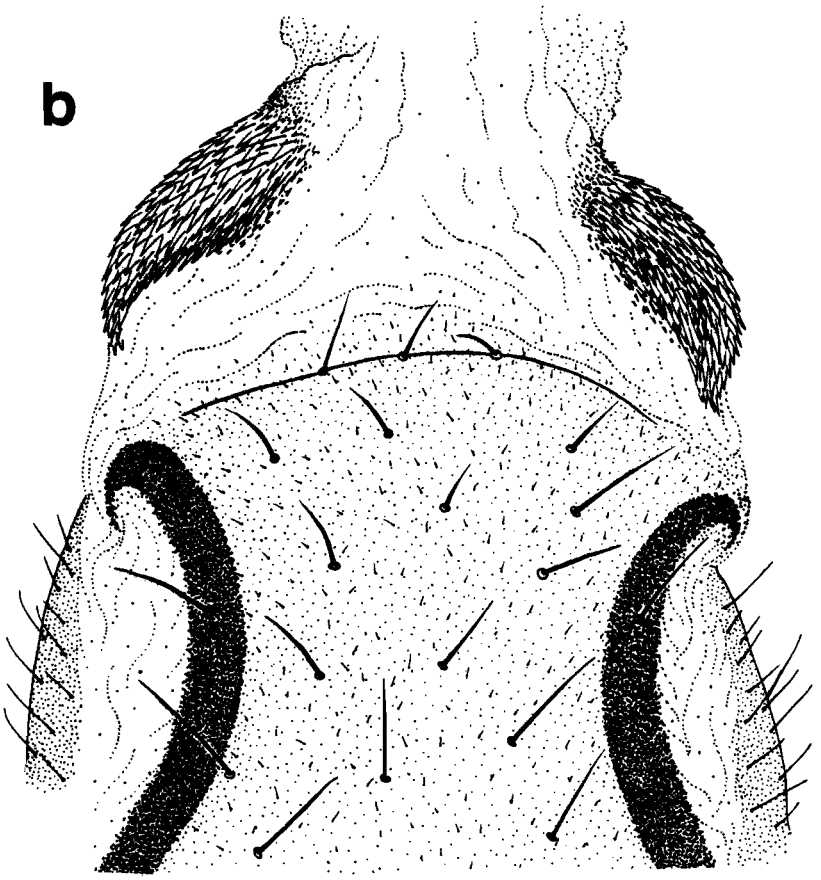


Figure 63 (continued)

b. gonocristae

[based on a specimen collected by
[unknown: collection N. Banks], Ashland, Oregon,
7.IX.1897; MCZ, Type 11376,
determined as C. oculata by
E.G. MacLeod 1963]


b

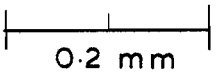

0·2 mm

Figure 63 (continued)

c. mediuncus, dorsal aspect

d. ibid., lateral aspect

e. ibid., ventral aspect

[based on a specimen collected by
[unknown: collection N. banks], Ashland, Oregon,
7.IX.1897; MCZ, Type 11376,
determined as C. oculata by
E.G. MacLeod 1963]

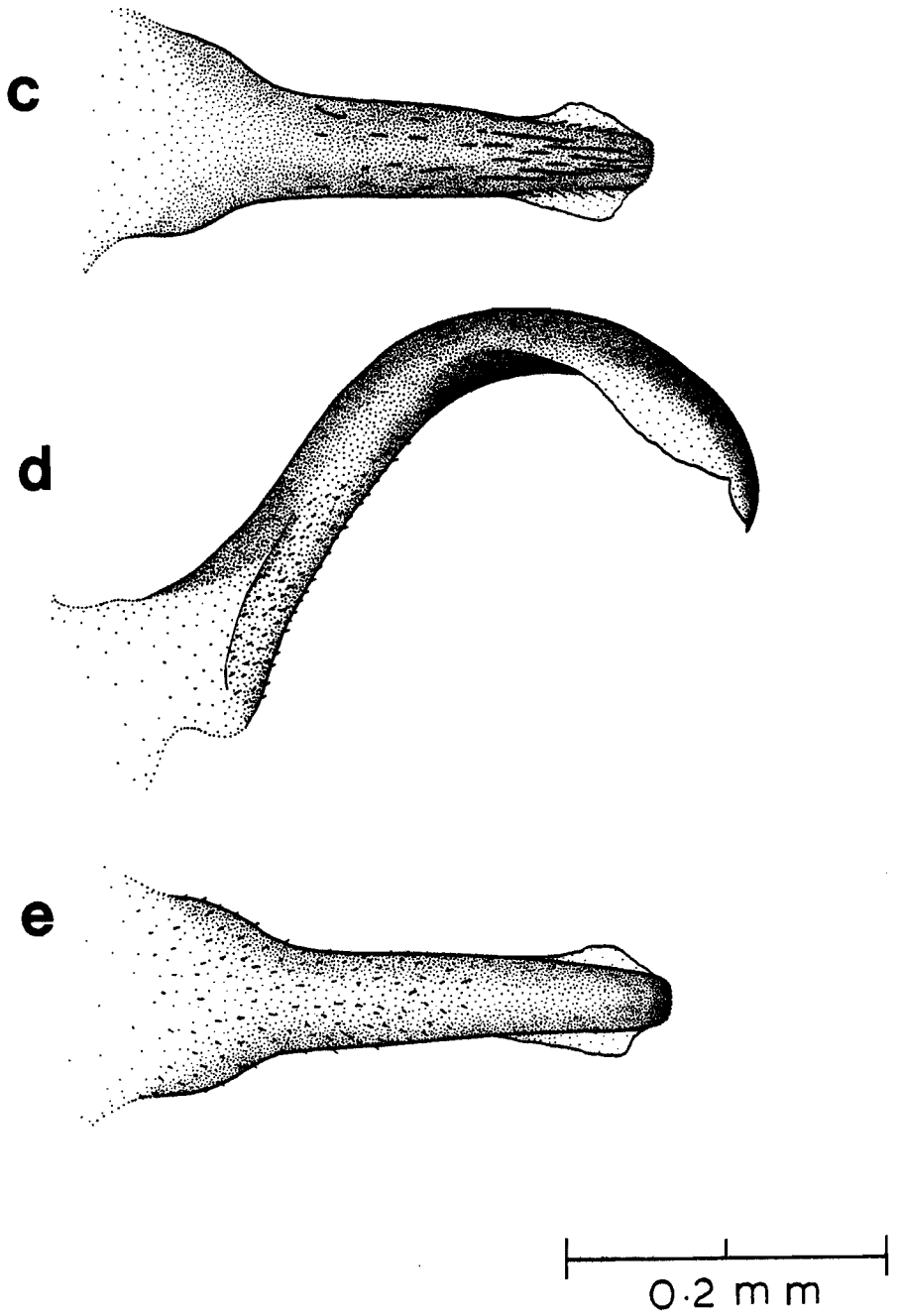

c
d
e
0·2 mm

Figure 63 (continued)

f. entoprocessus

g. gonarcus

[based on a specimen collected by
[unknown: collection N. banks], Ashland, Oregon,
7.IX.1897; MCZ, Type 11376,
determined as C. oculata by
E.G. MacLeod 1963]

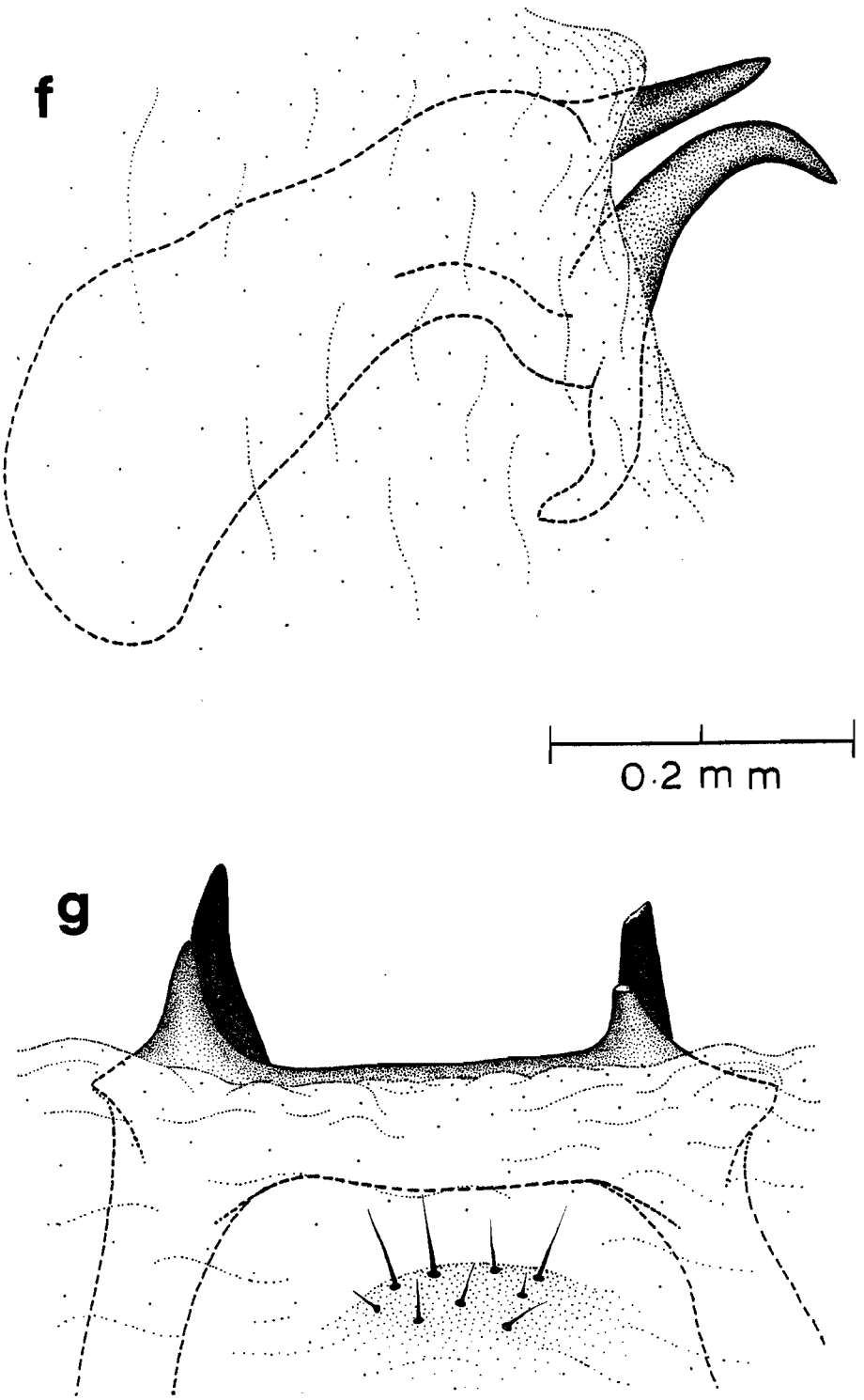

f
0·2 mm
g

Figure 64 Chrysopa pleuralis: female head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by
A.P. MacDougall, Lillooet, British Columbia,
1.VII.1925; ROM, determined
by P.A. Adams]

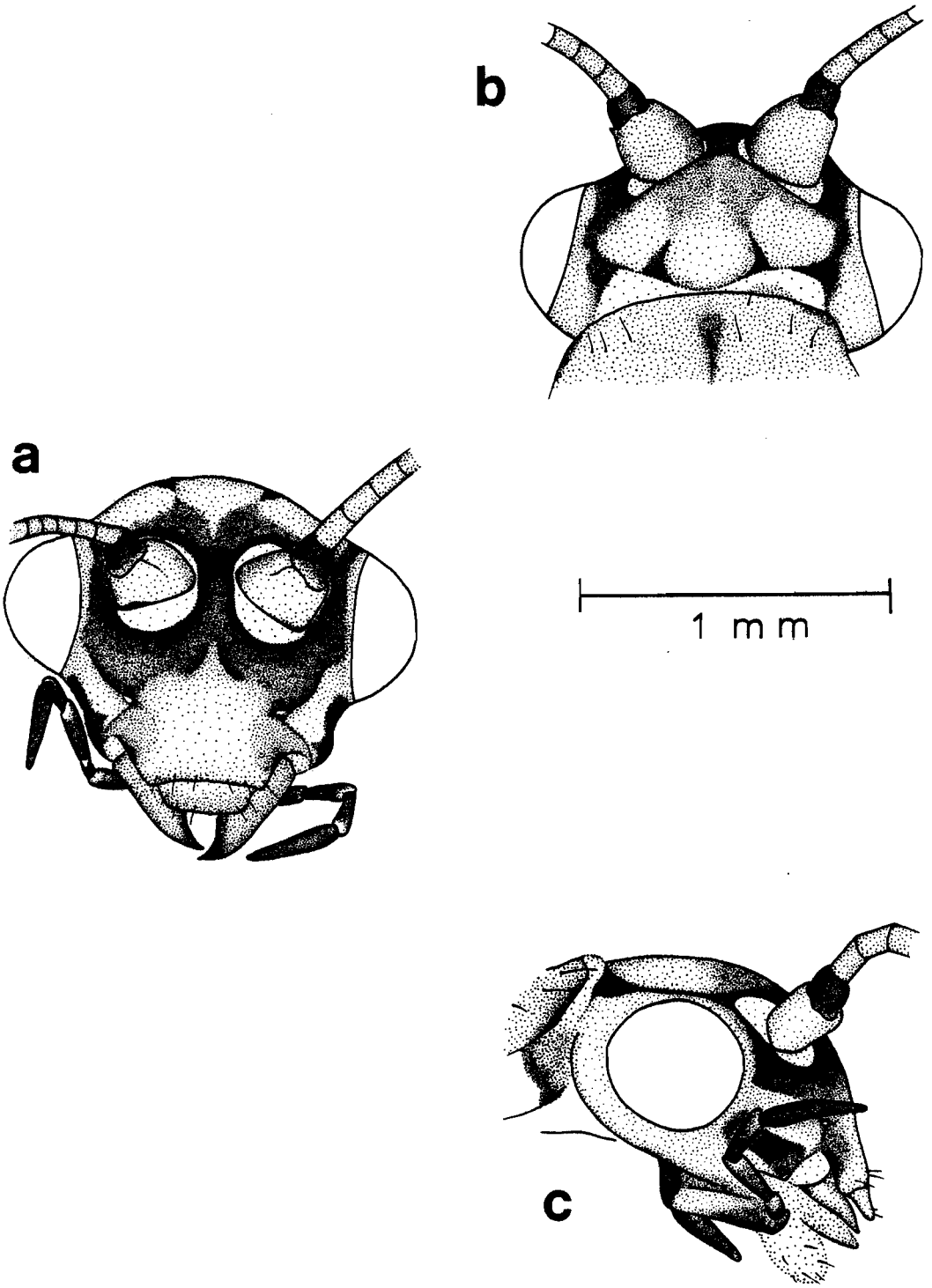
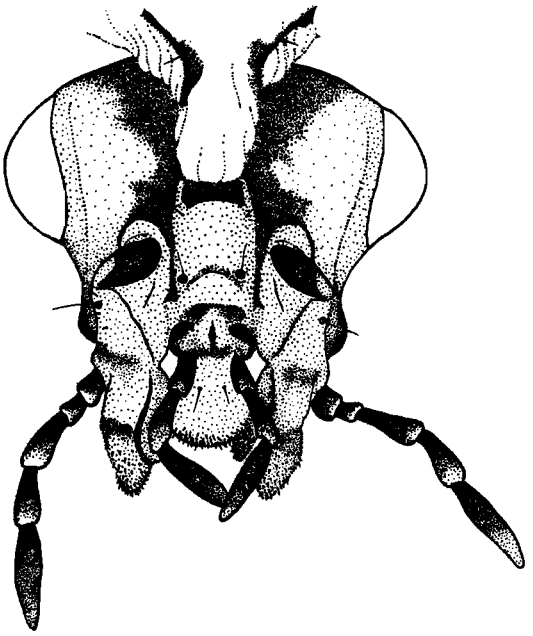

b
a
1 mm
c

Figure 64 (continued)

d. ventral

[based on a specimen collected by
A.P. MacDougall, Lillooet, British Columbia,
1.VII.1925; ROM, determined
by P.A. Adams]

d



1 mm

Figure 65 Chrysopa pleuralis: variation in head

a. Nicola, British Columbia; female

b. ibid., dorsal

c. Banff, Alberta; female

d. ibid., dorsal

[based on a specimen collected by

a, b) G.J. Spencer, 10.VII.1932; SEM

c, d) C.B.D. Garrett, 14.VIII.1922; CNC, determined by R.C. Smith, also as C. oculata by P.A. Adams]

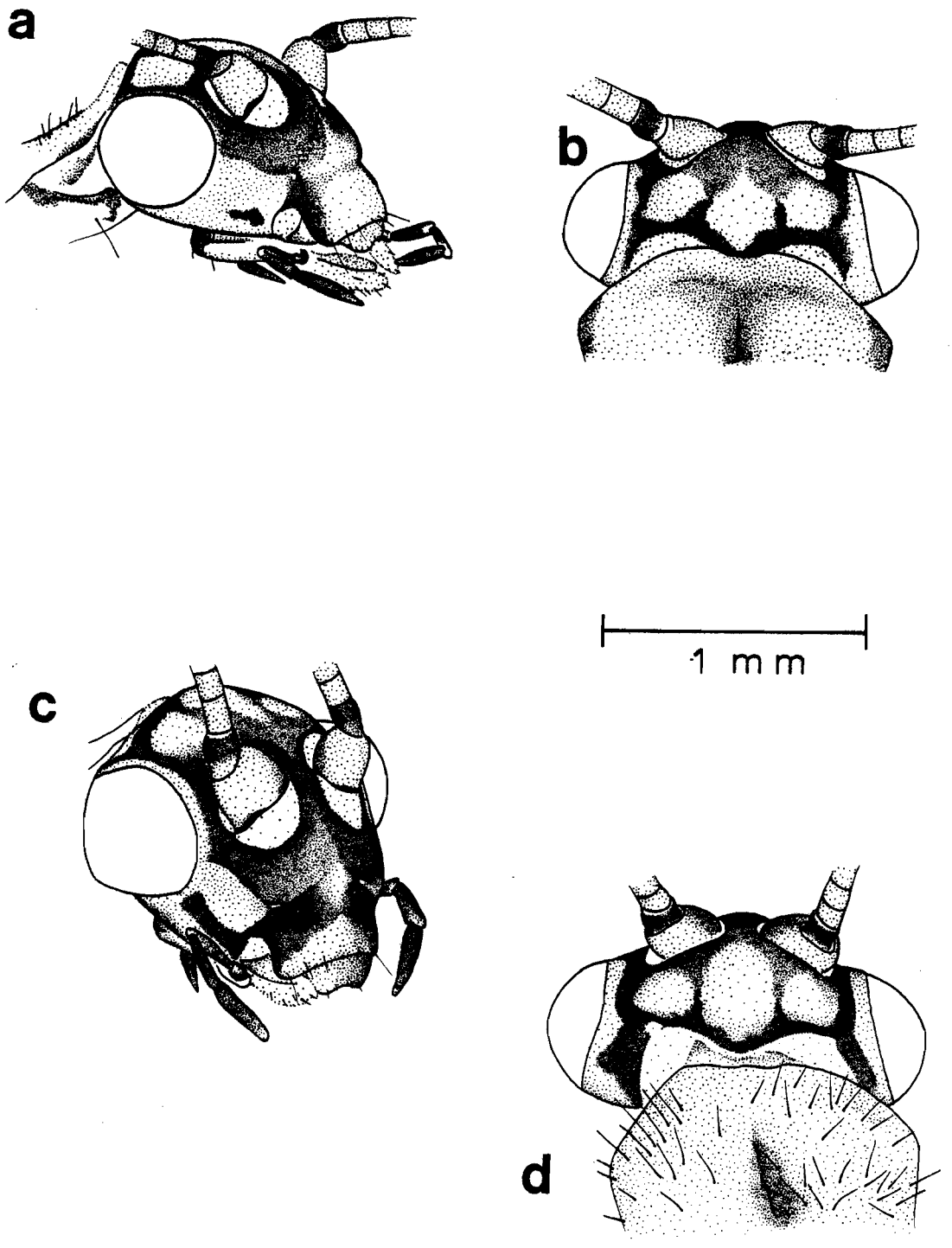

a
b
1 mm
c
d

Figure 66 *Chrysopa pleuralis*: thorax

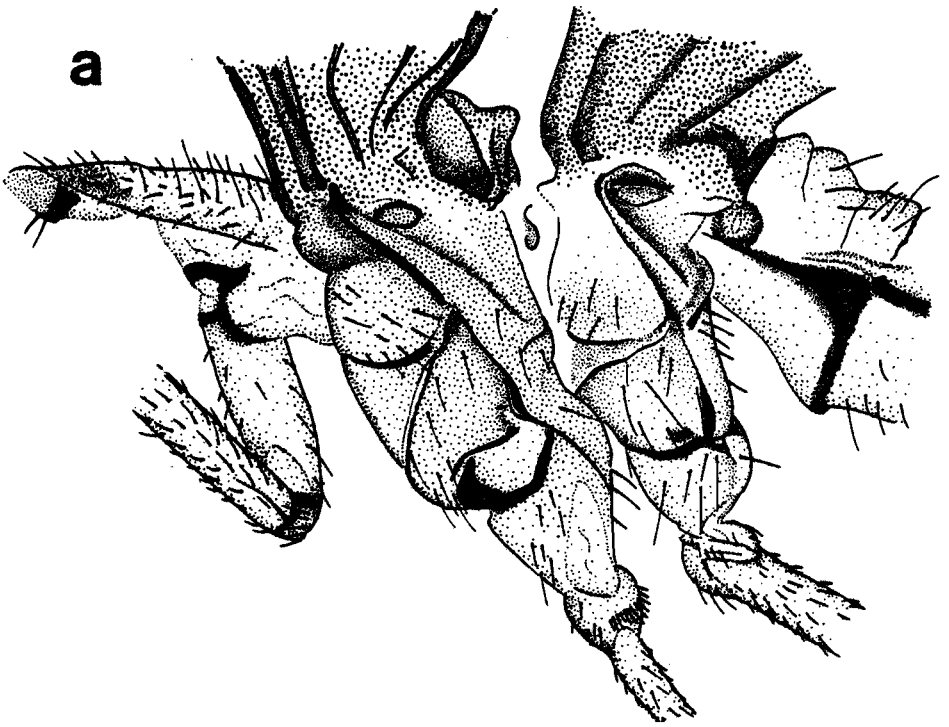
a. pleuron, lateral aspect

[based on a specimen collected by

C.B.D. Garrett, Banff, Alberta, 5.VII.1922,

male; CNC, determined

by P.A. Adams]

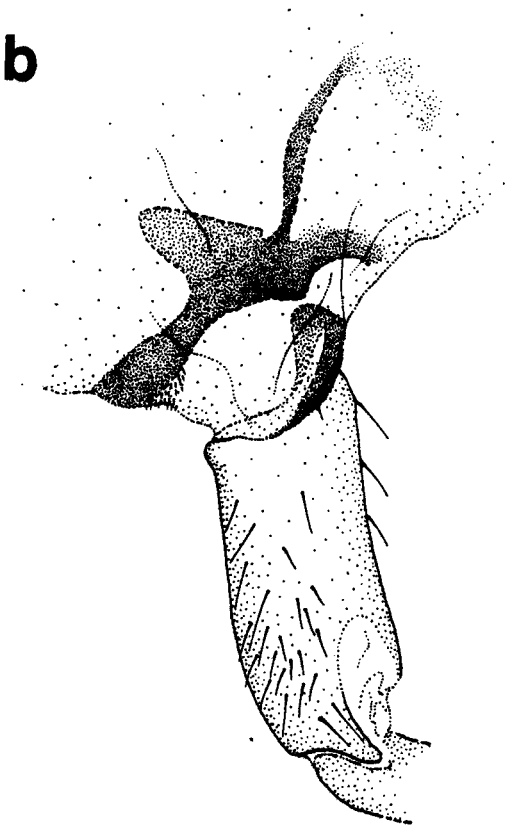


1 mm

Figure 66 (continued)

b. prothoracic coxa

[based on a specimen collected by
A.P. MacDougall, Lillooet, British Columbia,
1.VII.1925, female; ROM,
determined by P.A. Adams]



0·2 mm

Figure 67 Chrysopa pleuralis: male structures

a. terminalia with structures everted

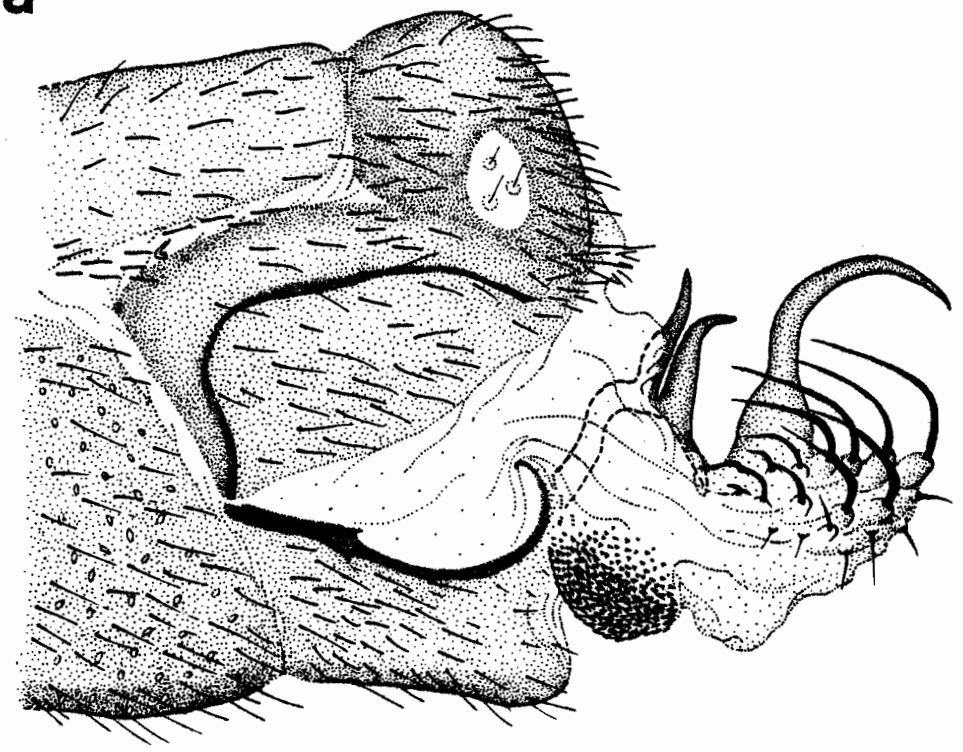
[based on a specimen collected by

G.B. Wiggins, I. Smith, & T. Yamamoto,

Teton Pass, Wyoming, 27.VI.1968;

ROM]

a



1 mm

Figure 67 (continued)

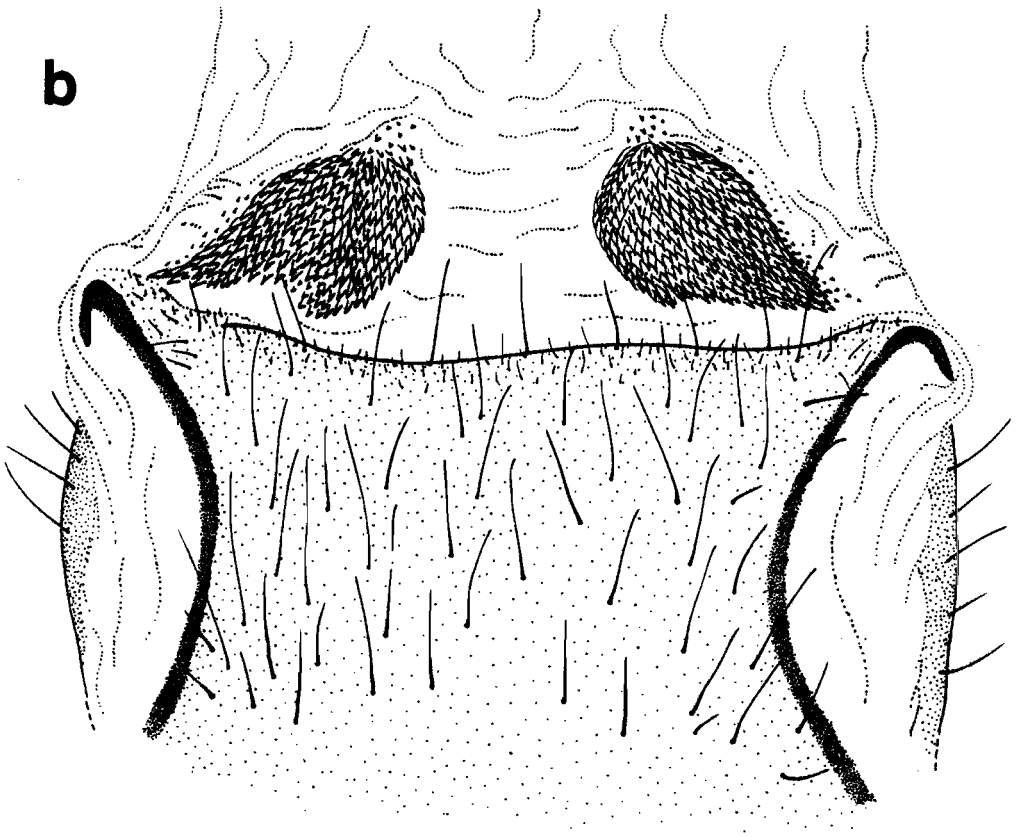
b. gonocristae

[based on a specimen collected by

G.B. Wiggins, I. Smith, & T. Yamamoto,

Teton Pass, Wyoming, 27.VI.1968;

ROM]



0·2 mm

Figure 67 (continued)

c. mediuncus, dorsal aspect

d. ibid., lateral aspect

e. ibid., ventral aspect

[based on a specimen collected by
G.B. Wiggins, I. Smith, & T. Yamamoto,
Teton Pass, Wyoming, 27.VI.1968;
ROM]

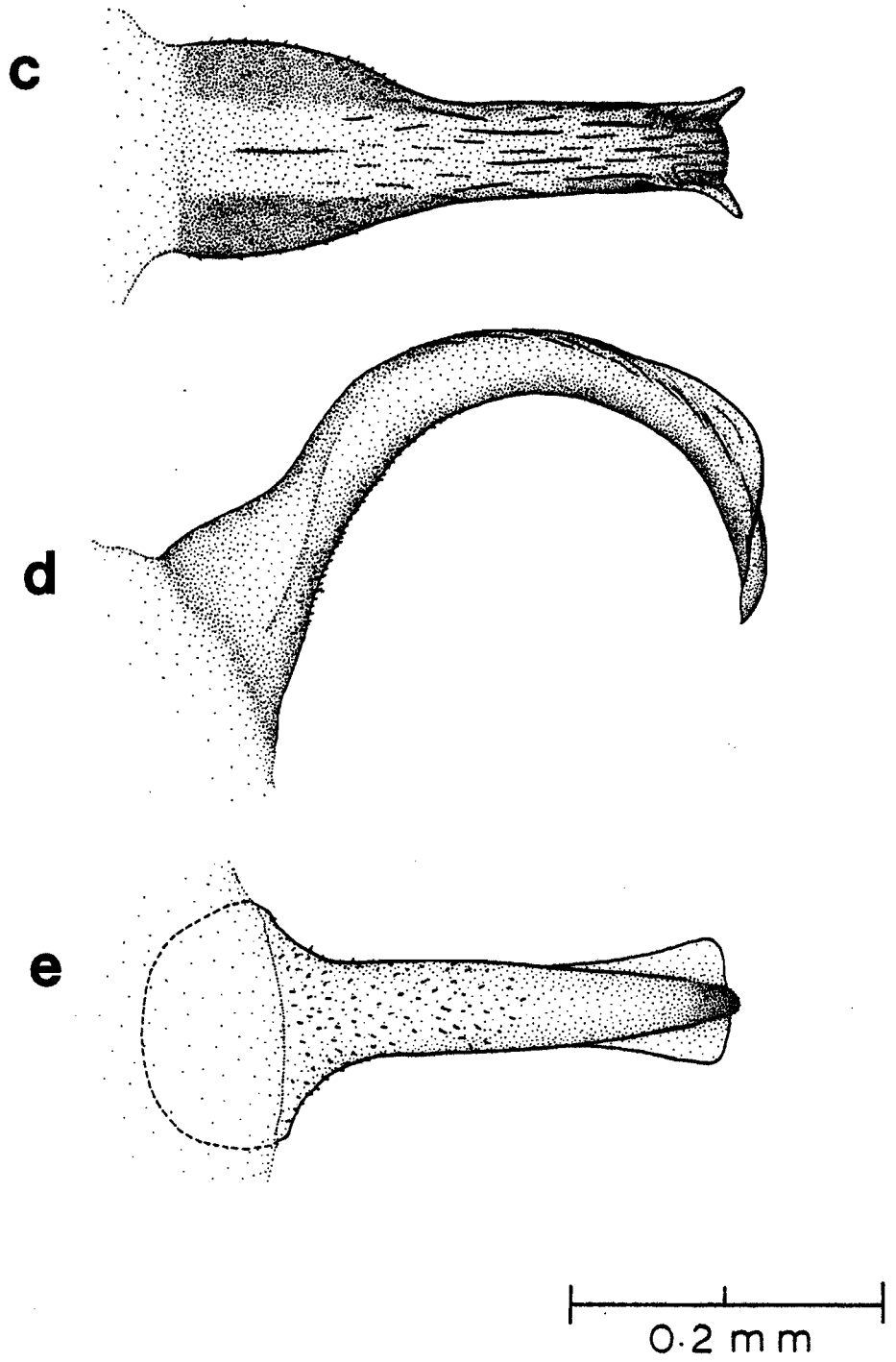

c
d
e
0·2 mm

Figure 67 (continued)

f. entoprocessus

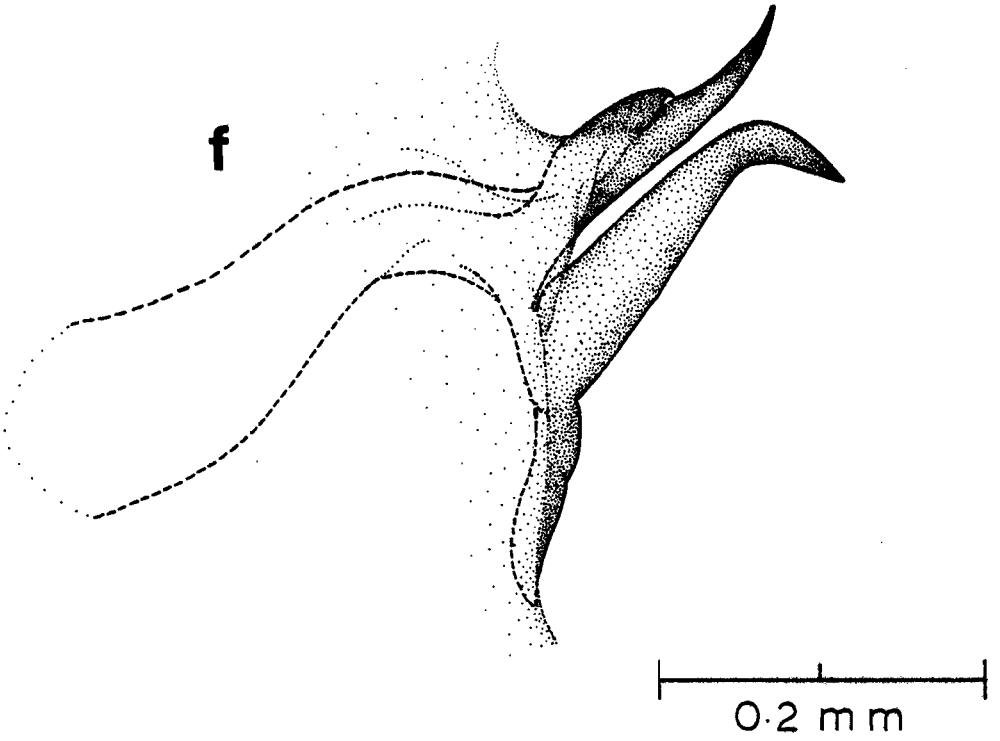
g. gonarcus

[based on a specimen collected by

G.B. Wiggins, I. Smith, & T. Yamamoto,

Teton Pass, Wyoming, 27.VI.1968;

ROM]


f
0·2 mm

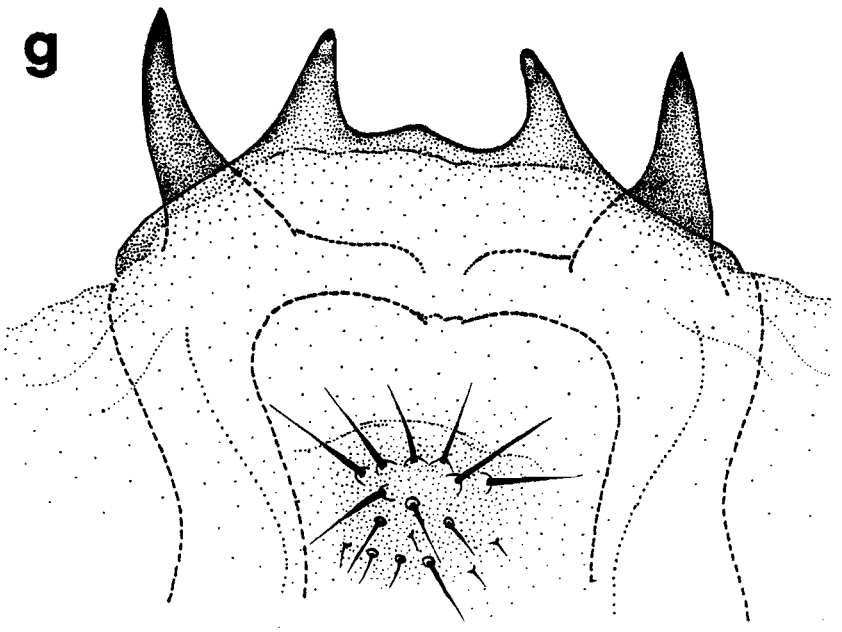

g

Figure 68 Chrysopa pleuralis: female structures

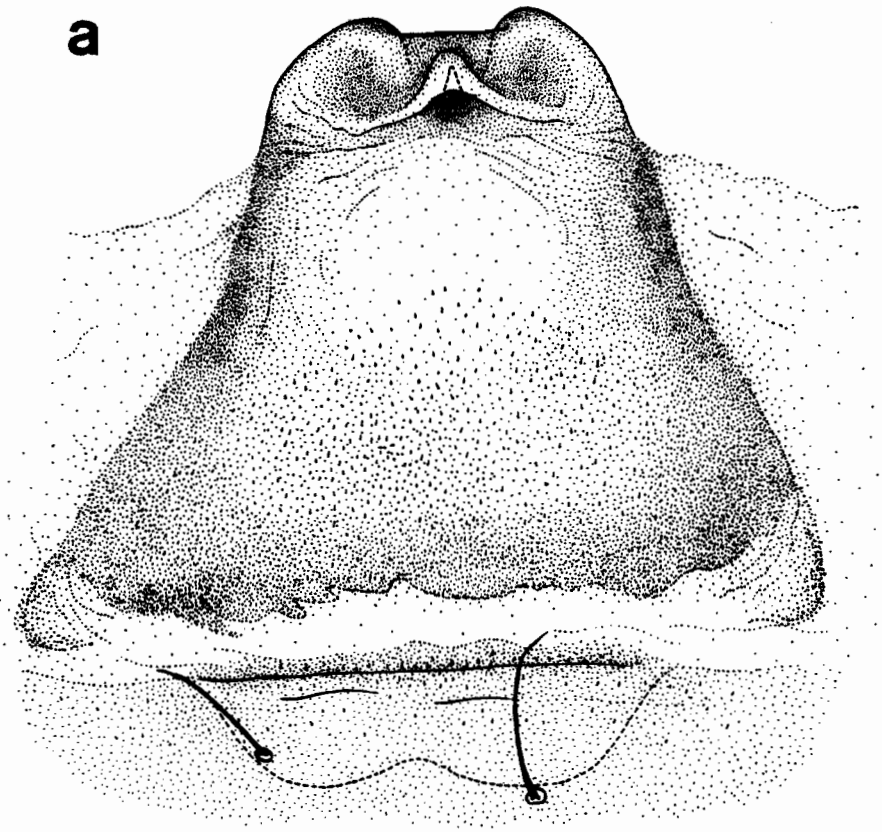
a. subgenitale

[based on a specimen collected by

A.P. MacDougall, Lillooet, British Columbia,

1.VII.1925; ROM, determined

by P.A. Adams]



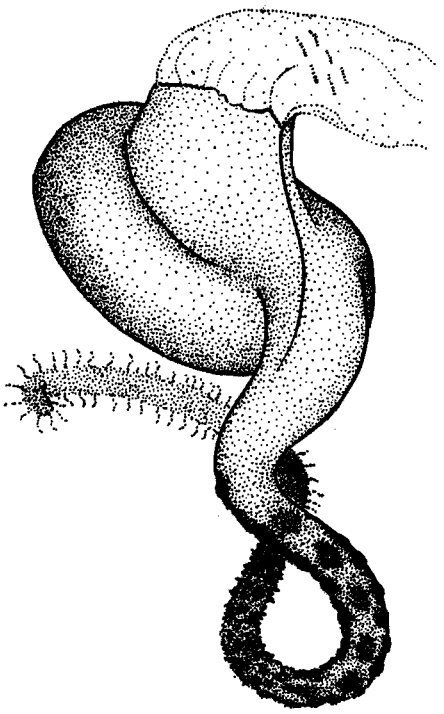
0·2 m m

Figure 68 (continued)

b. spermatheca

[based on a specimen collected by
A.P. MacDougall, Lillooet, British Columbia,
1.VII.1925; ROM, determined
by P.A. Adams]

b



0·2 mm

Figure 69 Chrysopa chi: female head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

J.A. Garland, Lanoraie, Québec,

2.VII.1975; LEM]

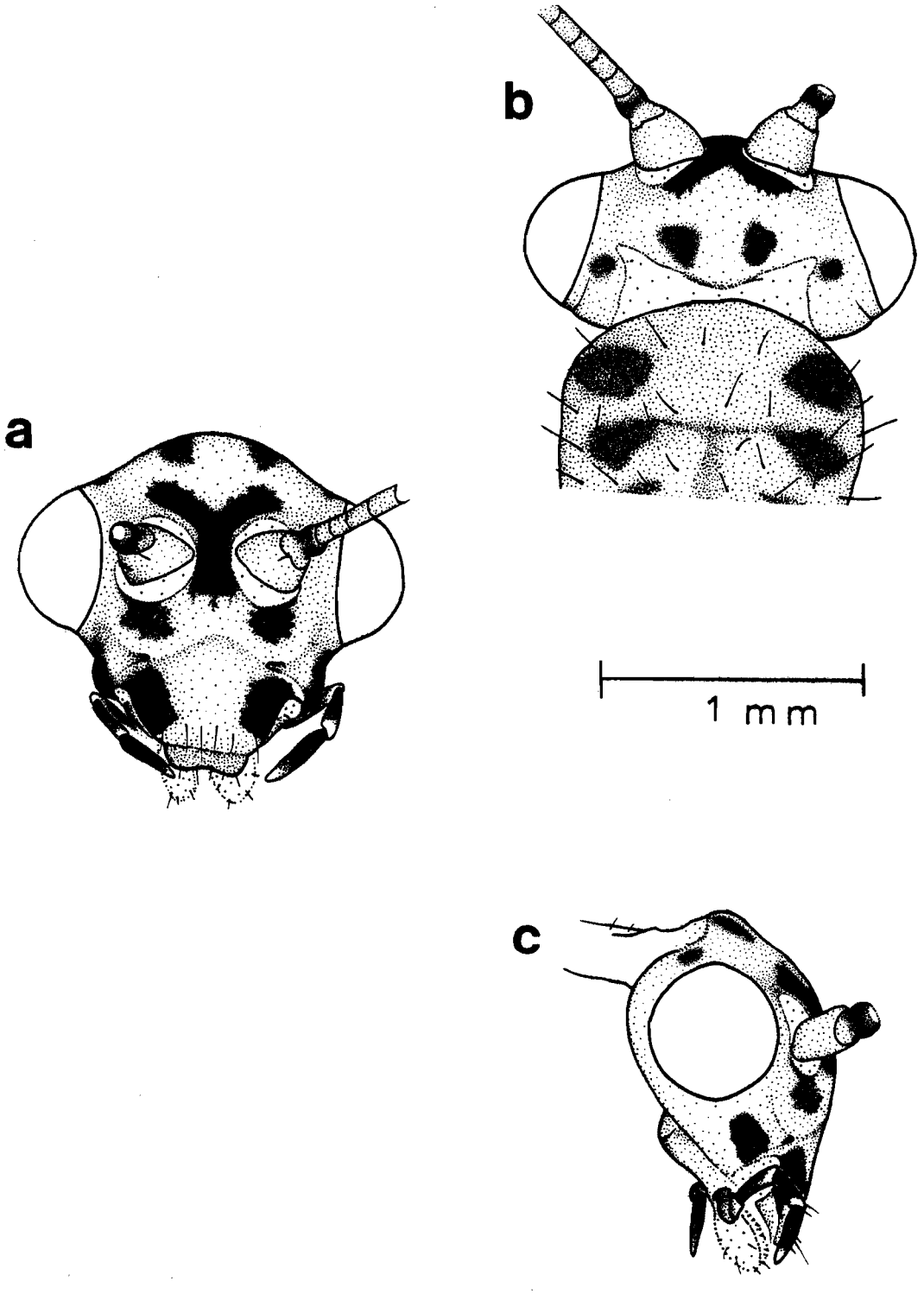

a
b
1 mm
c

Figure 70 Chrysopa chi: variation in head

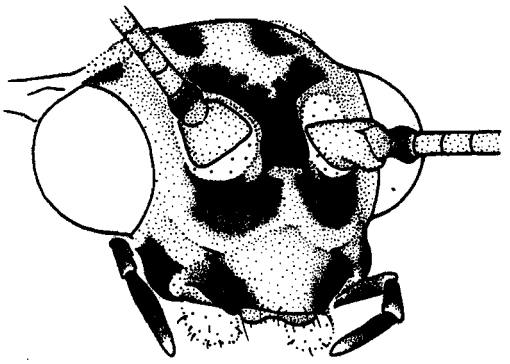
a. Ile-Perrot, Québec; male

b. ibid., another male

[based on 2 specimens collected by

J.A. Garland, 29.VI.1980; LEM]

a



1 mm

b

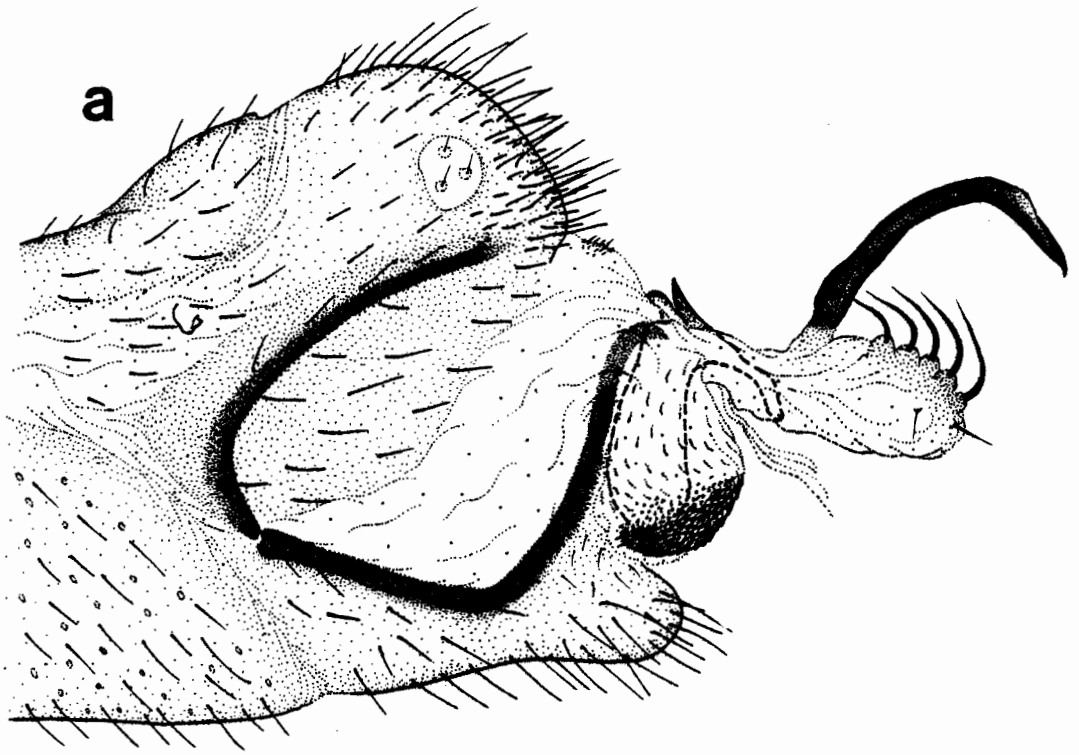
Figure 71 Chrysopa chi: male structures

a. terminalia with structures everted

[based on a specimen collected by

J.A. Garland, Ile-Perrot, Québec,

29.VI.1980; LEM]



1 mm

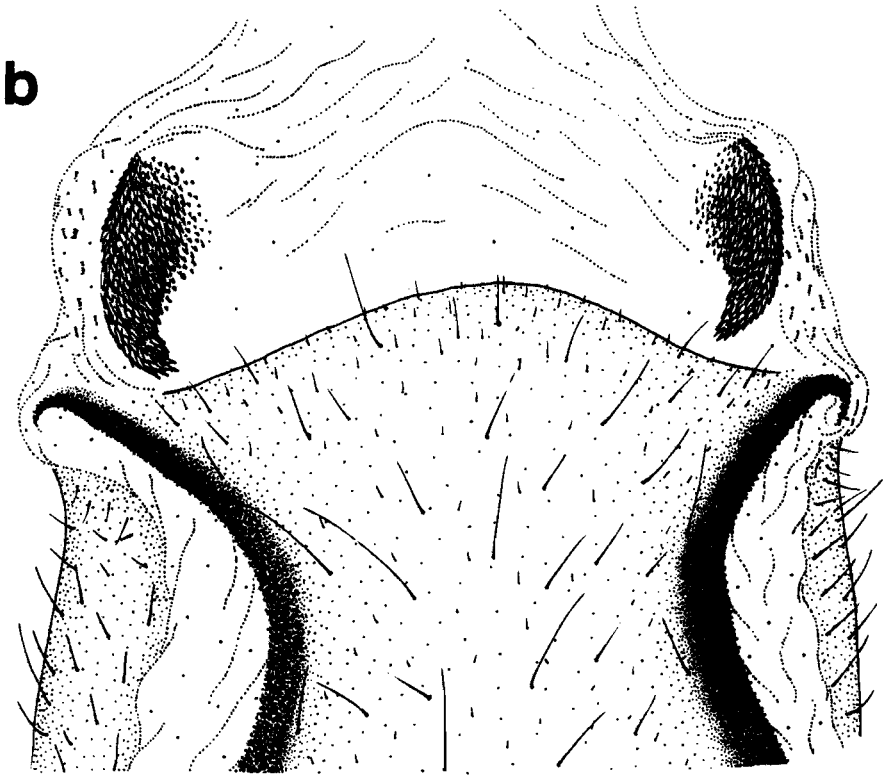
Figure 71 (continued)

b. gonocristae

[based on a specimen collected by

J.A. Garland, Ile-Perrot, Québec,

29.VI.1980; LEM]



0·2 mm

Figure 71 (continued)

c. mediuncus, dorsal aspect

d. ibid., lateral aspect

e. ibid., ventral aspect

[based on a specimen collected by

J.A. Garland, Ile-Perrot, Québec

29.VI.1980; LEM]

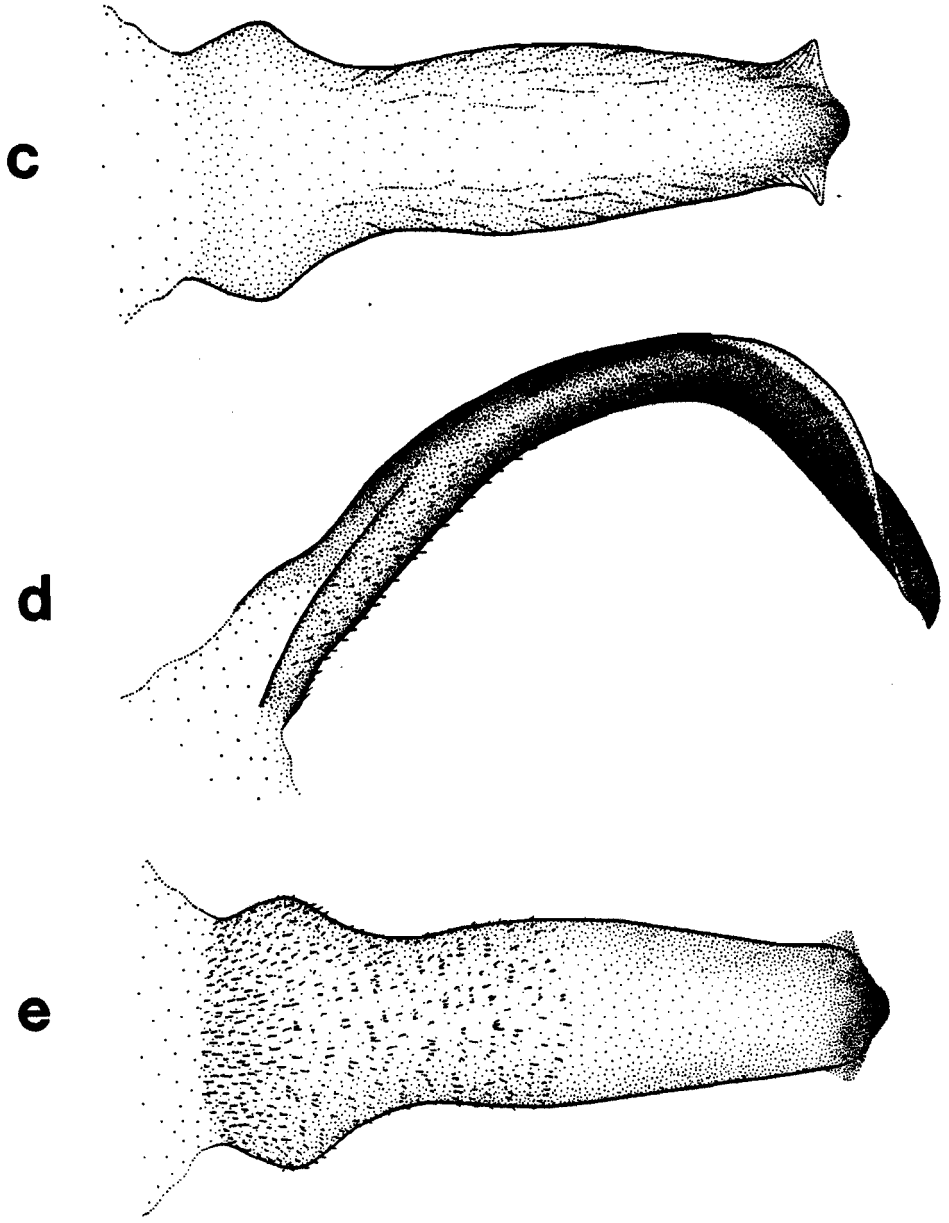

c
d
e
0·2 mm

Figure 71 (continued)

f. entoprocessus

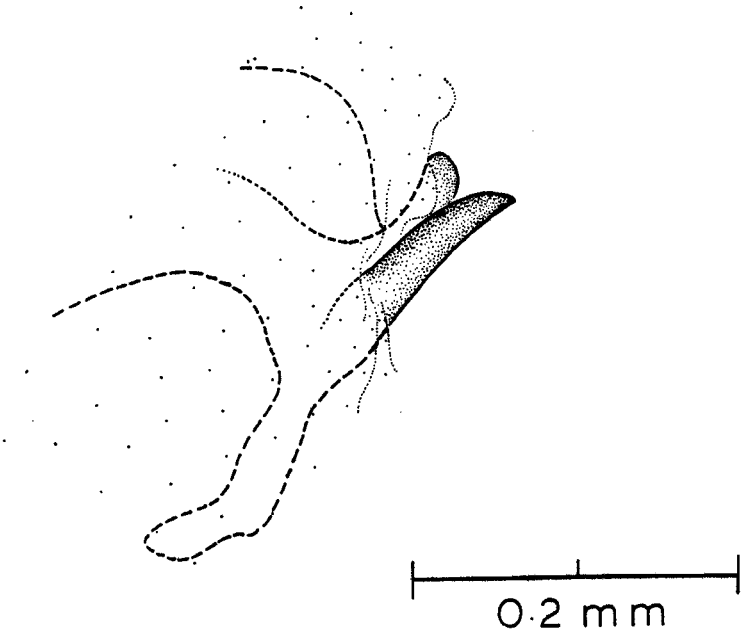
g. gonarcus

[based on a specimen collected by

J.A. Garland, Ile-Perrot, Québec,

29.VI.1980; LEM]

f



g

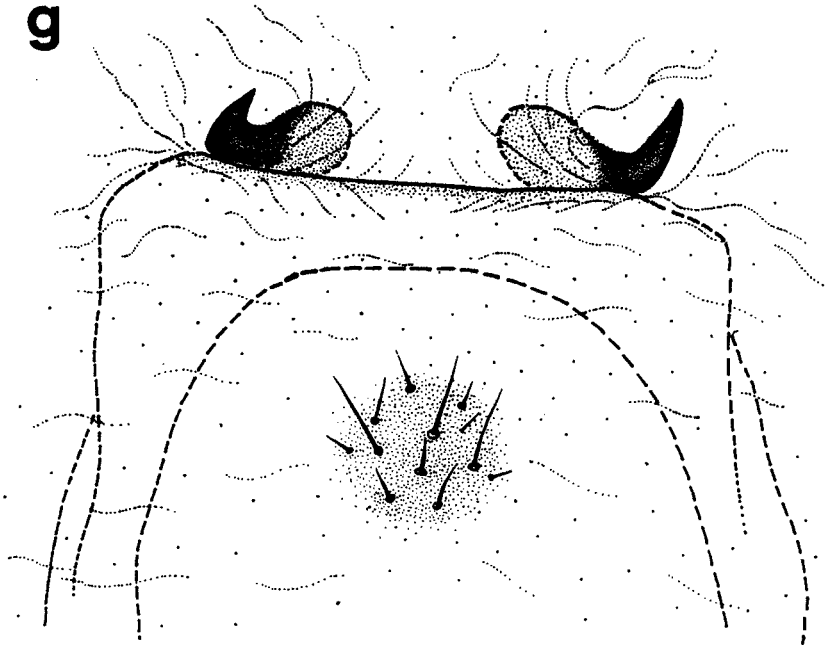


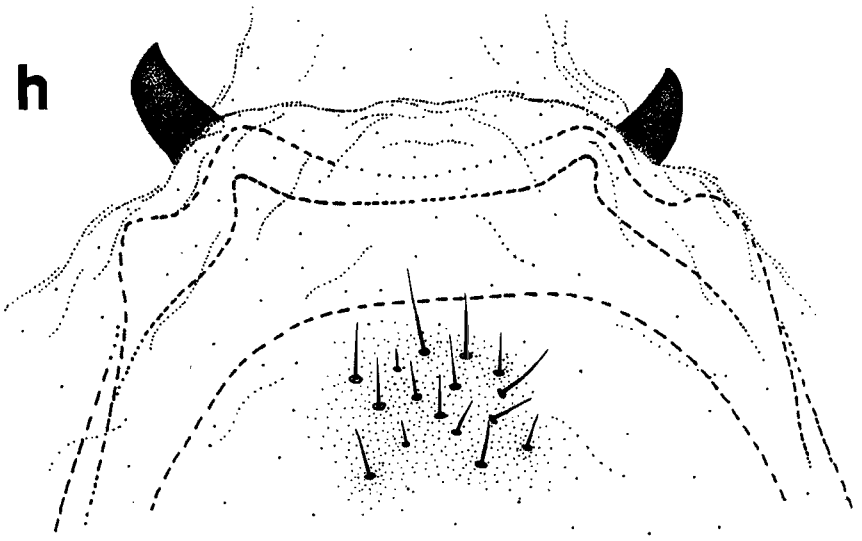
Figure 71 (continued)

h. gonarcus

[based on a specimen collected by

malaise trap, Mont-St-Hilaire, Québec

12-16.VIII.1977; LEM]


h

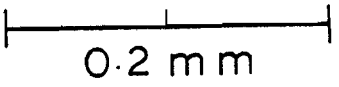

0·2 mm

Figure 71 (continued)

i. mediuncus, lateral aspect

j. ibid., another specimen

k. ibid., another specimen

l. ibid., another specimen

[based on 4 specimens collected by

W.W. Judd, Dawson, Yukon, 6.VII.1949;

CNC, determined as Chrysopa chrysops

by P.A. Adams]

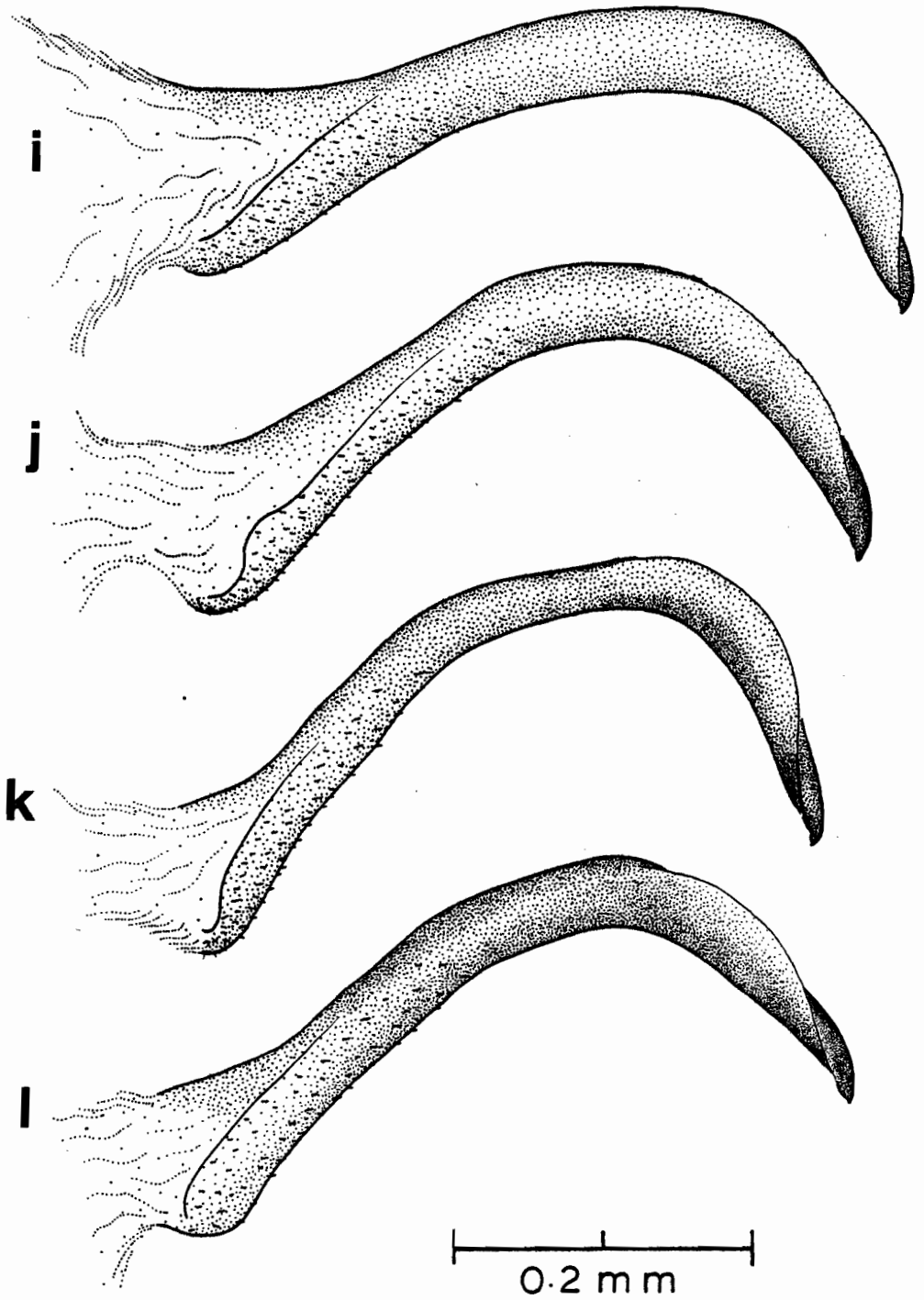

i
j
k
l
0·2 mm

Figure 71 (continued)

m. entoprocessus, same as in i

n. ibid., same as in j

o. ibid., same as in k

p. ibid., same as in l

[based on 4 specimens collected by

W.W. Judd. Dawson, Yukon, 6.VII.1949;

CNC, determined as Chrysopa chrysops

by P.A. Adams]

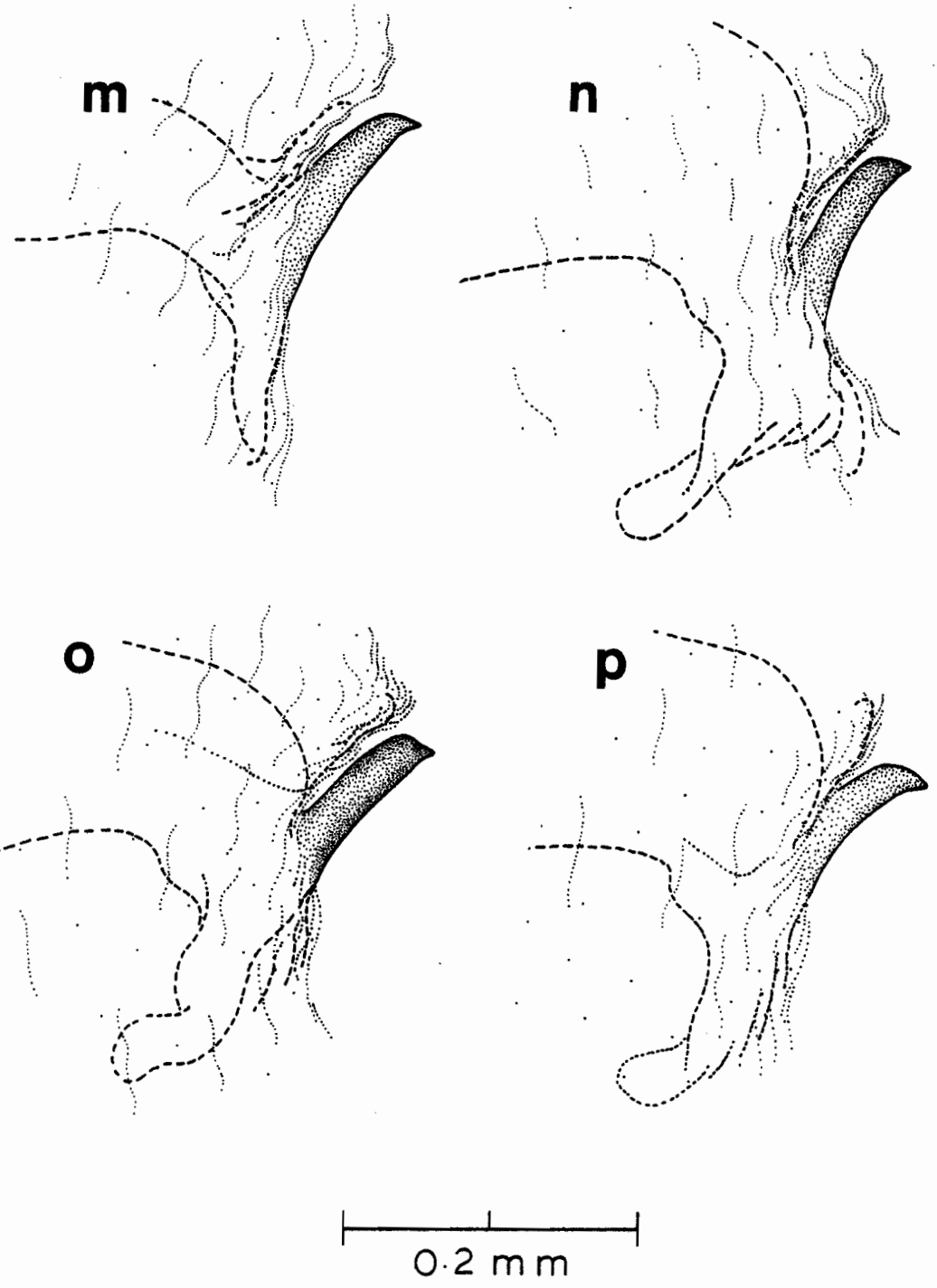

m
n
o
p
0·2 mm

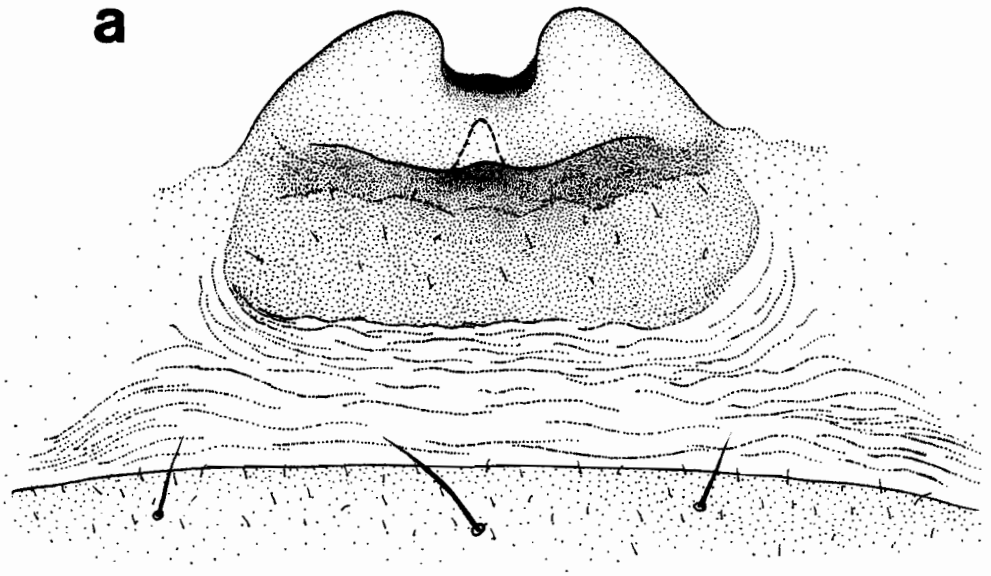
Figure 72 Chrysopa chi: female structures

a. subgenitale

[based on a specimen collected by

J.A. Garland, Lanoraie, Québec,

2.VII.1975; LEM]



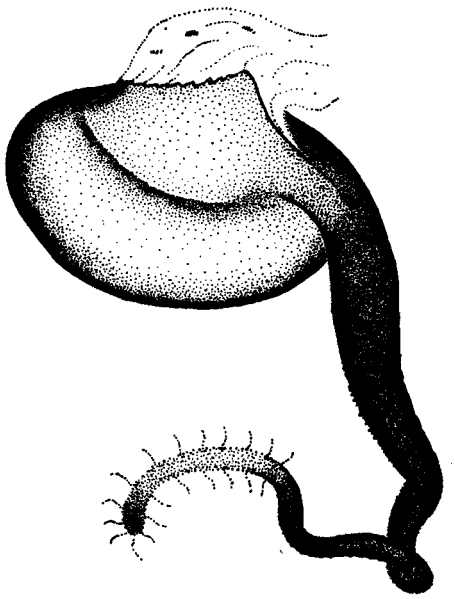
0·2 mm

Figure 72 (continued)

b. spermatheca

[based on a specimen collected by
J.A. Garland, Lanoraie, Québec,
2.VII.1975; LEM]

b



0·2 mm

Figure 72 (continued)

c. subgenitale

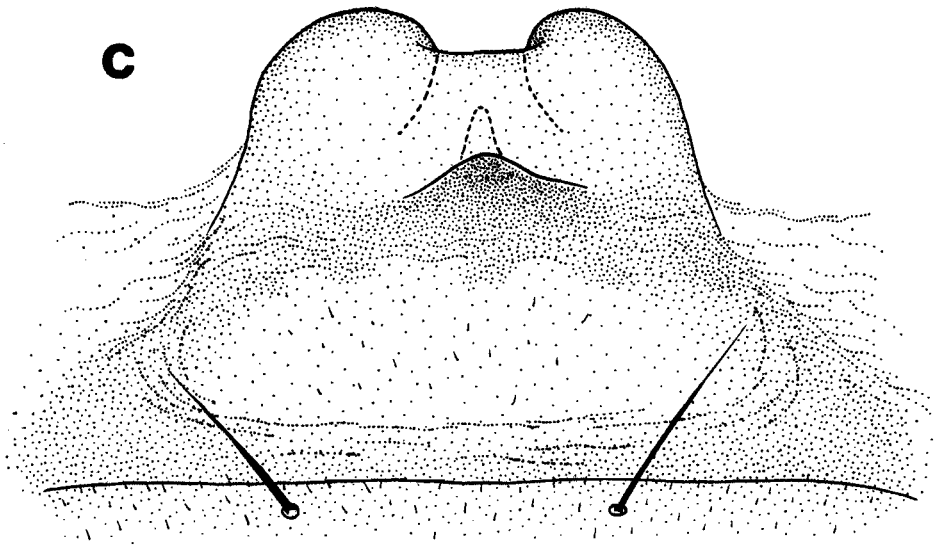
d. ibid., ental aspect

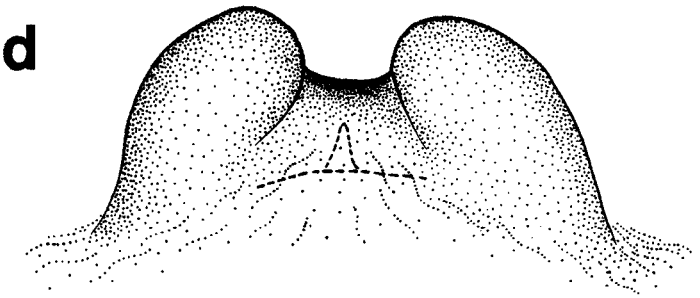
[based on a specimen collected by

W.W. Judd, Dawson, Yukon, 6.VII.1949;

CNC, determined as Chrysopa chrysops

by P.A. Adams]


c


d

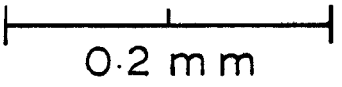

0·2 mm

Figure 72 (continued)

e. subgenitale

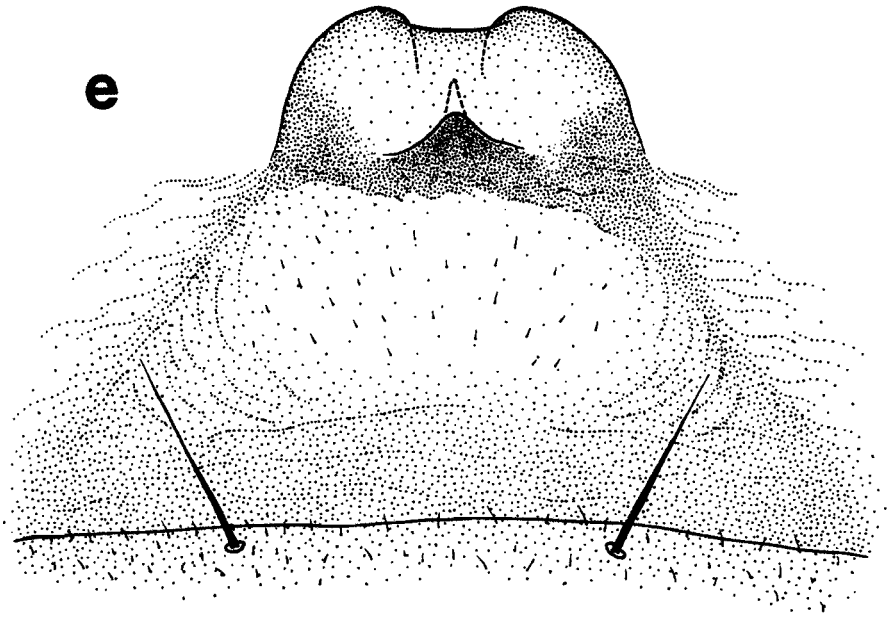
f. ibid., ental aspect

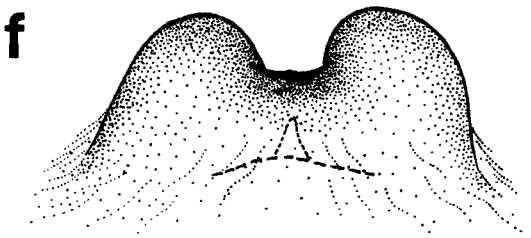
[based on a specimen collected by

W.W. Judd, Dawson, Yukon, 6.VII.1949;

CNC, determined as Chrysopa chrysops

by P.A. Adams]


e


f

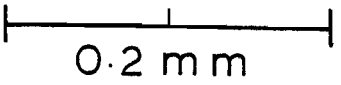

0·2 mm

Figure 72 (continued)

g. subgenitale

h. ibid., ental aspect

[based on a specimen collected by

W.W. Judd, Dawson, Yukon, 6.VII.1949;

CNC, determined as Chrysopa chrysops

by P.A. Adams]

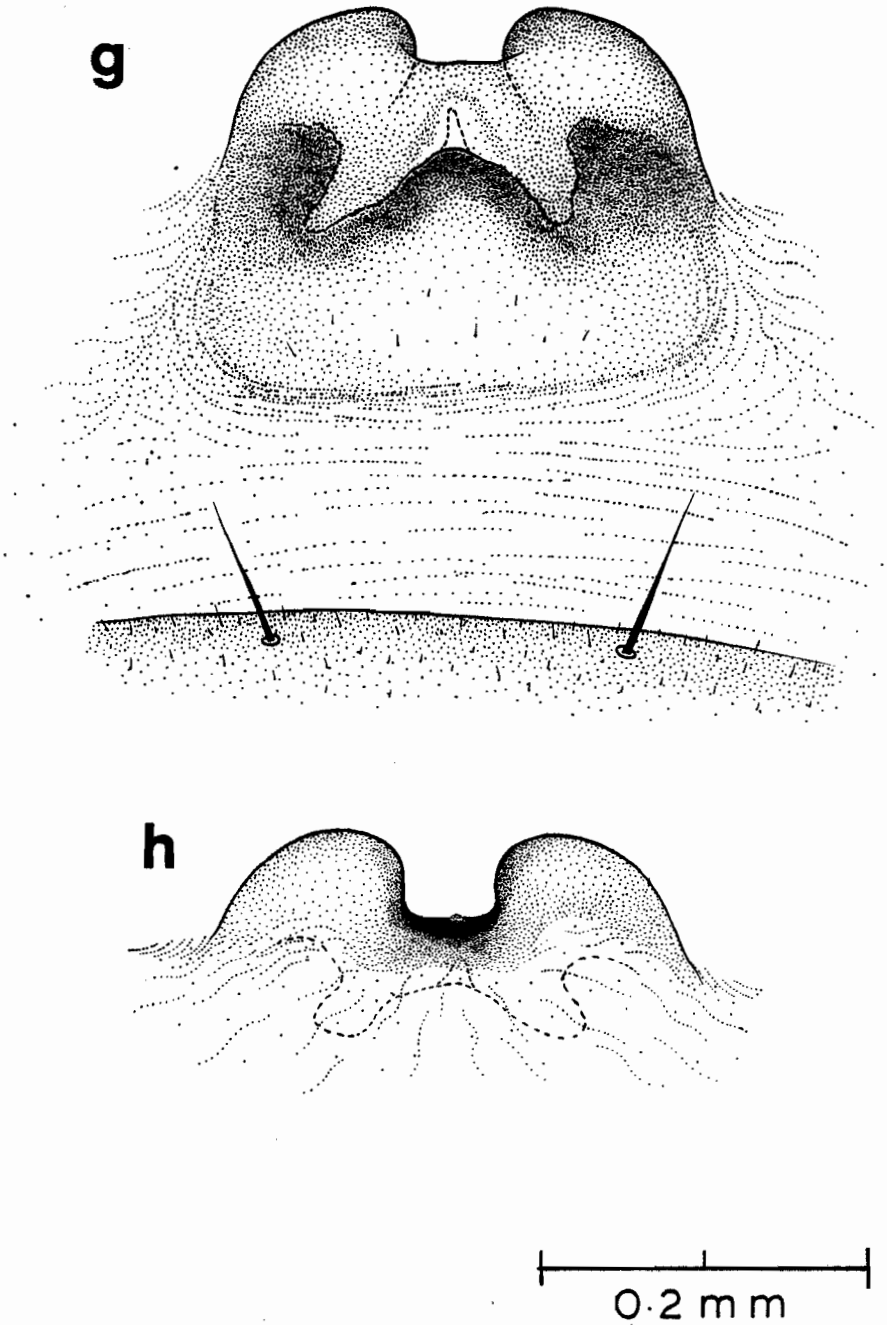

g
h
0·2 mm

Figure 72 (continued)

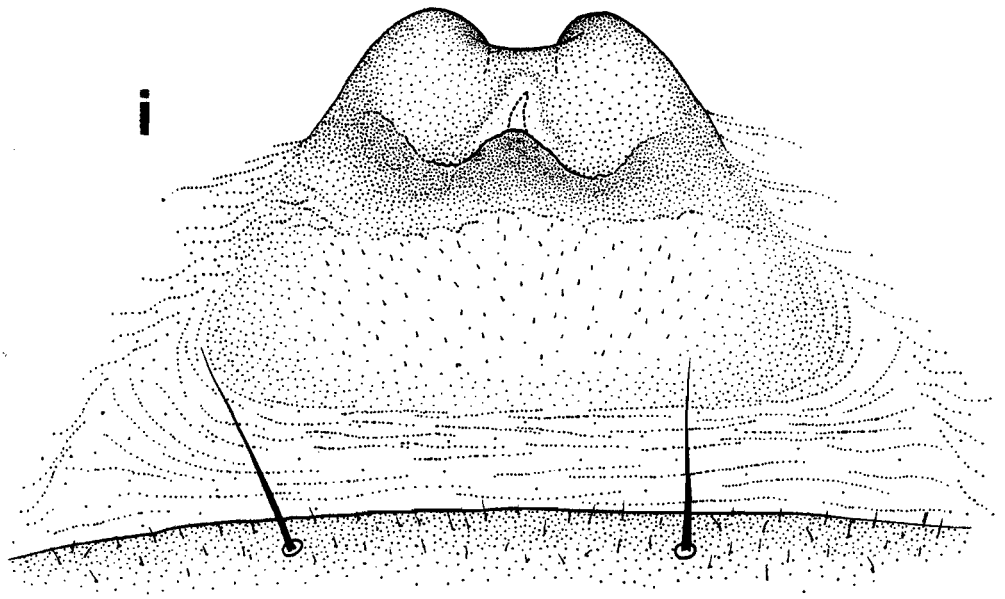
i. subgenitale

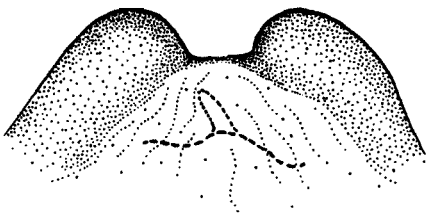
j. ibid., ental aspect

[based on a specimen collected by

J.A. Garland, Ile-Perrot, Québec,

6.VII.1980; LEM]


i


j

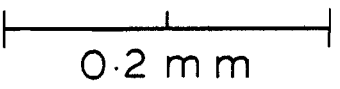

0·2 mm

Figure 73 Mandibles of Chrysopa spp.

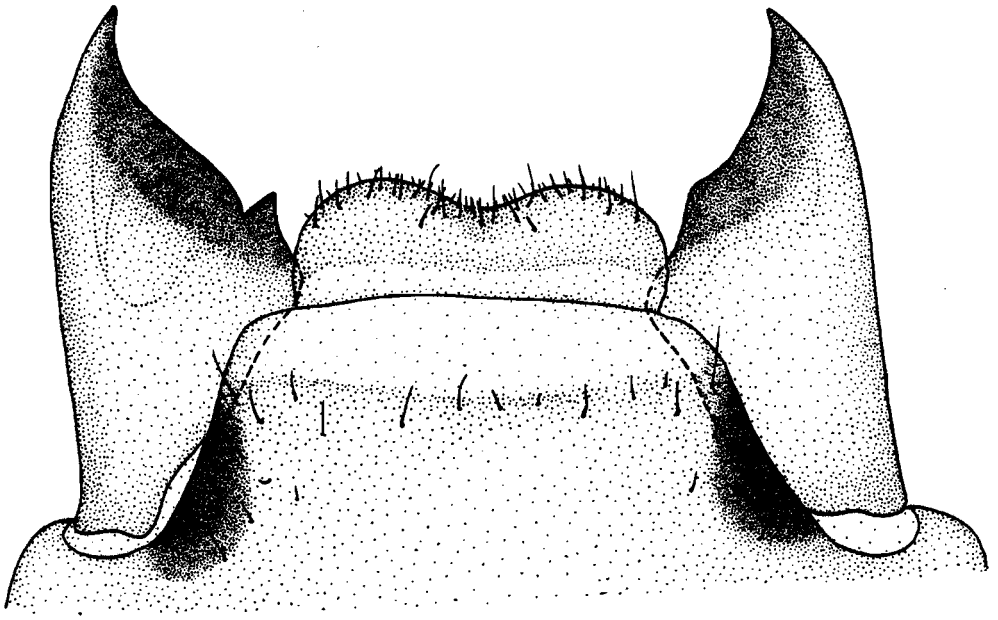
a. C. nigricornis; male

b. C. quadripunctata; male

[based on a specimen collected by

a) B. Rolseth, Ottawa, Ontario,
5.VII.1967; UAE

b) J.C.E. Riotte & I. Smith, Chaffeys Locks,
Ontario, 2.VII.1963; ROM]



0·2 mm

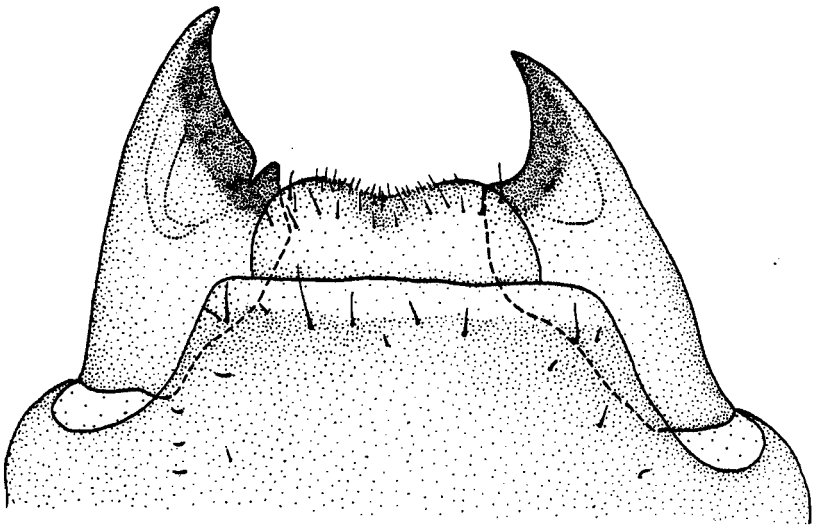


Figure 73 (continued)

c. C. coloradensis; female

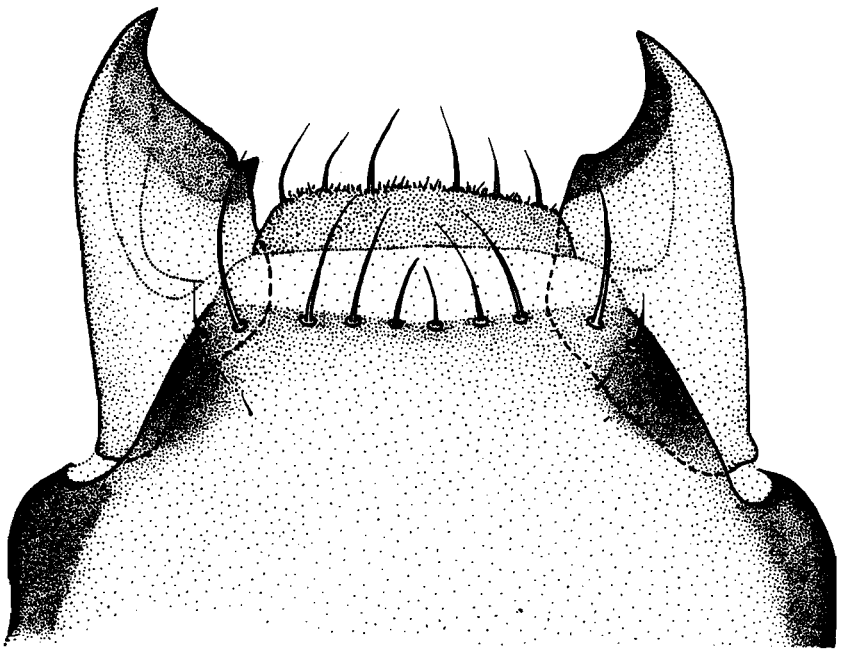
d. C. excepta; female

[based on a specimen collected by

c) J.A. Garland, Penticton, British Columbia,
10.VIII.1976; LEM

d) A.R. Brooks, Elbow, Saskatchewan,
1.VIII.1951; CNC, determined
by P.A. Adams]

c



0·2 mm

d

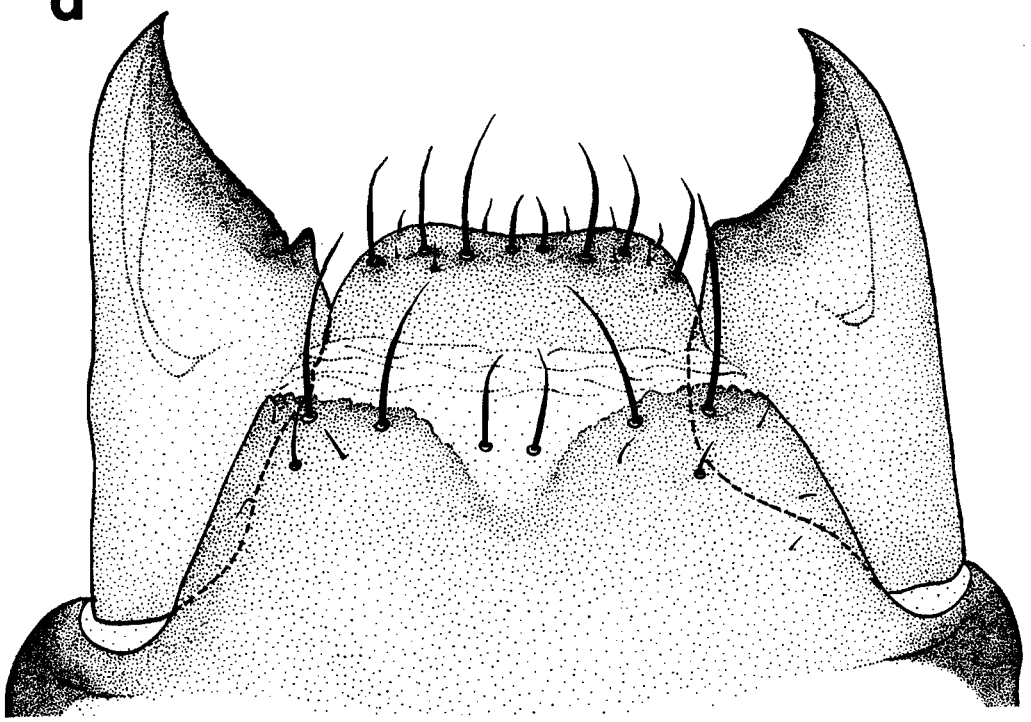


Figure 73 (continued)

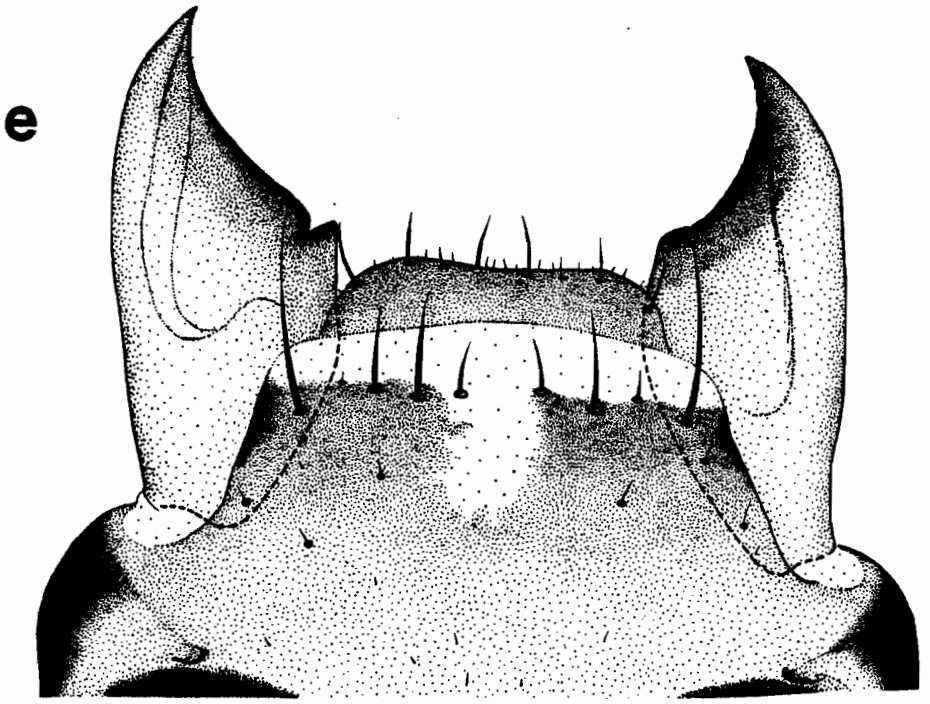
e. C. oculata; female

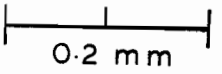
f. C. pleuralis; female

[based on a specimen collected by

e) J.A. Garland, Ile-Perrot, Québec,
20.VIII.1978; LEM

f) A.P. MacDougall, Lillooet, British Columbia,
1.VII.1925; ROM, determined
by P.A. Adams]


e


0·2 mm

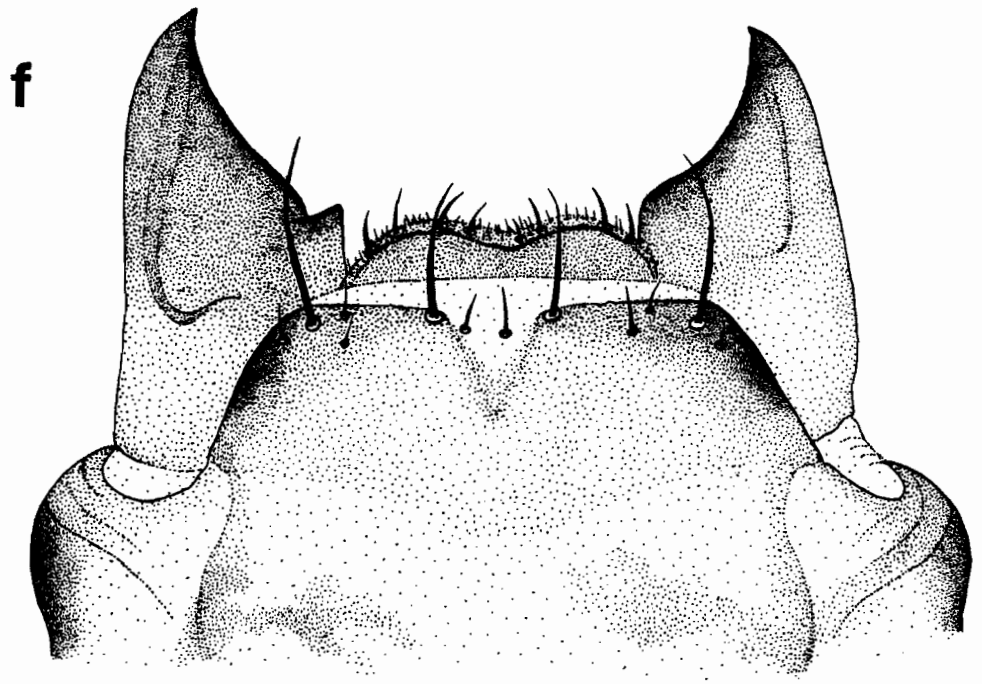

f

Figure 73 (continued)

g. C. chi; female

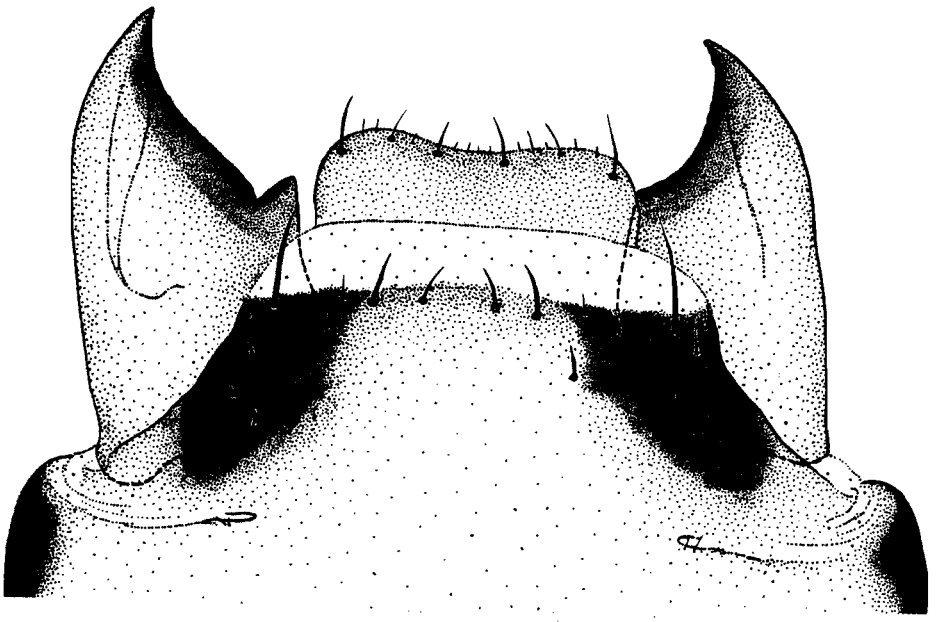
h. C. perla; male

[based on a specimen collected by

g) J.A. Garland, Lanoraie, Québec,
2.VII.1975; LEM

h) P.C. Barnard, Chilbolton, Hampshire,
England, 3.VI.1979; LEM,
determined by P.C. Barnard]

g



0·2 mm

h

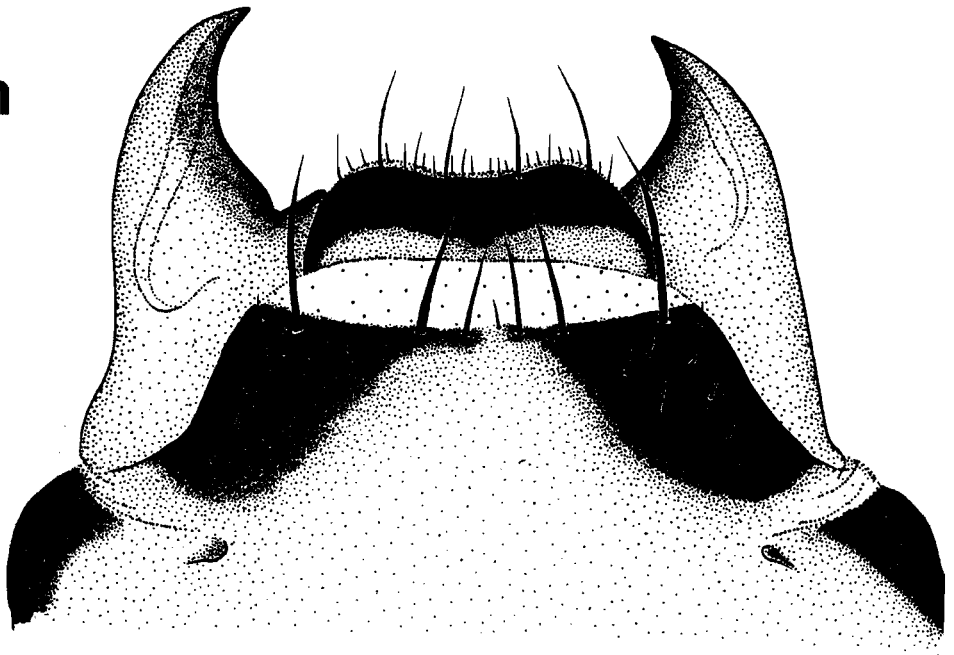


Figure 74 Pretarsal claws

a. Nothochrysa californica; Benton Co., Oregon, 15.VI.1968, T. Yamamoto & I. Smith; ROM

b. Eremochrysa canadensis; Weirs Beach, New Hampshire, VIII.1968, F.O. Morrison; LEM

c. Chrysopiella brevisetosa; Drumheller, Alberta, 14.VI.1946, E.H. Strickland; UAE, Paratype male

d. Meleoma signoretti; Tadoussac, Québec, 20.VII. 1932, A.F. Winn; LEM

e. Chrysopa chi; Ile-Perrot, Québec, 29.VI.1980, J.A. Garland; LEM

f. Chrysopa perla; Chilbolton, Hampshire, England, 3.VI.1979, P.C. Barnard; LEM, determined by P.C. Barnard 1979

g. Chrysopa nigricornis; Mont-St-Hilaire, Québec, 2-5.VIII.1977, malaise trap; LEM

h. Glenochrysa lineaticornis; Shawbridge, Québec, 23.VIII.1926, A.F. Winn; LEM

i. Chrysoperla carnea; Ste-Anne-de-Bellevue, Québec, 21.IV.1979, J.A. Garland; LEM

j. Mallada perfectus; Penticton, British Columbia, 28.VII.1976, J.A. Garland; LEM

k. Oviedus placitus; Weirs Beach, New Hampshire, 19.VIII.1966, F.O. Morrison; LEM

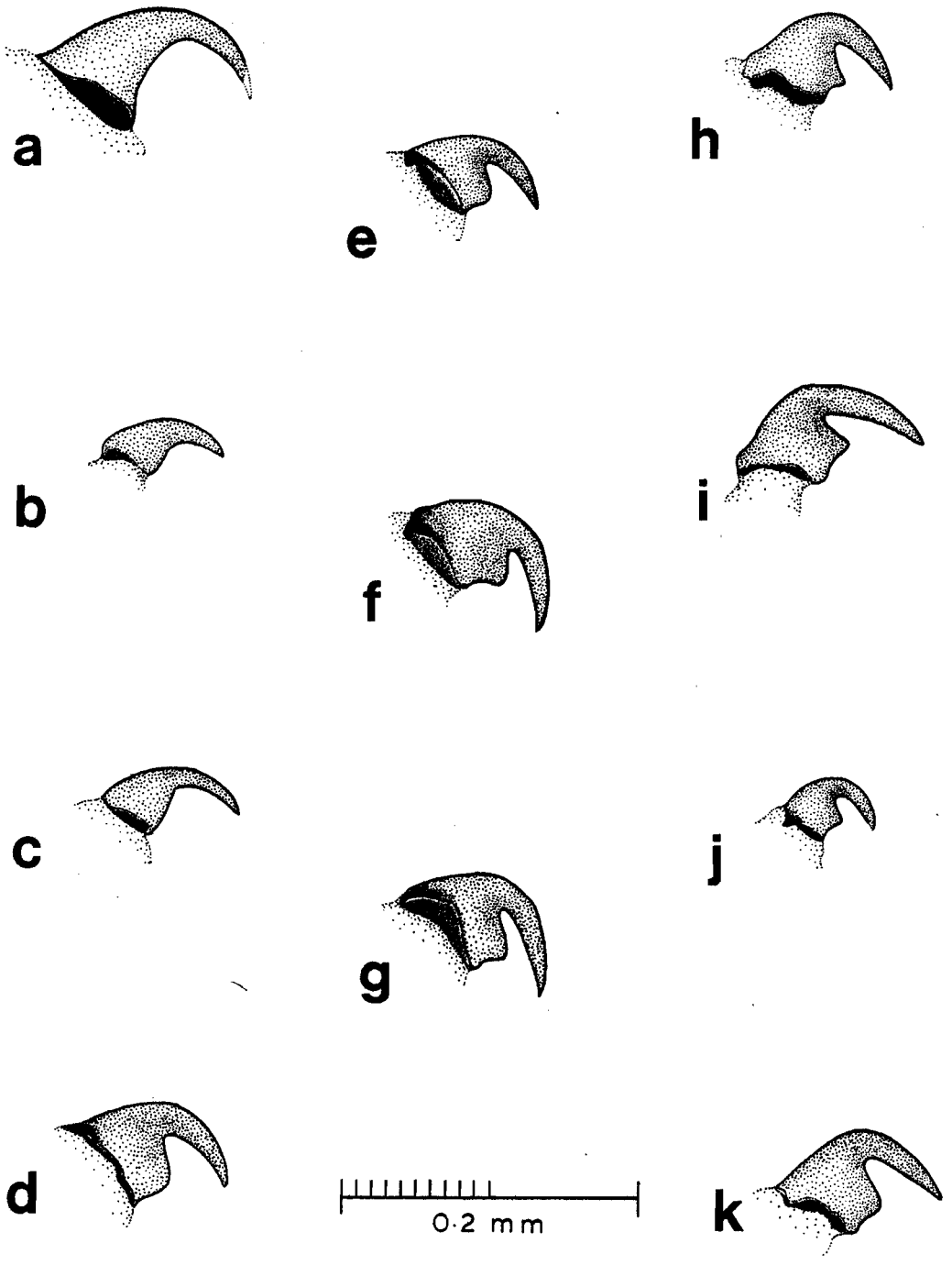

a
e
h
b
f
i
c
g
j
d
0·2 mm
k

Figure 74 (continued)

l. Nineta gravida; Bellingham, Washington, 20.VIII.1962, J.F.G. Clarke; USNM, determined as Chrysopa gravida by O.S. Flint 1962, and as Nineta gravida by P.A. Adams 1976, female

m. Nineta flava; Waddon, Surrey, England, 1.VI.1976, J. Marshall; BMNH, determined as Chrysopa flava by P.C. Barnard 1976, male


l
m
0·2 mm

Figure 75 Chrysopa perla: male head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by
P.C. Barnard, Chilbolton, Hampshire, England,
3.VI.1979; LEM, determined by
P.C. Barnard 1979]

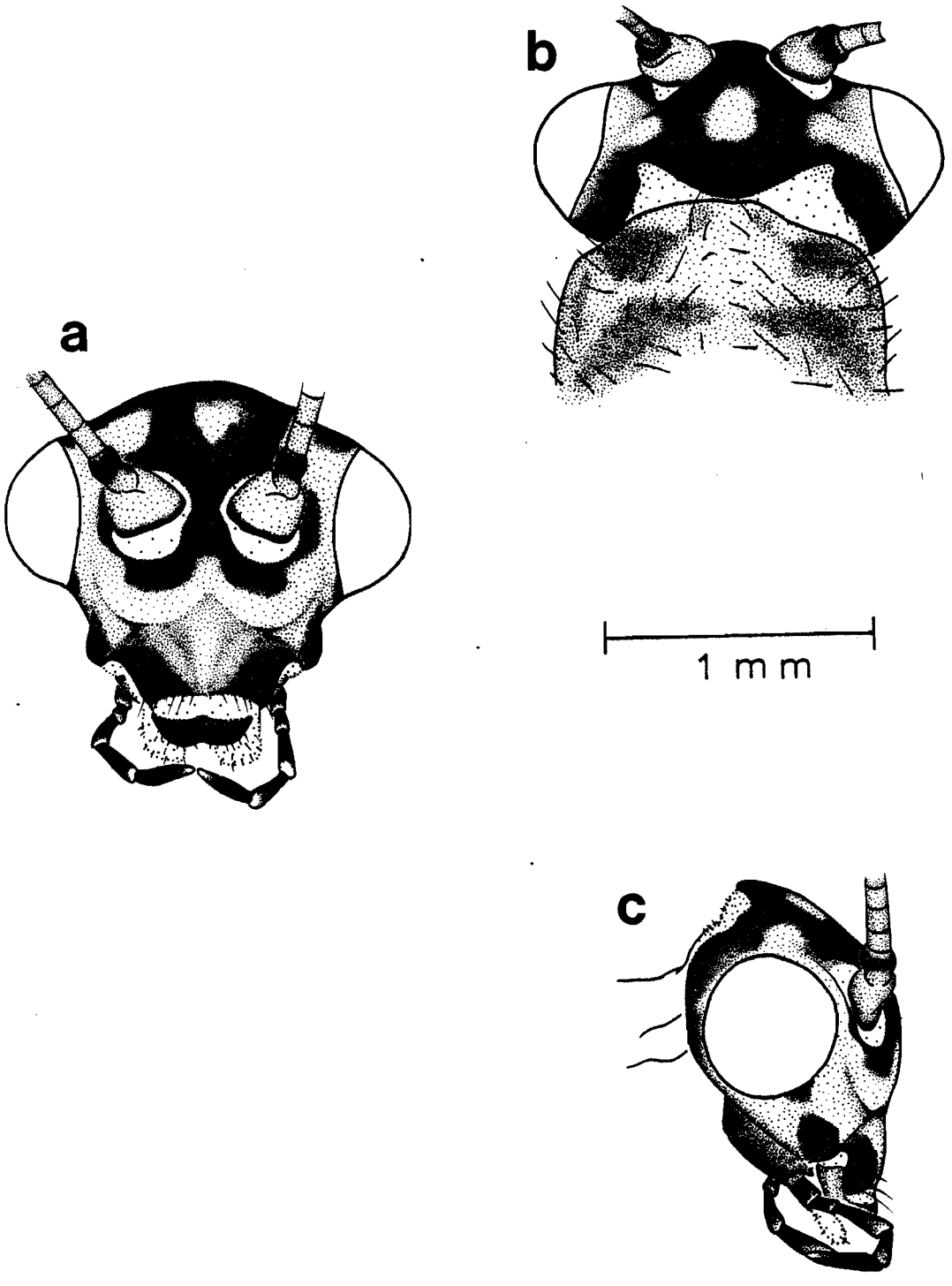
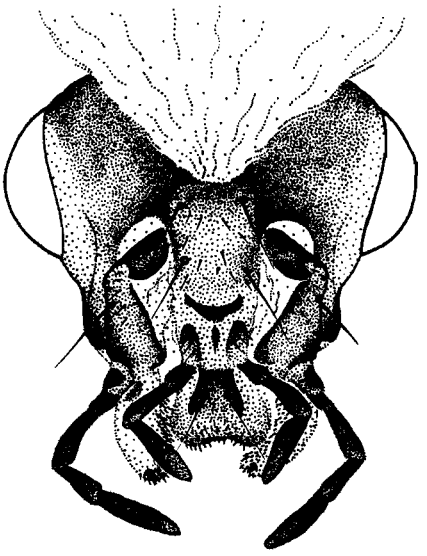

a
b
1 mm
c

Figure 75 (continued)

d. ventral

[based on a specimen collected by
P.C. Barnard, Chilbolton, Hampshire, England,
3.VI.1979; LEM, determined by
P.C. Barnard 1979]

d



1 mm

Figure 76 Chrysopa perla: wing

a. fore wing

b. hind wing

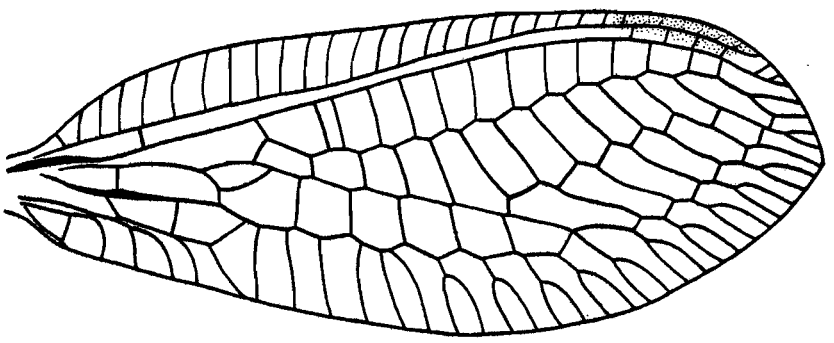
[based on a specimen collected by

P.C. Barnard, Chilbolton, Hampshire, England,

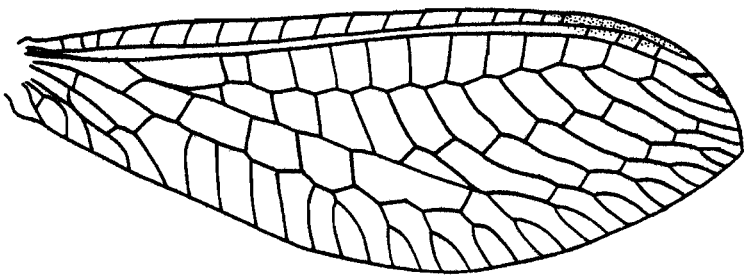
3.VI.1979; LEM, determined by

P.C. Barnard 1979; male]

a



b



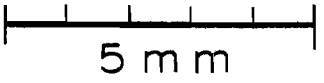
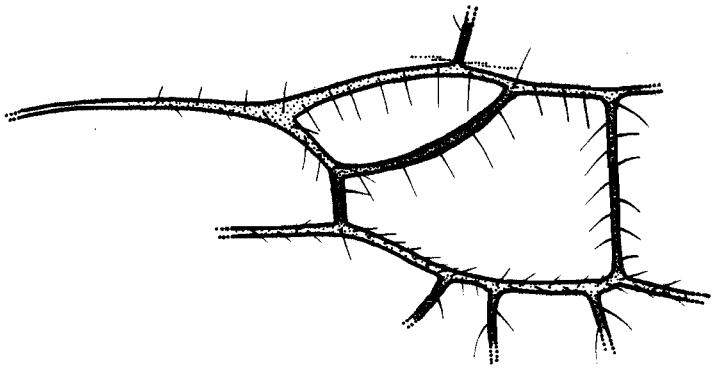


Figure 76 (continued)

c. intramedian cell of fore wing

[based on a specimen collected by
P.C. Barnard, Chilbolton, England,
3.VI.1979; LEM, determined by
P.C. Barnard 1979; male]

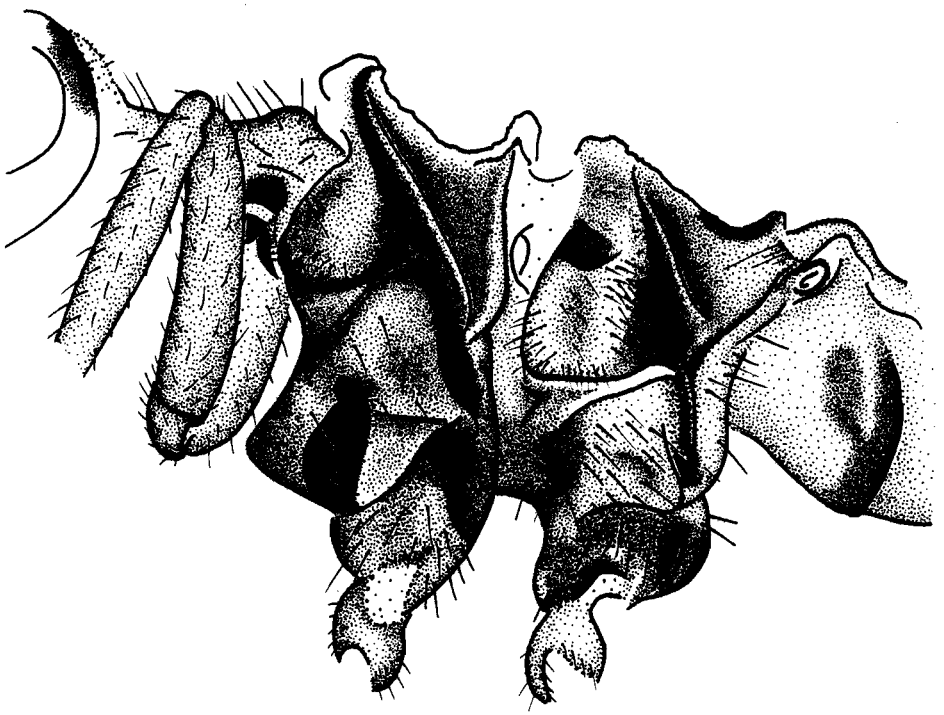
c



1 mm

Figure 77 Chrysopa perla: thorax

[based on a specimen collected by
P.C. Barnard, Chilbolton, Hampshire, England,
3.VI.1979; LEM, determined by
P.C. Barnard 1979; male]



1 mm

Figure 78 Chrysopa perla: male structures

a. terminalia with structures everted

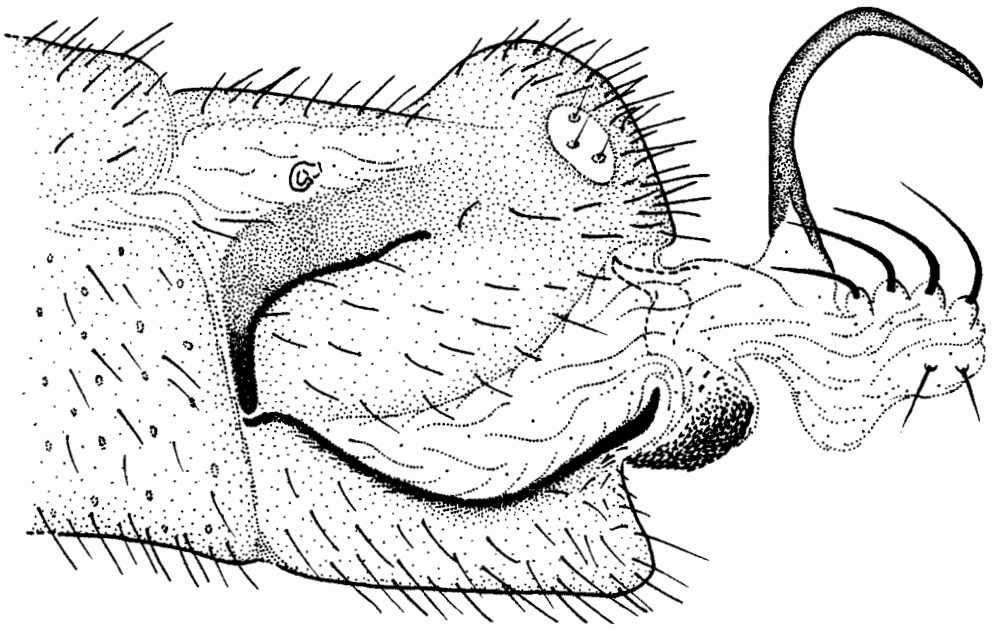
[based on a specimen collected by

P.C. Barnard, Chilbolton, Hampshire, England,

3.VI.1979; LEM, determined by

P.C. Barnard 1979]

a



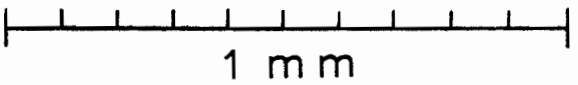
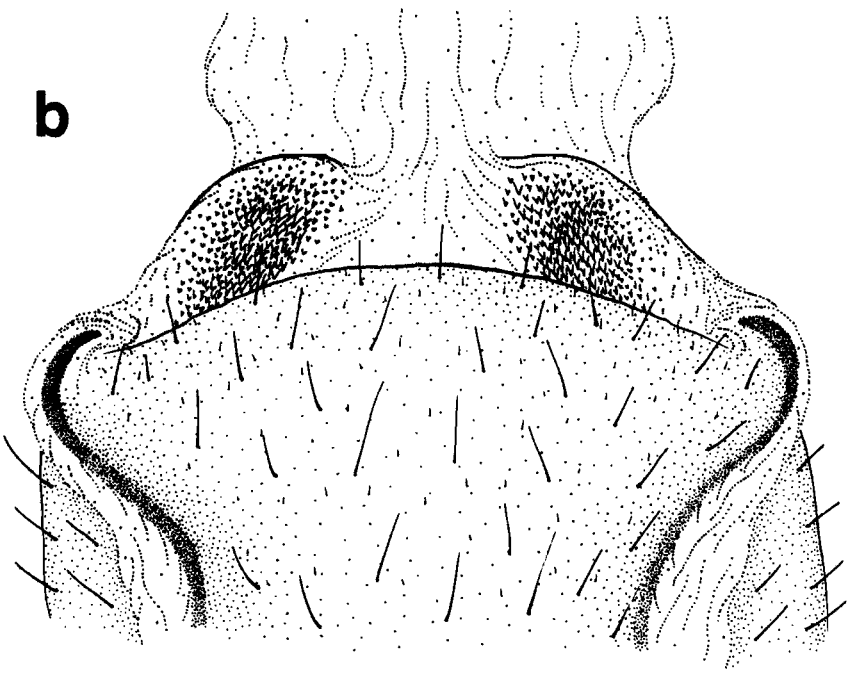


Figure 78 (continued)

b. gonocristae

[based on a specimen collected by
P.C. Barnard, Chilbolton, Hampshire, England,
3.VI.1979; LEM, determined by
P.C. Barnard 1979]


b

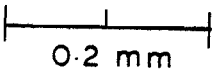

0·2 mm

Figure 78 (continued)

c. mediuncus, dorsal aspect

d. ibid., lateral aspect

e. ibid., ventral aspect

[based on a specimen collected by
P.C. Barnard, Chilbolton, Hampshire, England,
3.VI.1979; LEM, determined by
P.C. Barnard 1979]

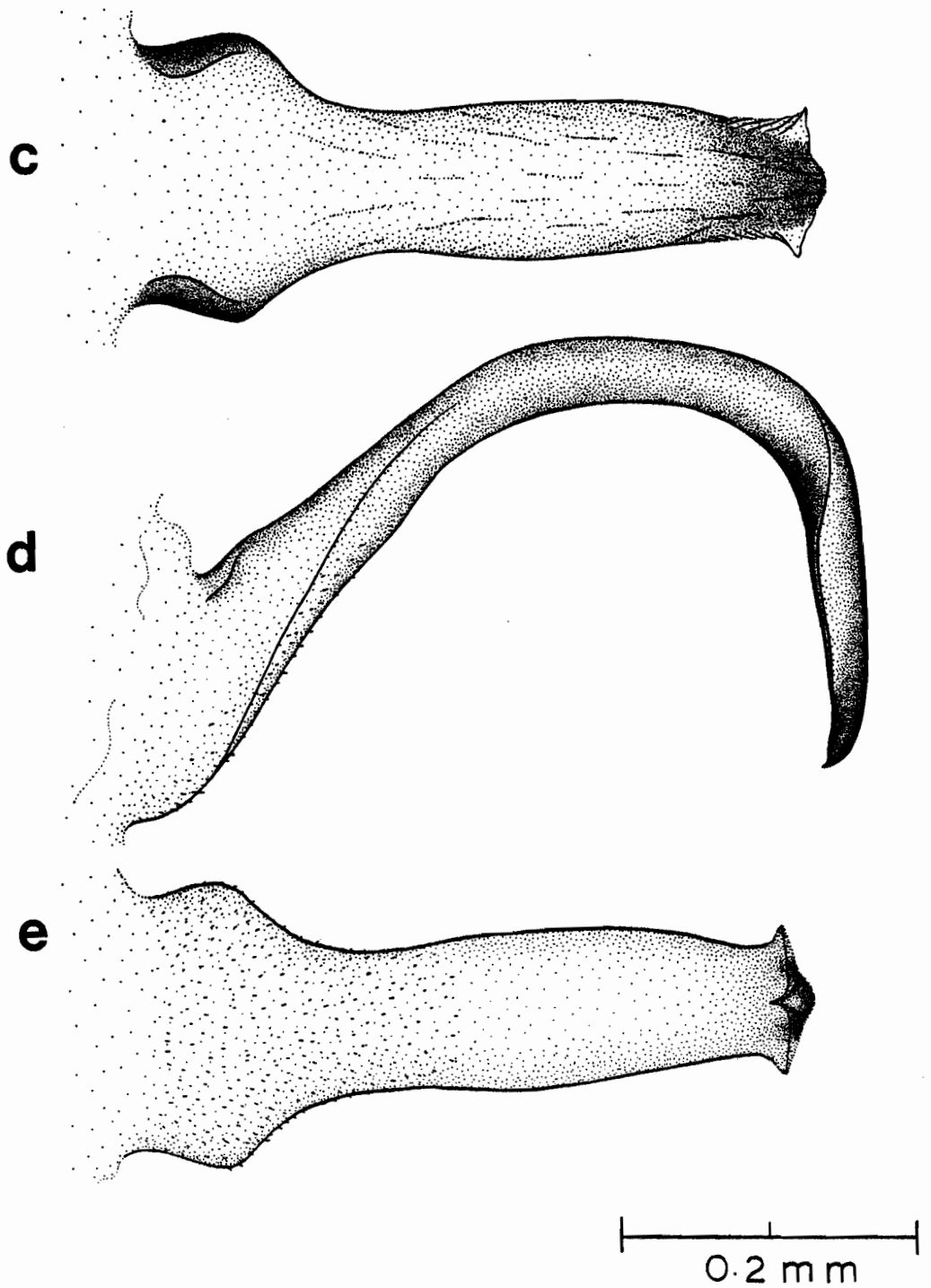

c
d
e
0·2 mm

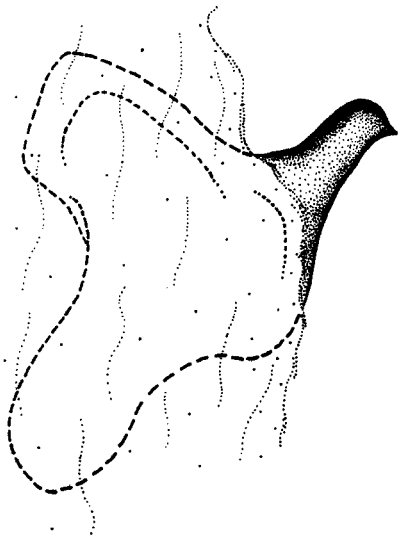
Figure 78 (continued)

f. entoprocessus

g. gonarcus

[based on a specimen collected by
P.C. Barnard, Chilbolton, Hampshire, England,
3.VI.1979; LEM, determined by
P.C. Barnard 1979]

f



0·2 mm

g

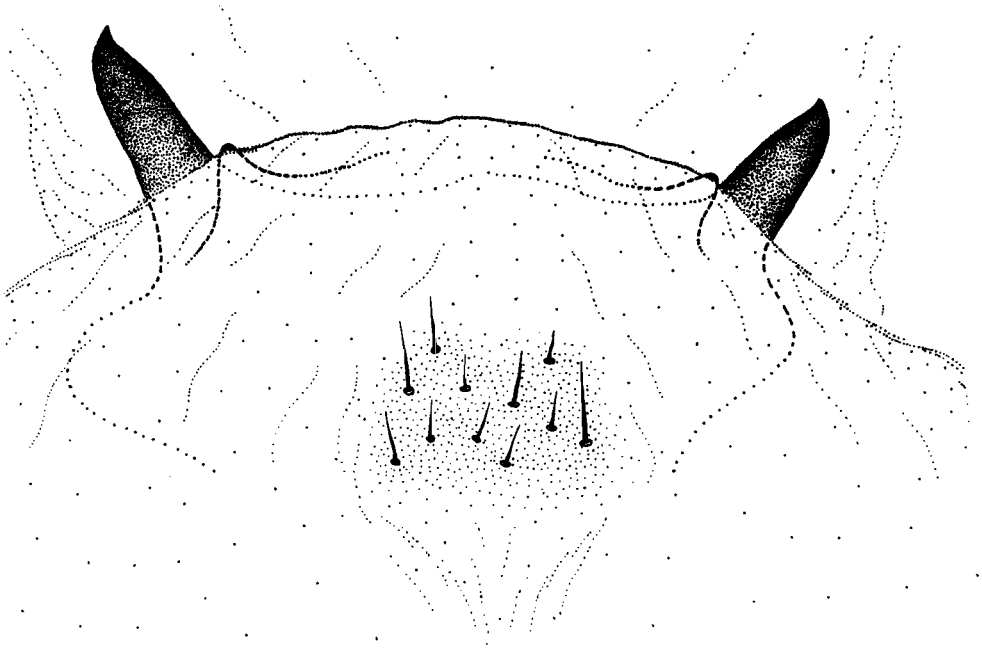


Figure 79 *Chrysoperla rufilabris*: female head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

K.E. Schedl, Biscotasing, Ontario, 16.IX.1931;

CNC, determined as *Chrysopa interrupta* Schn. by R.C. Smith, and as *Chrysopa rufilabris* by P.A. Adams 1961]

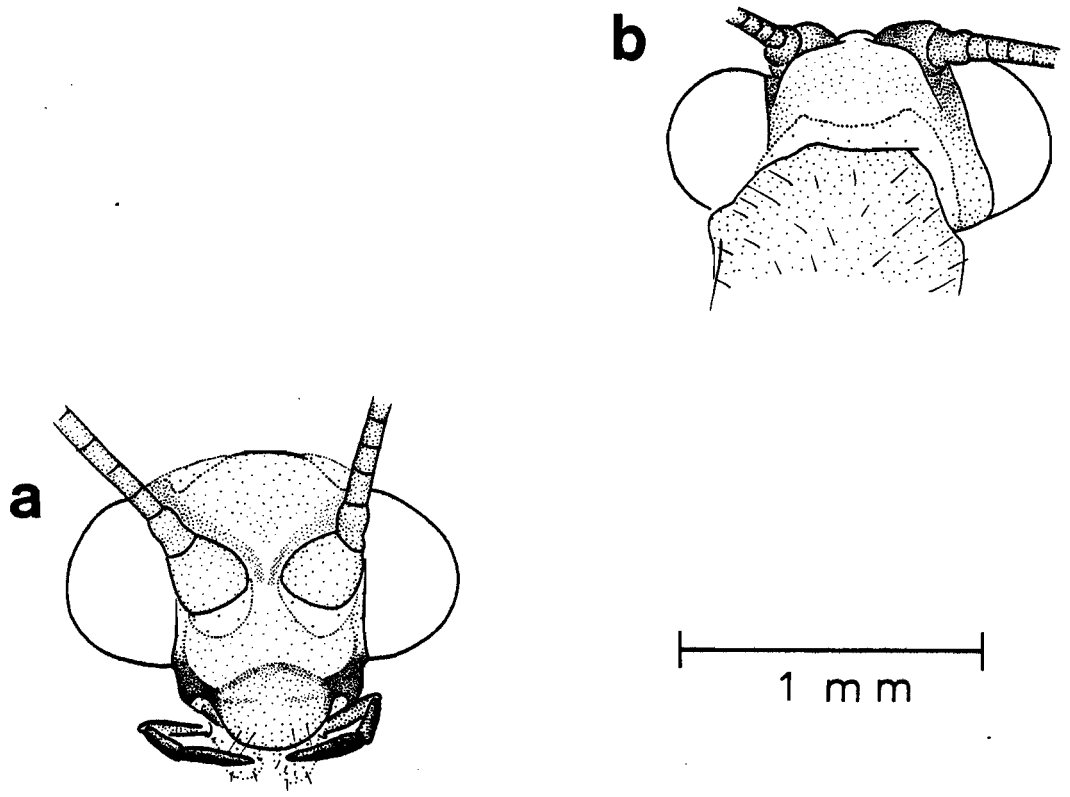
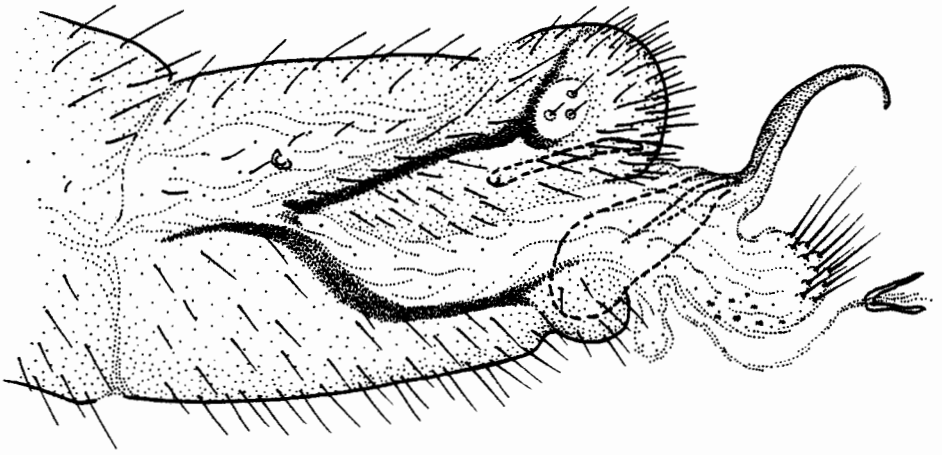

b
a
1 mm
c

Figure 80 Chrysoperla rufilabris: male structures

a. terminalia with structures everted

[based on a specimen collected by
W.L. Putman, Vineland, Ontario, 5.IX.1930;
CNC, determined by R.C. Smith,
also by P.A. Adams as Chrysopa
rufilabris]

a



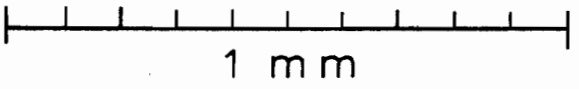


Figure 80 (continued)

b. arcessus

c. gonarcus-entoprocessus

d. tignum

[based on a specimen collected by

W.L. Putman, Vineland, Ontario, 5.IX.1930;

CNC, determined by R.C. Smith,

also by P.A. Adams as Chrysopa

rufilabris]

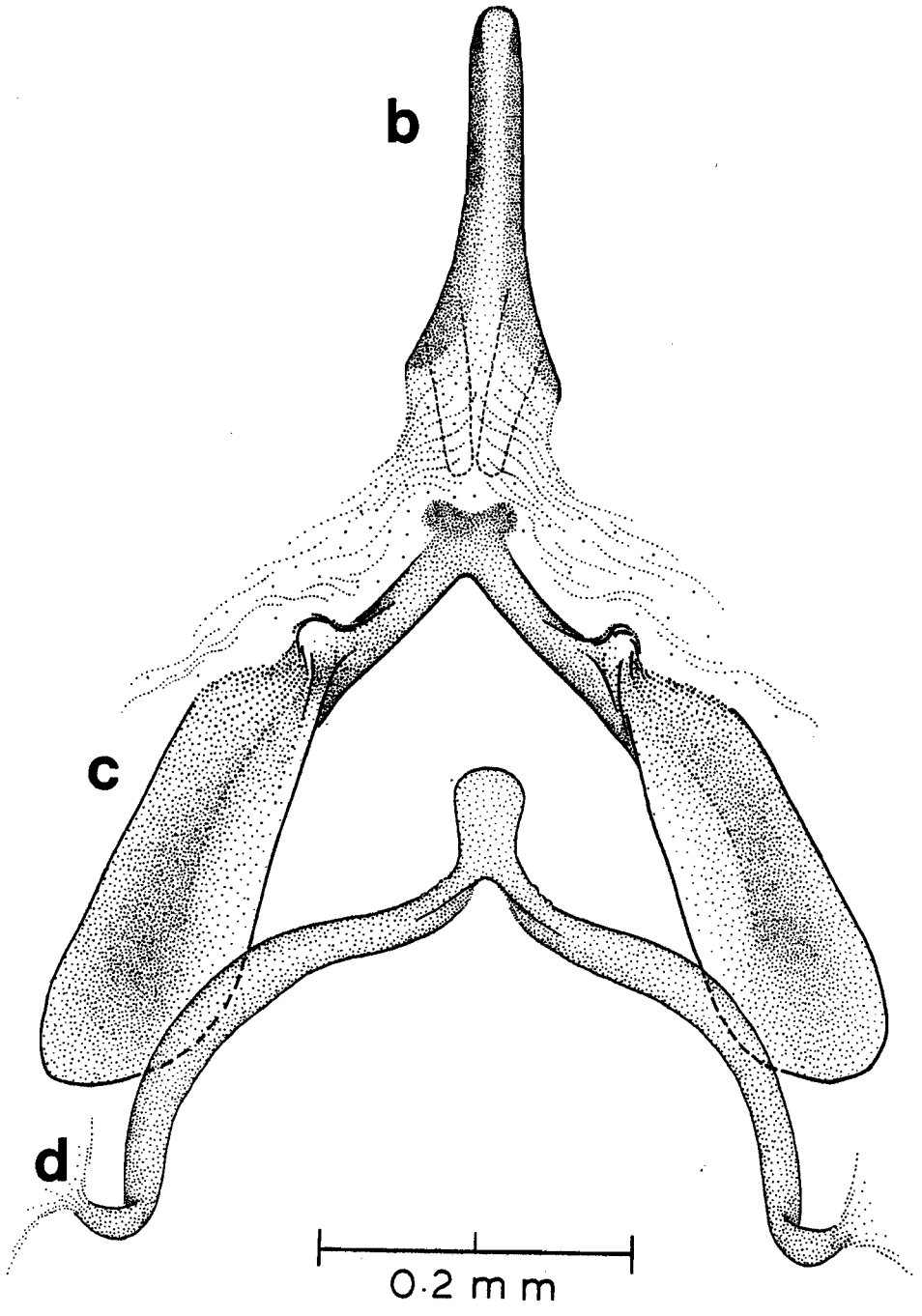
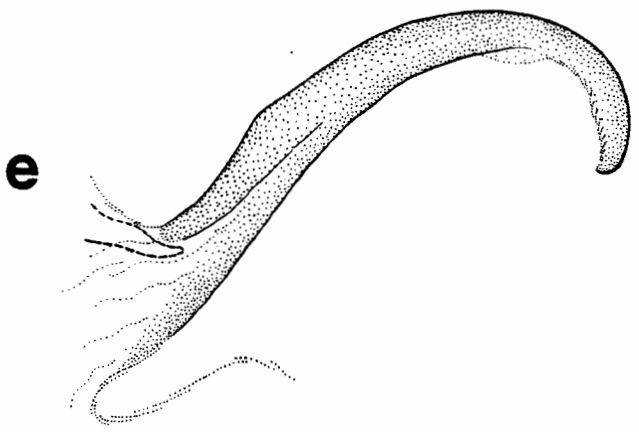

b
c
d
0·2 mm

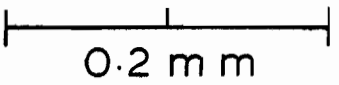
Figure 80 (continued)

e. arcessus

f. spinellae

[based on a specimen collected by
W.L. Putman, Vineland, Ontario, 5.IX.1930;
CNC, determined by R.C. Smith,
also by P.A. Adams as Chrysopa
rufilabris]


e


0·2 mm

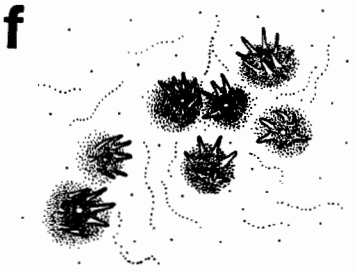

f

Figure 81 Chrysoperla rufilabris: female structures

a. subgenitale

b. ibid., lateral aspect

[based on a specimen collected by

K.E. Schedl, Biscotasing, Ontario, 16.IX.1931;

CNC, determined as Chrysopa

interrupta Schn. by R.C. Smith, and

as Chrysopa rufilabris by P.A. Adams

1961]

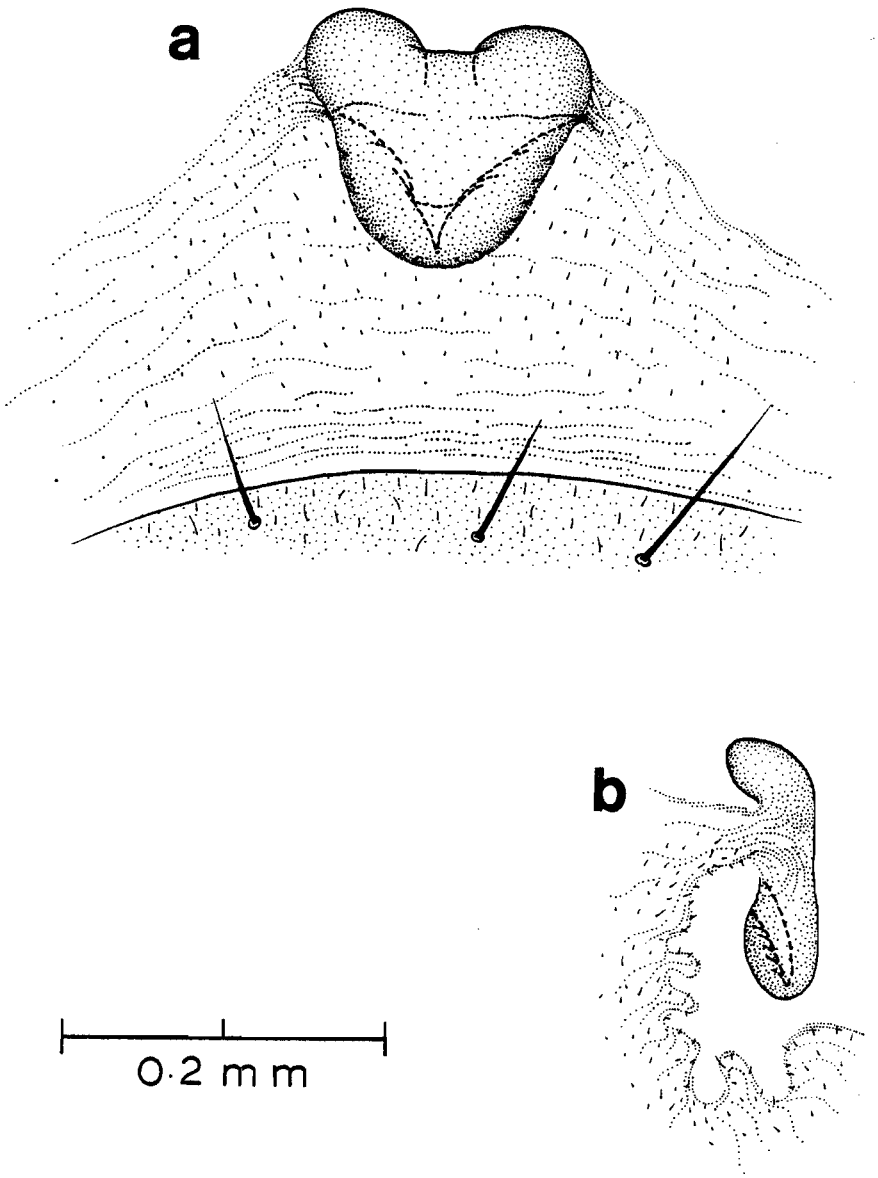
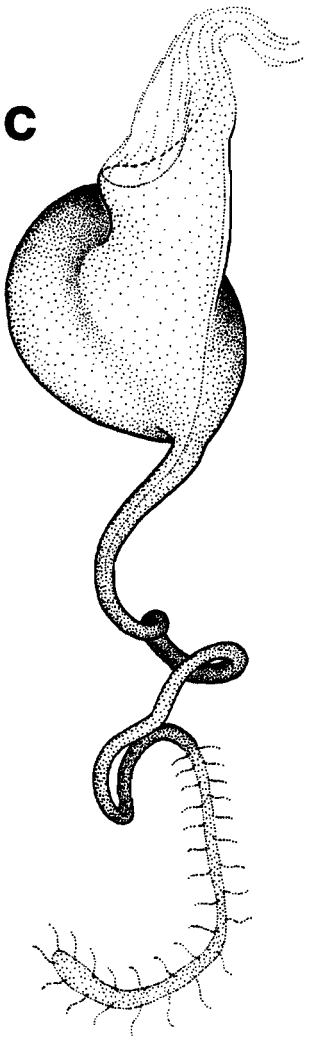

a
b
0·2 mm

Figure 81 (continued)

c. spermatheca

[based on a specimen collected by
K.E. Schedl, Biscotasing, Ontario, 16.IX.1931;
CNC, determined as Chrysopa
interrupta Schn. by R.C. Smith, also
as Chrysopa rufilabris by P.A. Adams
1961]


c

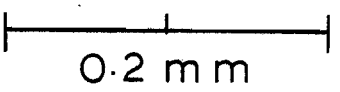

0·2 mm

Figure 82 Chrysoperla rufilabris: wing

a. fore wing

b. hind wing

[based on a specimen collected by

J.A. Garland, Ste-Anne-de-Bellevue, Québec,

7.IX.1978; LEM]

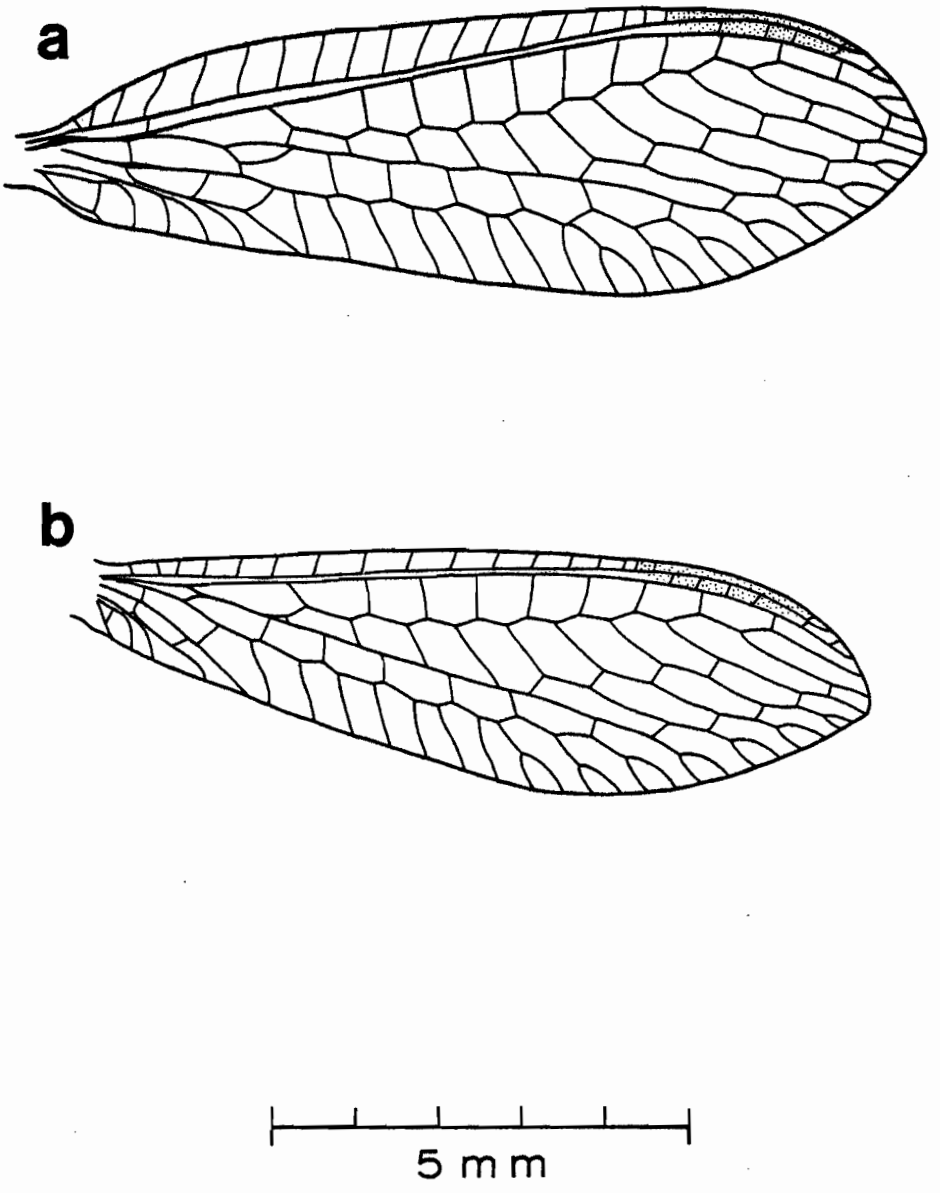

a
b
5 mm

Figure 83 Chrysoperla harrisii: male head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

J.A. Garland, Ste-Anne-de-Bellevue, Québec,

29.VIII.1978; LEM]

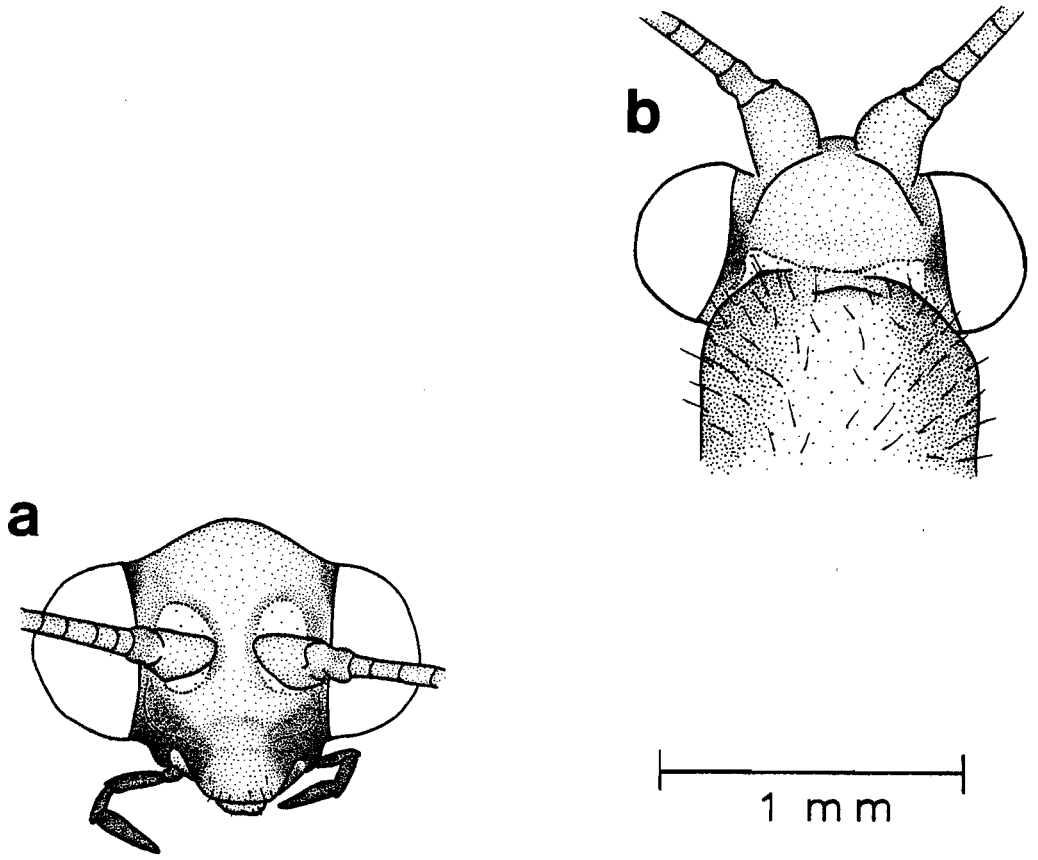

b
a
1 mm
c

Figure 84 Chrysoperla harrisii: male structures

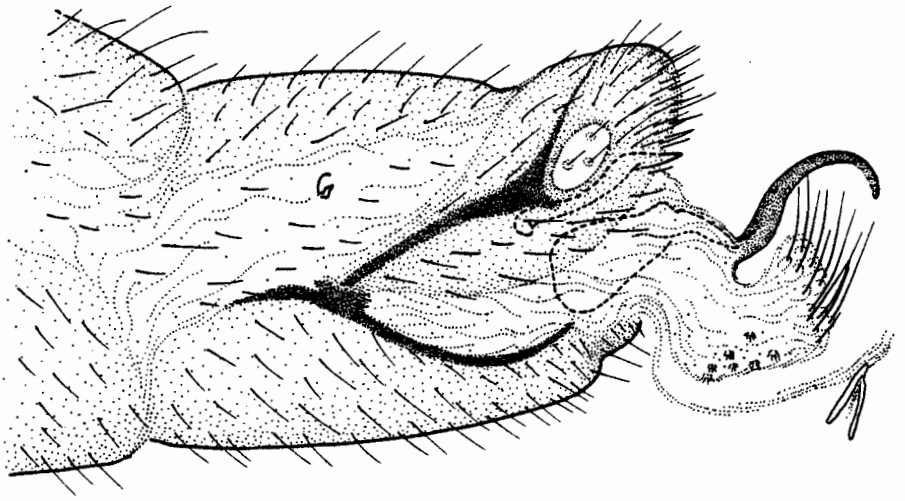
a. terminalia with structures everted

[based on a specimen collected by

J.A. Garland, Ste-Anne-de-Bellevue, Québec,

29.VIII.1978; LEM]

a



1 mm

Figure 84 (continued)

b. arcessus

c. gonarcus-entoprocessus

d. tignum

[based on a specimen collected by
J.A. Garland, Ste-Anne-de-Bellevue, Québec,
29.VIII.1978; LEM]

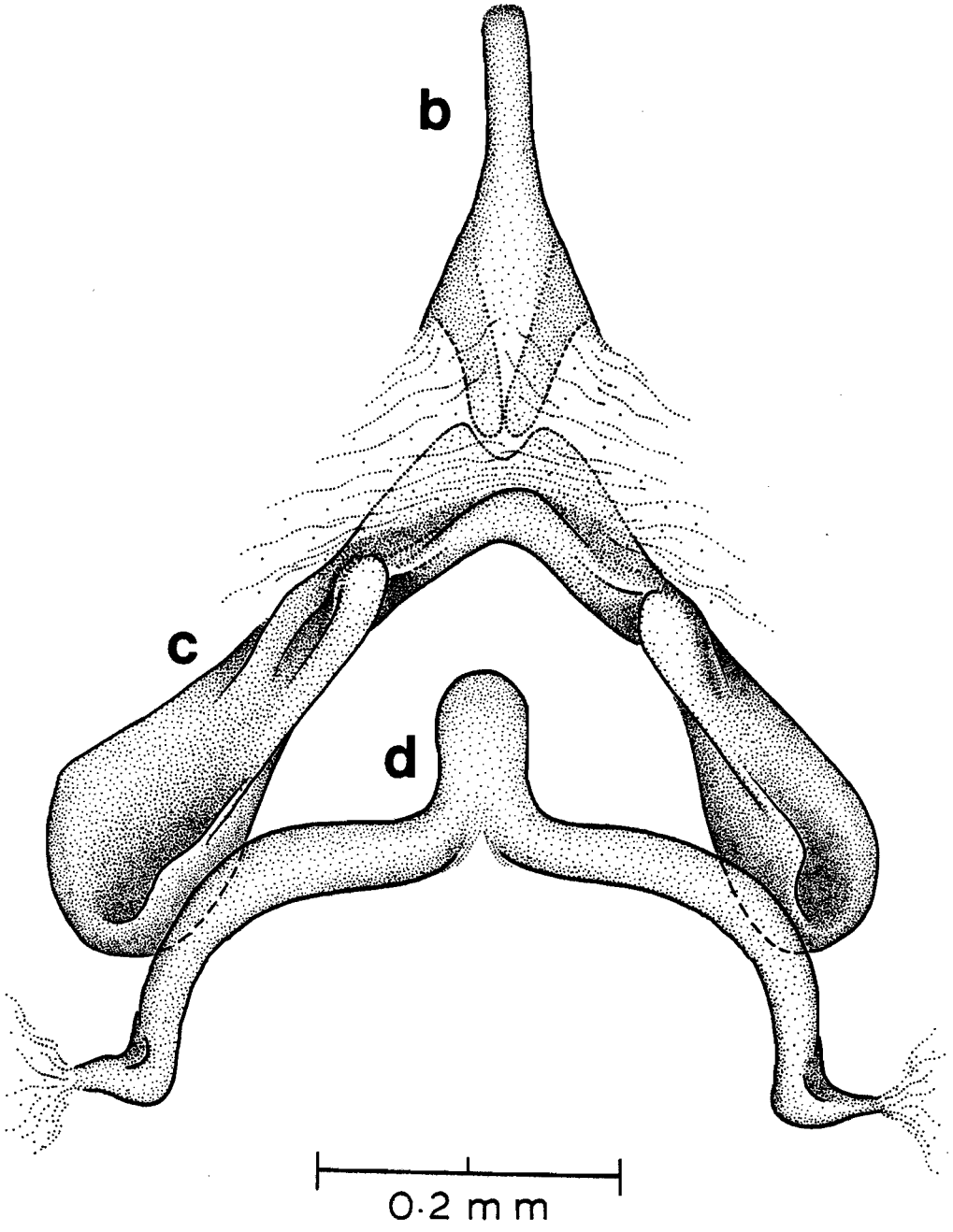

b
c
d
0·2 mm

Figure 84 (continued)

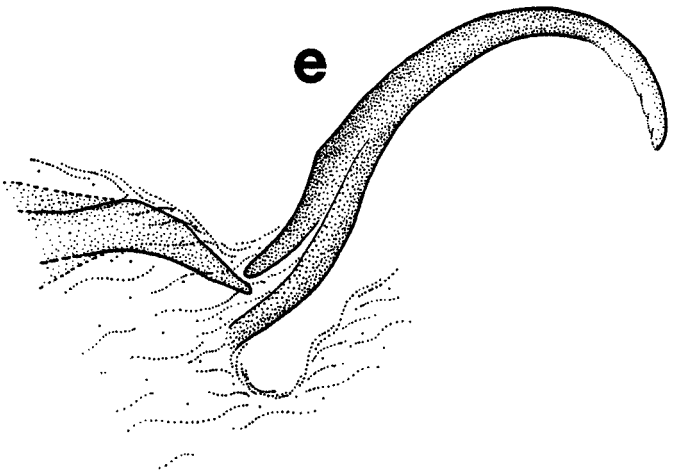
e. arcessus, lateral aspect

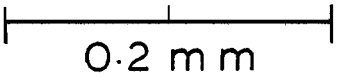
f. spinellae

[based on a specimen collected by

J.A. Garland, Ste-Anne-de-Bellevue, Québec,

29.VIII.1978; LEM]


e


0·2 mm

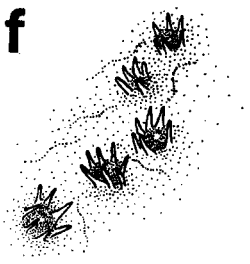

f

Figure 85 Chrysoperla harrisii: female structures

a. subgenitale

b. ibid., lateral aspect

[based on a specimen collected by

A.T. Finnamore, Ste-Anne-de-Bellevue, Québec,

4.VI.1976; LEM]

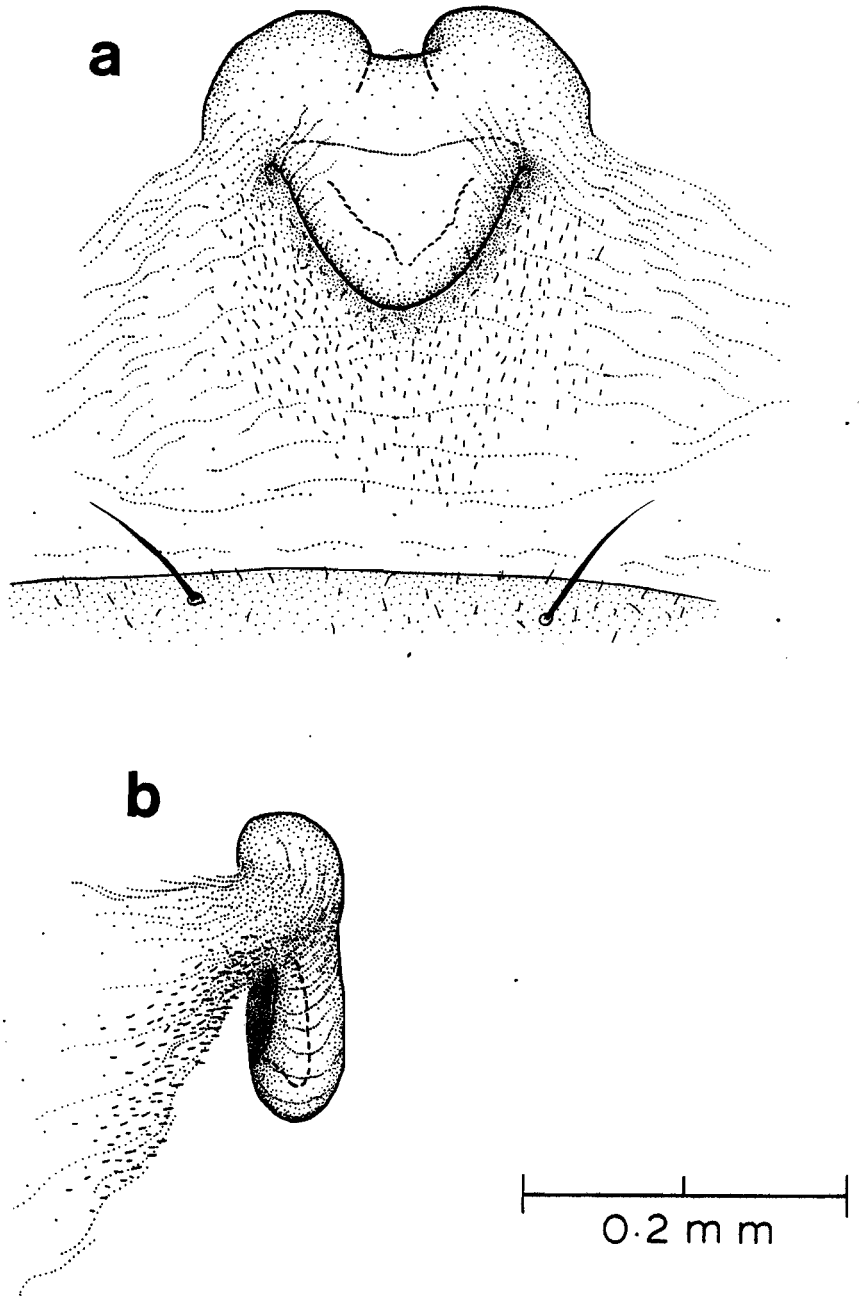

a
b
0·2 m m

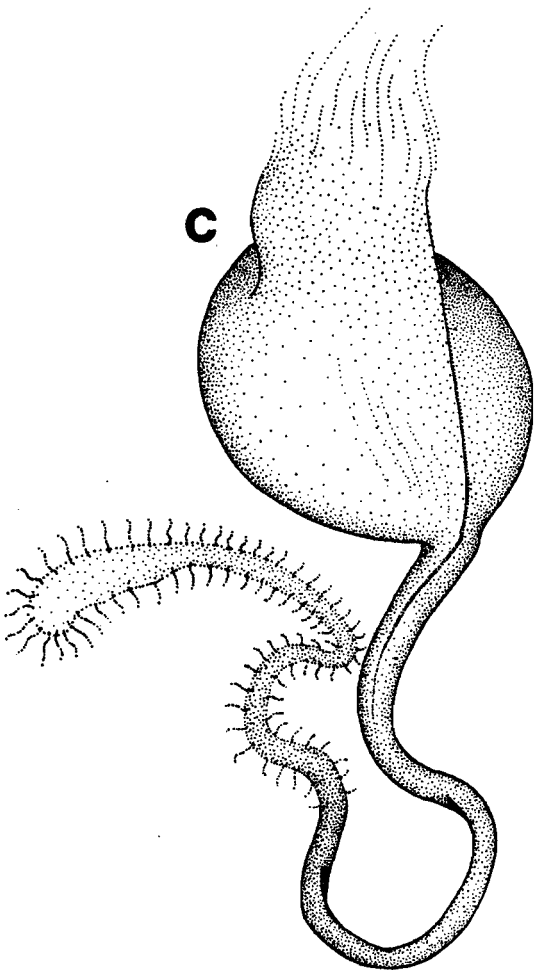
Figure 85 (continued)

c. spermatheca

[based on a specimen collected by

A.T. Finnamore, Ste-Anne-de-Bellevue, Québec,

4.VI.1976; LEM]



0·2 mm

Figure 86 Chrysoperla harrisii: wing

a. fore wing

b. hind wing

[based on a specimen collected by

A.T. Finnamore, Ste-Anne-de-Bellevue, Québec,

4.VI.1976; LEM, female]

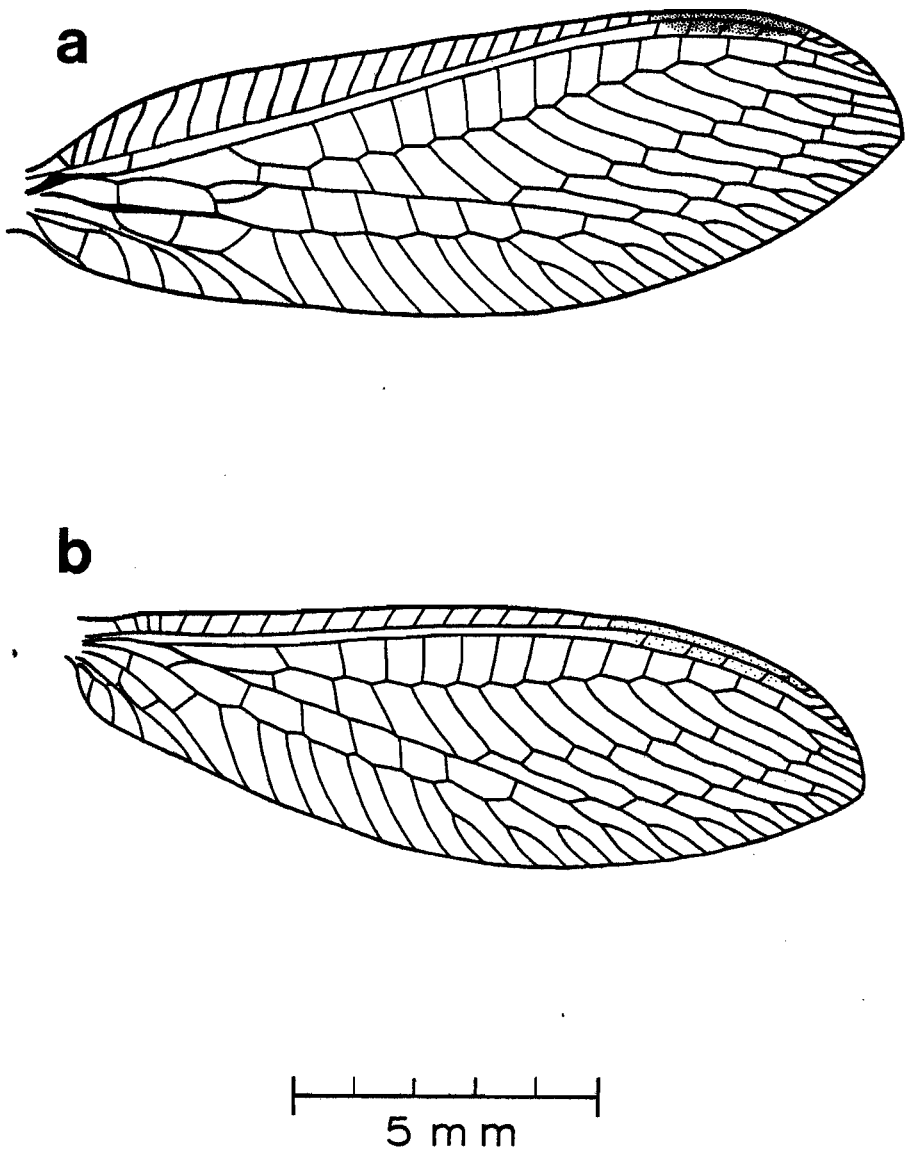

a
b
5 mm

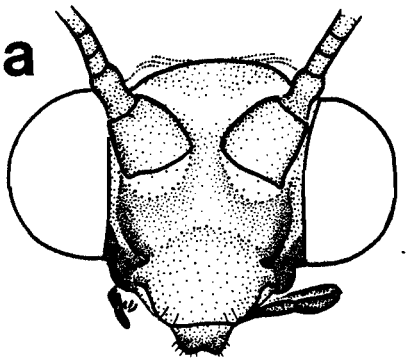
Figure 87 Chrysoperla comanche: female head

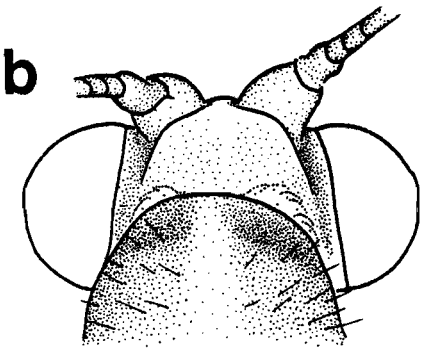
a. frontal

b. dorsal

c. lateral

[based on a specimen collected by
W.R. Richards, Andreas Canyon, Palm Springs,
California, 4.IV.1955; CNC,
determined as Chrysopa comanche
by P.A. Adams 1961]





1 mm

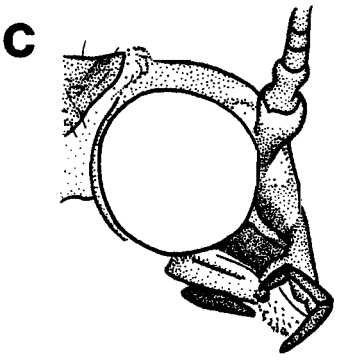


Figure 88 Chrysoperla comanche: male structures

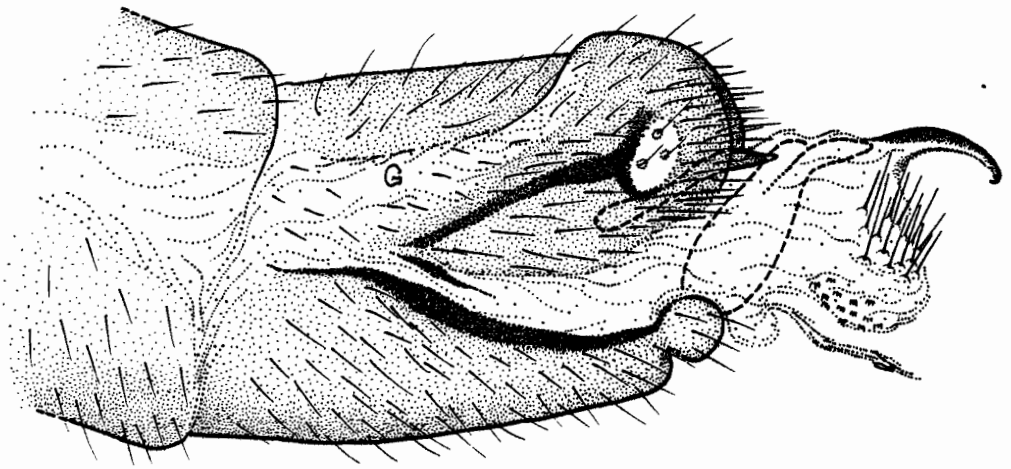
a. terminalia with structures everted

[based on a specimen collected by

R. Lalonde & W. Boyle, Antony, New Mexico,

27.VII.1966; LEM]

a



1 mm

Figure 88 (continued)

b. arcessus

c. gonarcus-entoprocessus

d. tignum

[based on a specimen collected by
R.F. Sternitsky, Ramsey Canyon, Huachuca Mts.,
Cochise Co., Arizona, 5.VIII.1966;
CNC]

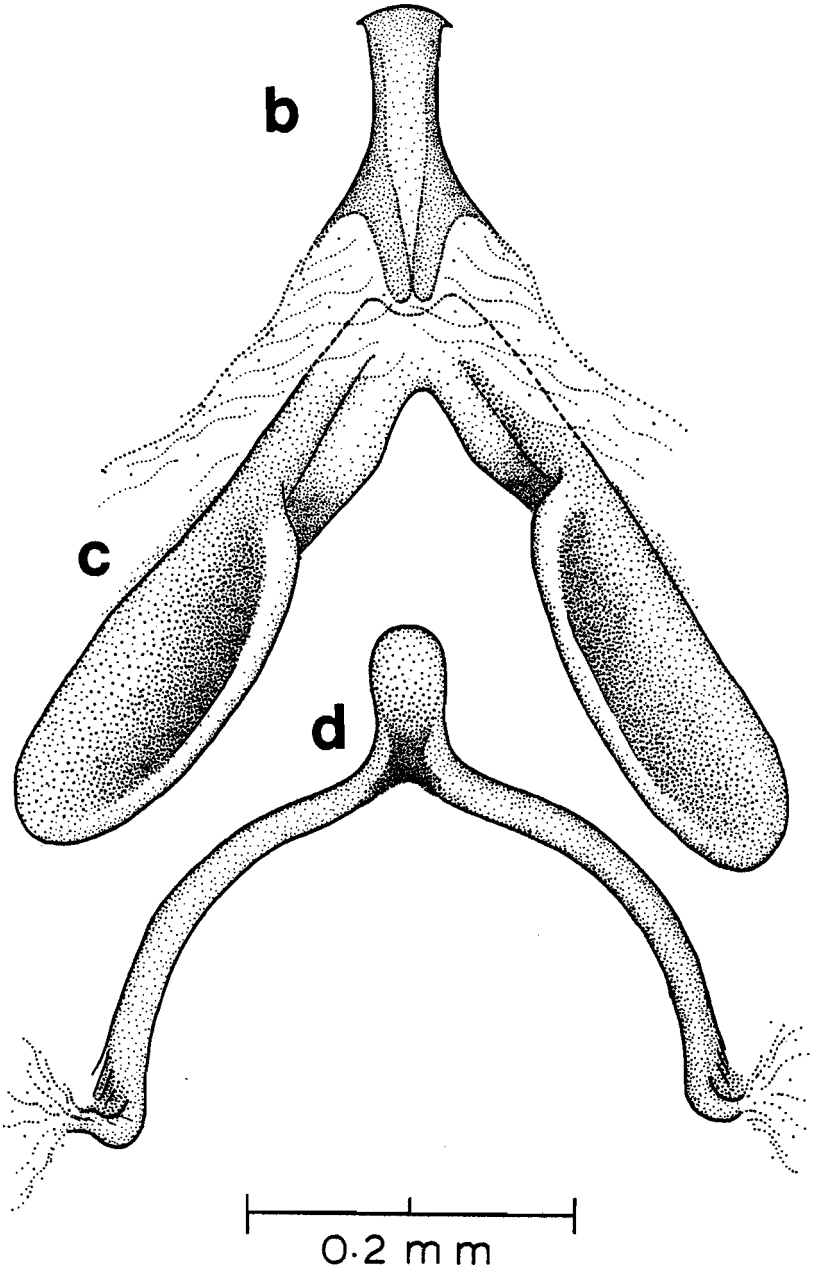

b
c
d
0·2 mm

Figure 88 (continued)

e. arcessus, lateral aspect

f. spinellae

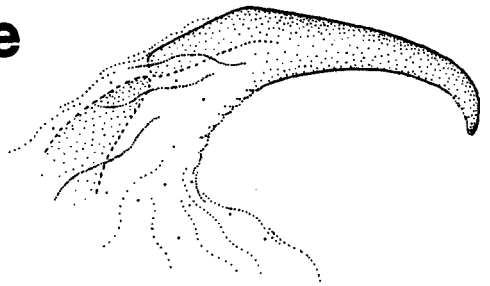
[based on a specimen collected by

R.F. Sternitsky, Ramsey Canyon, Huachuca Mts.,

Cochise Co., Arizona, 5.VIII.1966;

CNC]

e



0·2 mm

f

Figure 89 *Chrysoperla comanche*: female structures

a. subgenitale

b. *ibid.*, lateral aspect

[based on a specimen collected by
W.R. Richards, Andreas Canyon, Palm Springs,
California, 4.IV.1955; CNC,
determined as *Chrysopa comanche*
by P.A. Adams 1961]

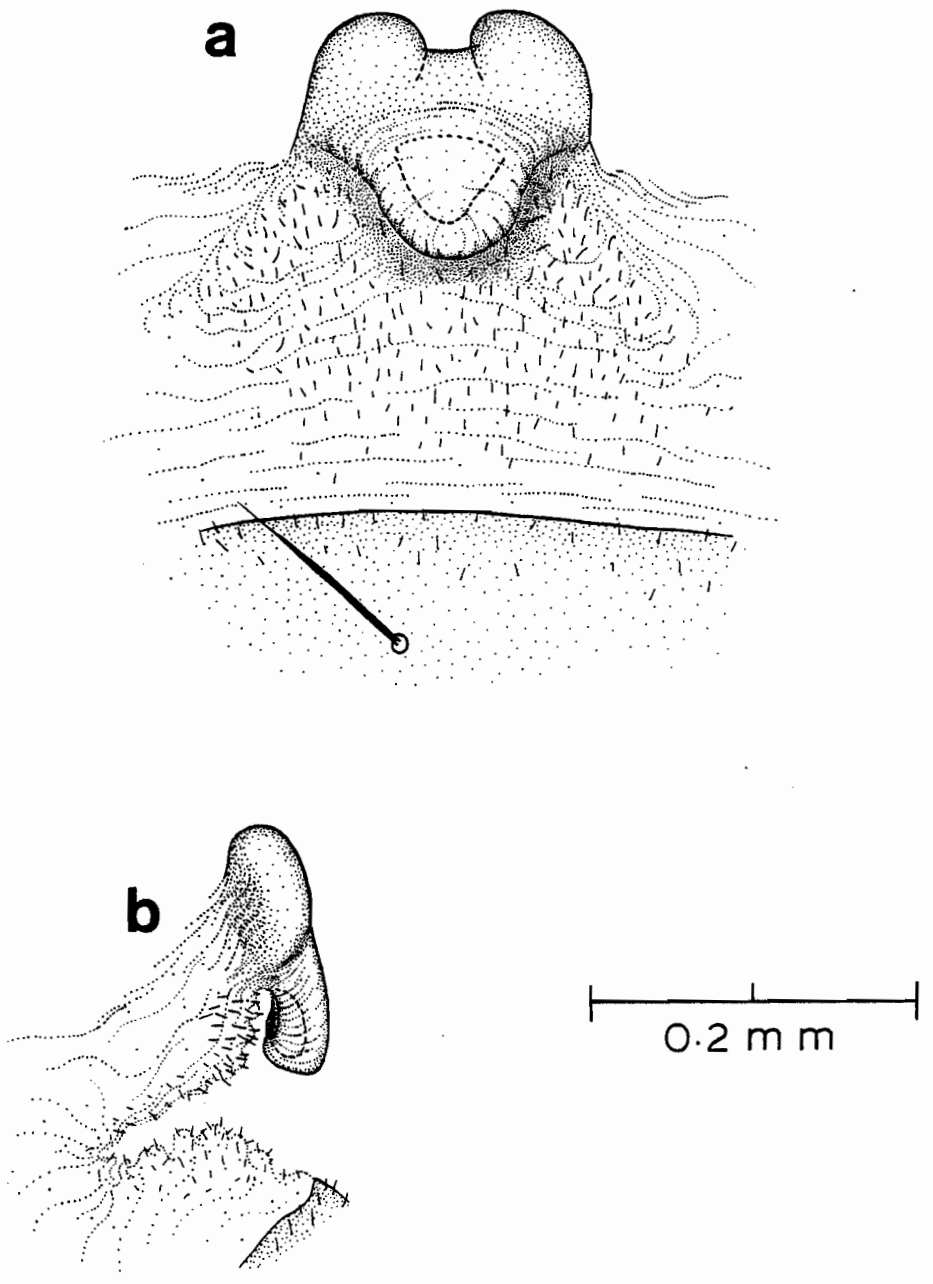
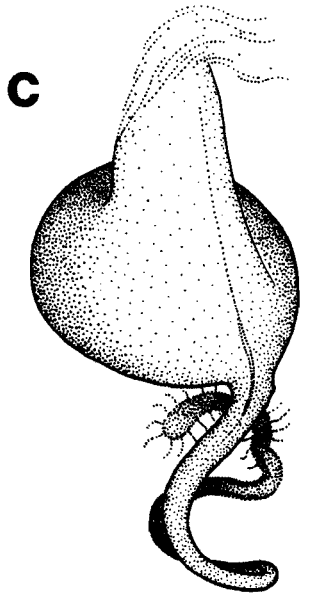

a
b
0·2 m m

Figure 89 (continued)

c. spermatheca

[based on a specimen collected by
W.R. Richards, Andreas Canyon, Palm Springs,
California, 4.IV.1955; CNC,
determined as Chrysopa comanche
by P.A. Adams 1961]


c

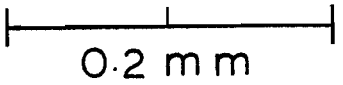

0·2 mm

Figure 90 Chrysoperla comanche: wing

a. fore wing

b. hind wing

[based on a specimen collected by

R.F. Sternitsky, Ramsey Canyon, Huachuca Mts.,

Cochise Co., Arizona, 5.VIII.1966;

CNC, male]

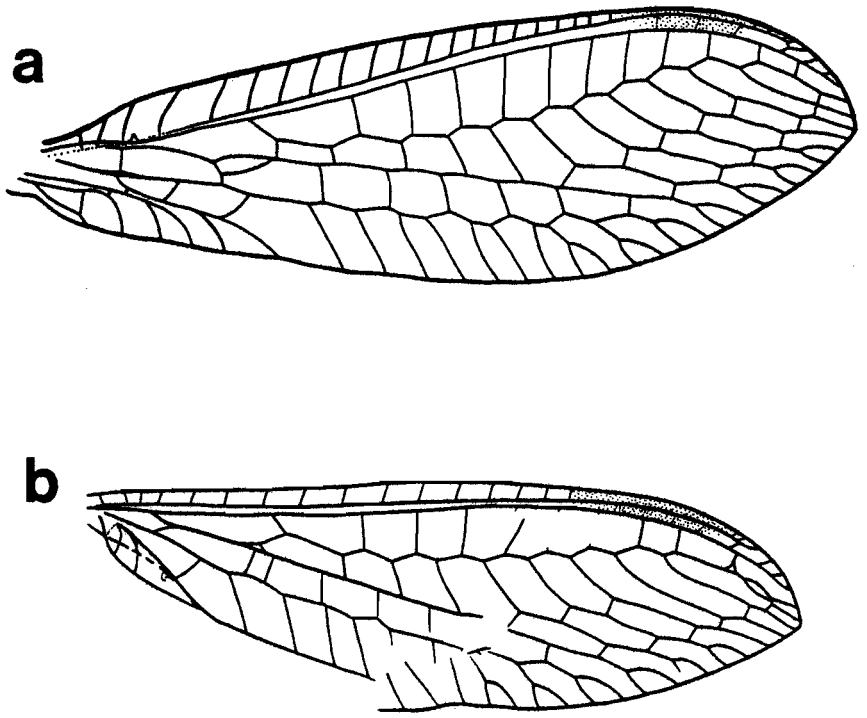
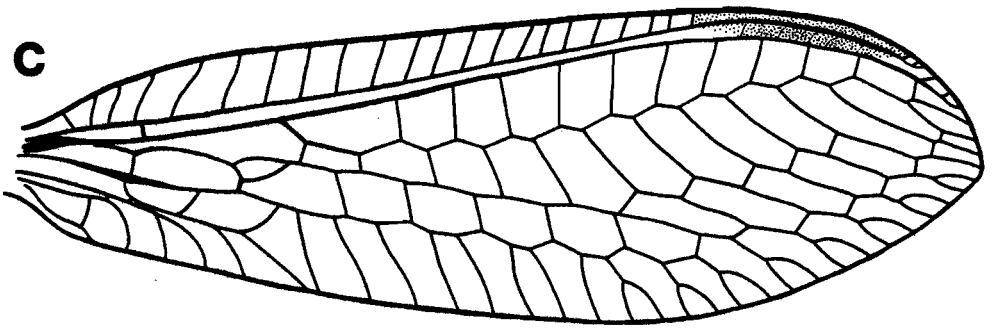

a
b
5 mm

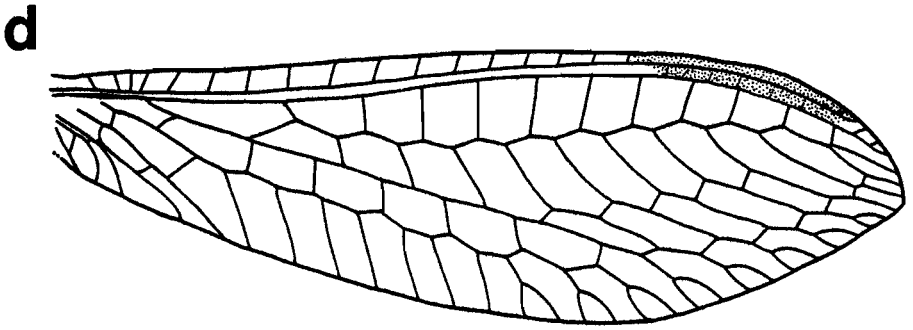
Figure 90 (continued)

c. fore wing

d. hind wing

[based on a specimen collected by
W.R. Richards, Andreas Canyon, Palm Springs,
California, 4.IV.1955; CNC,
determined as Chrysopa comanche
by P.A. Adams 1961, female]


c


d

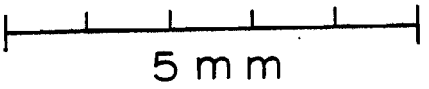

5 mm

Figure 91 Chrysoperla carnea: male head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

E.A.R. Liscombe, Carberry, Manitoba,

22.VIII.1948; UMW]

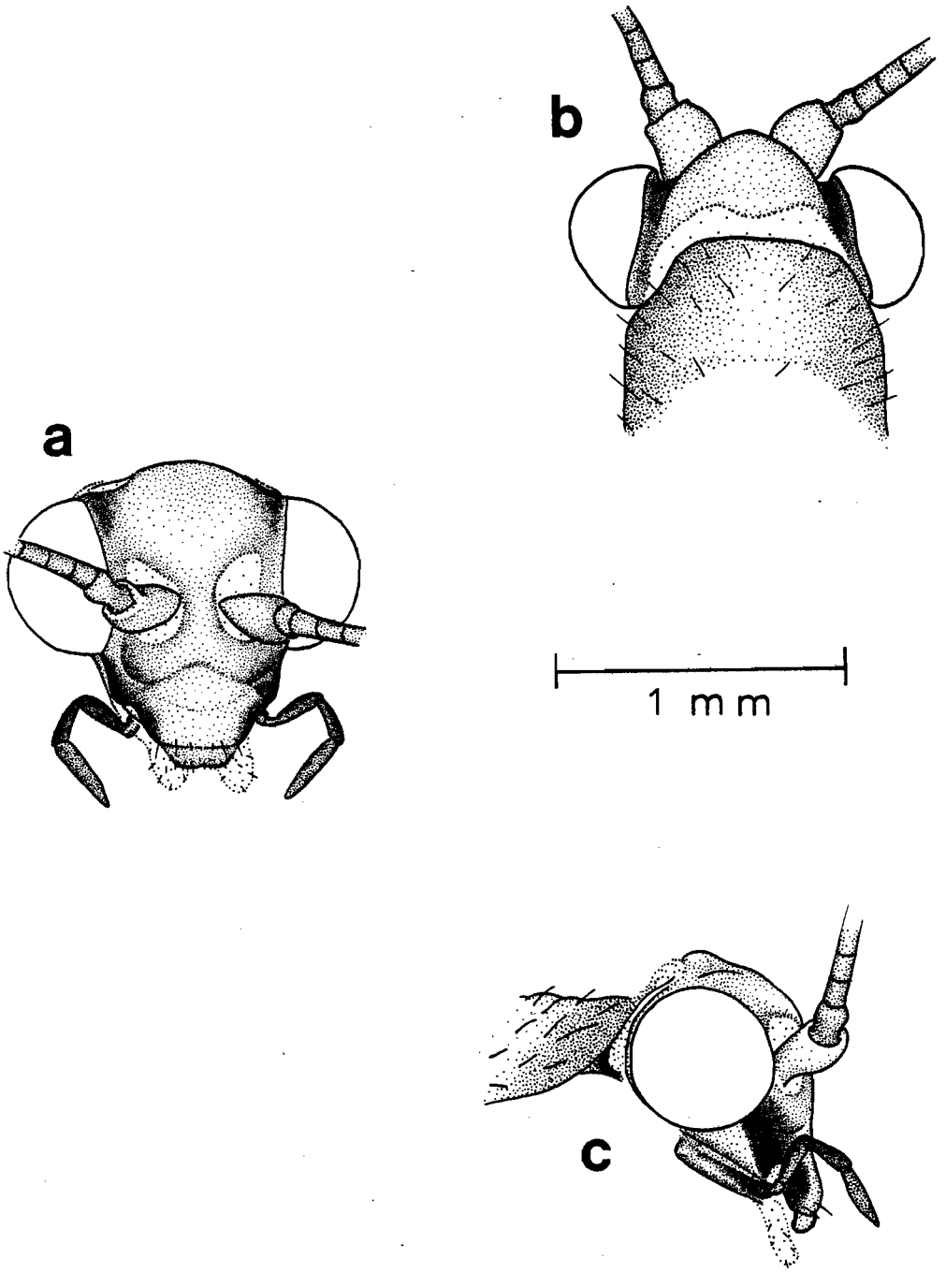

b
a
1 mm
c

Figure 92 Chrysoperla carnea: variation in head

a. Fairbanks, Alaska; male

b. Mackenzie River, N.W.T.; female

c. ibid., another female specimen

d. High Prairie, Alberta; male

[based on a specimen collected by

a) B. Wright, 26.VI-1.VII.1979; NSM

b, c) O. Bryant, 1929; CAS

d) A.R. Brooks, 16.VII.1961; CNC,

determined as Chrysopa carnea

by P.A. Adams]

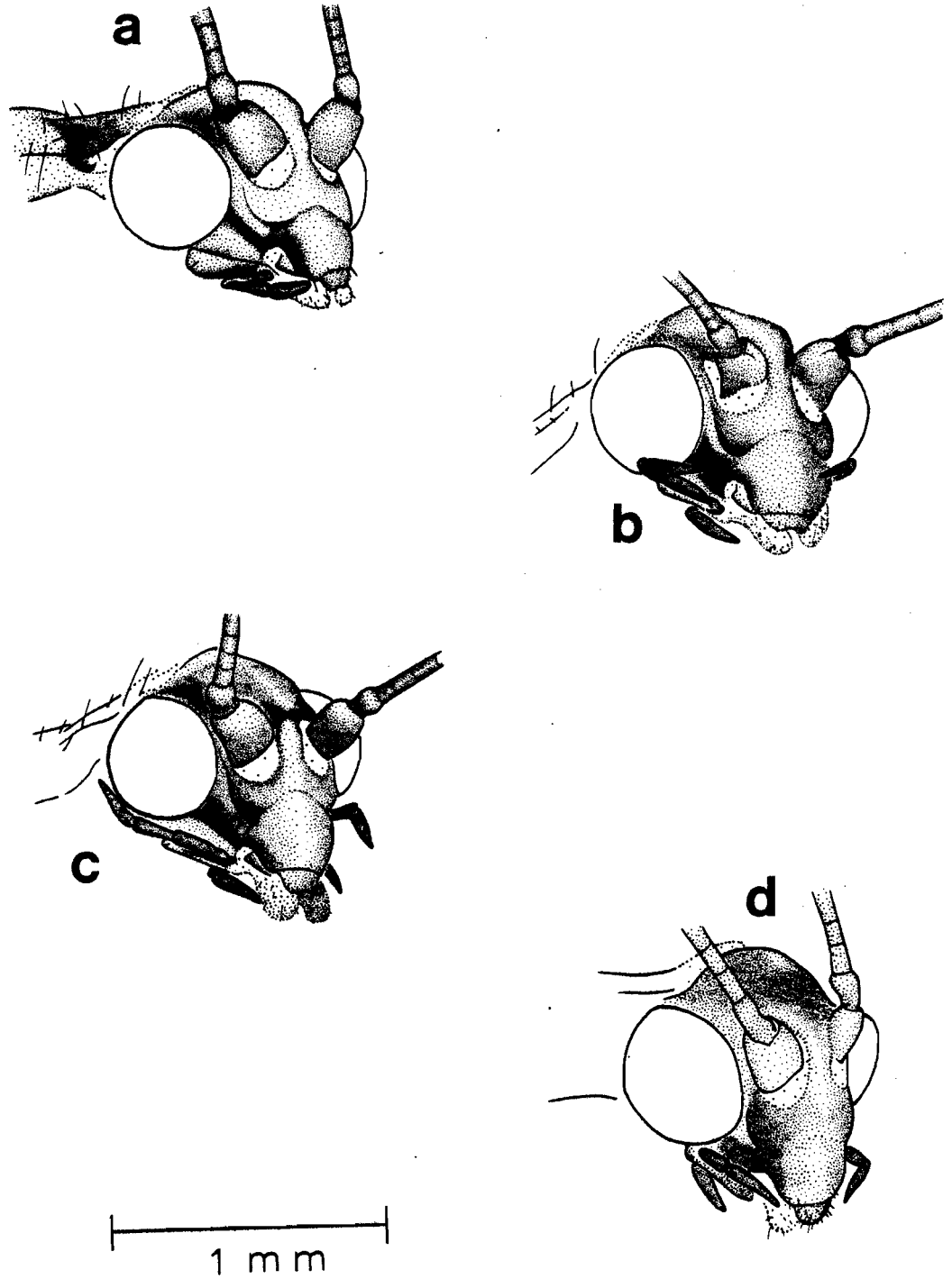

a
b
c
d
1 mm

Figure 92 (continued)

e. Edmonton, Alberta; male

f. Vancouver, British Columbia; female

g. Kenora, Ontario; female

h. Sable Island, Nova Scotia; female

[based on a specimen collected by

e) W.S. McLeod, 14.IV.1939; UMW

f) M. Isman, 5.VI.1974; SEM

g) D.H. Marlow, 10.VII.1978; UMW

h) B. Wright, 11-14.VIII.1978; NSM]

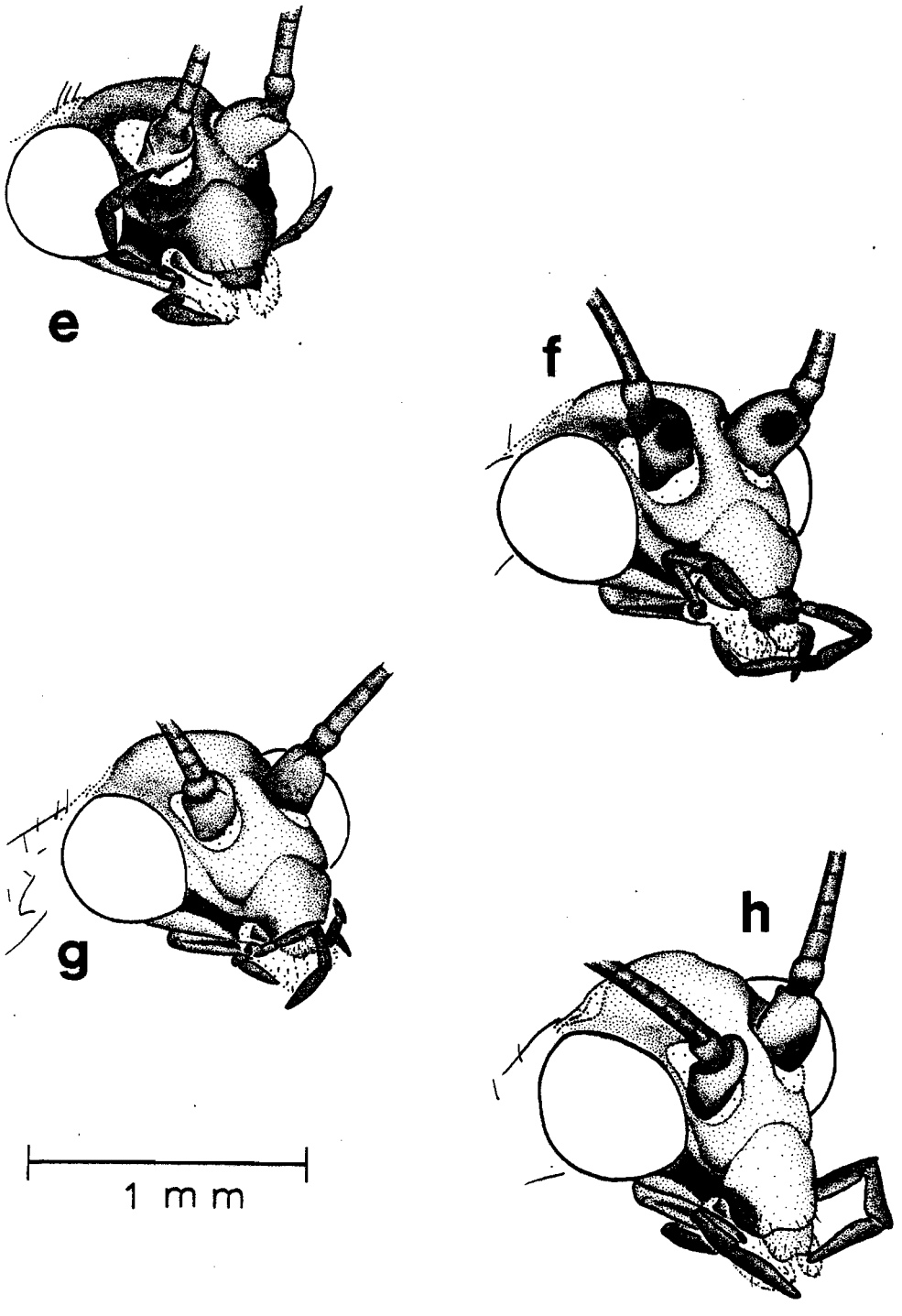

e
f
g
h
1 mm

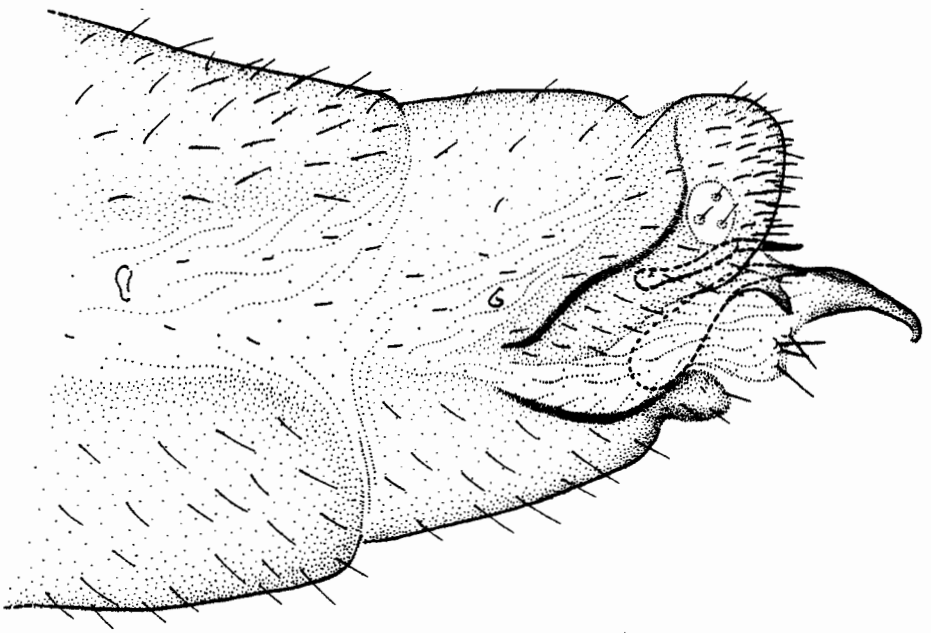
Figure 93 Chrysoperla carnea: male terminalia everted

a. Carberry, Manitoba

[based on a specimen collected by

E.A.R. Liscombe, 22.VIII.1948; UMW]

a



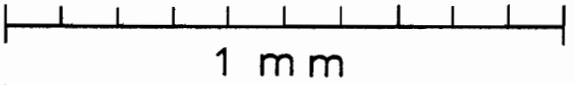
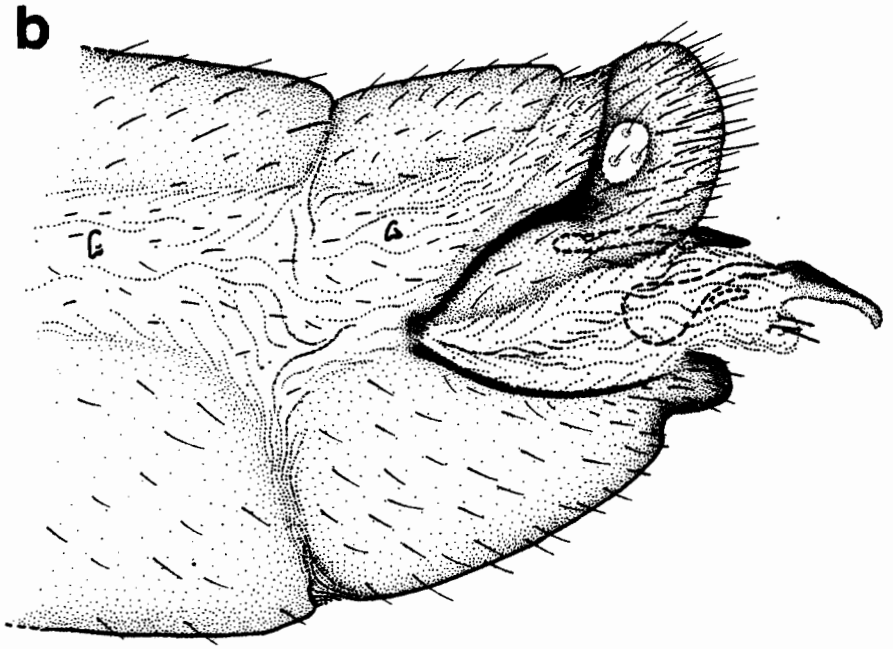


Figure 93 (continued)

b. Mackenzie River, N.W.T.

[based on a specimen collected by

O. Bryant, 1929; CAS]


b

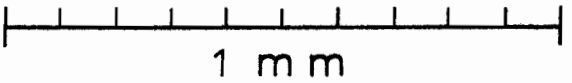
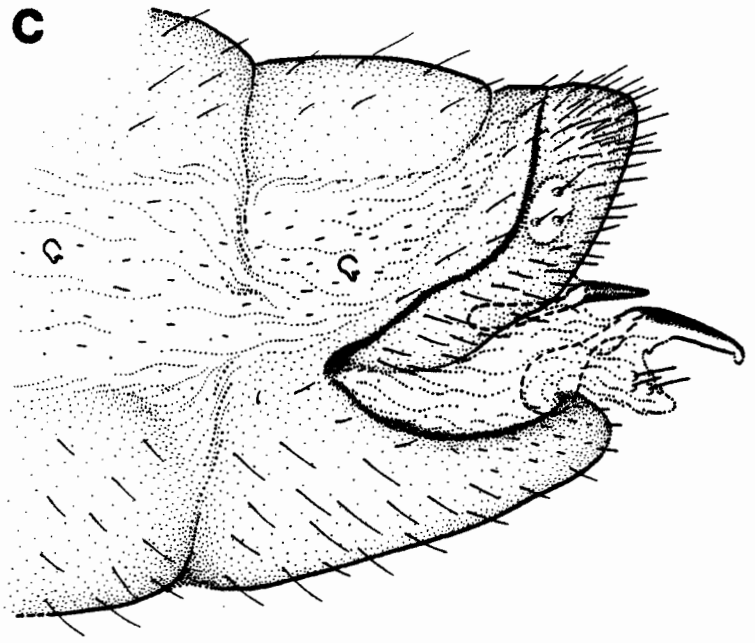

1 mm

Figure 93 (continued)

c. Mackenzie River, N.W.T.

[based on a specimen collected by

O. Bryant, 1929; CAS]



1 mm

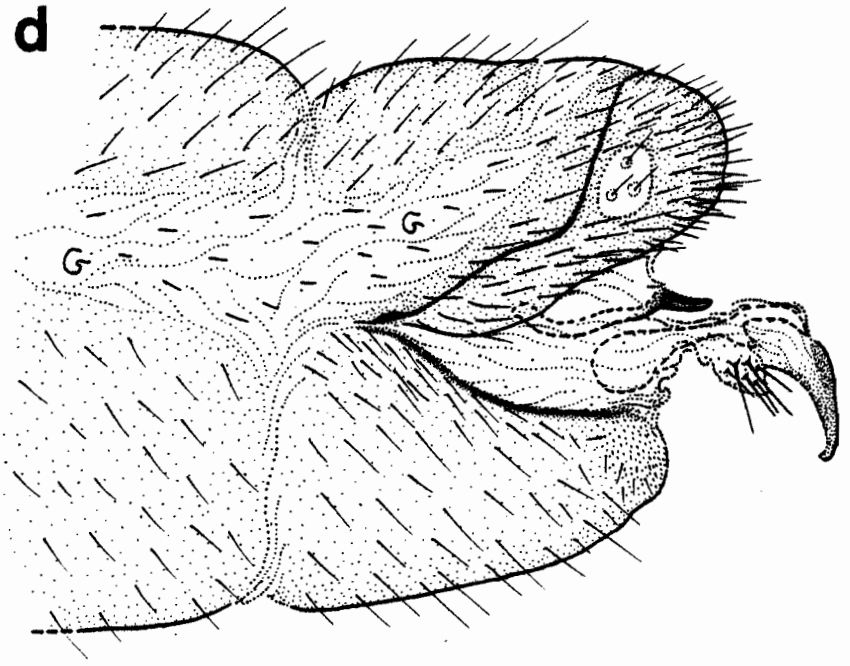
Figure 93 (continued)

d. High Prairie, Alberta

[based on a specimen collected by

A.R. Brooks, 16.VII.1961; CNC, determined

as Chrysopa carnea by P.A. Adams]



1 mm

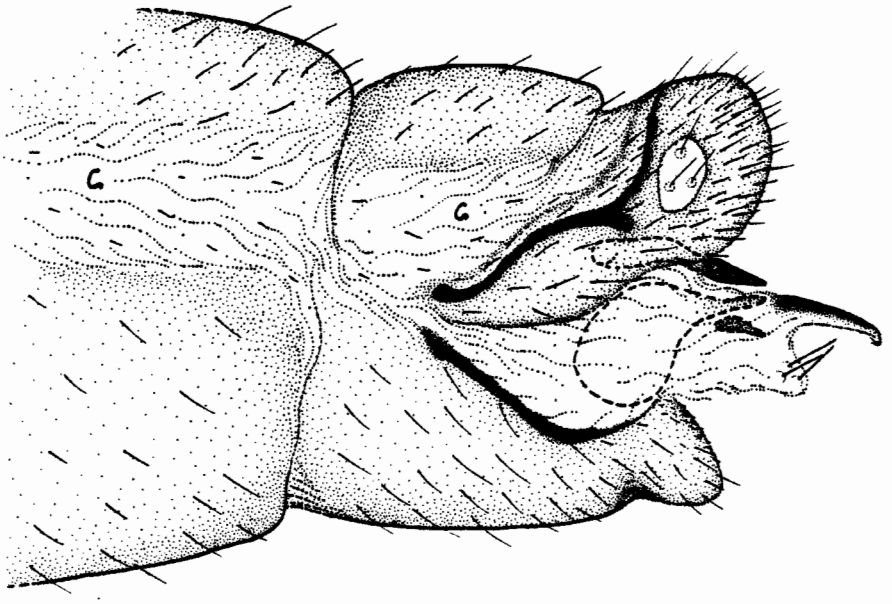
Figure 93 (continued)

e. Cypress Hills, Saskatchewan

[based on a specimen collected by

R.R. Hooper, 7.IX.1967; SMNH]

e



1 mm

Figure 94 Chrysoperla carnea: male structures

a. arcessus

b. gonarcus-entoprocessus

c. tignum

[based on a specimen collected by

E.A.R. Liscombe, Carberry, Manitoba,

22.VIII.1948; UMW]

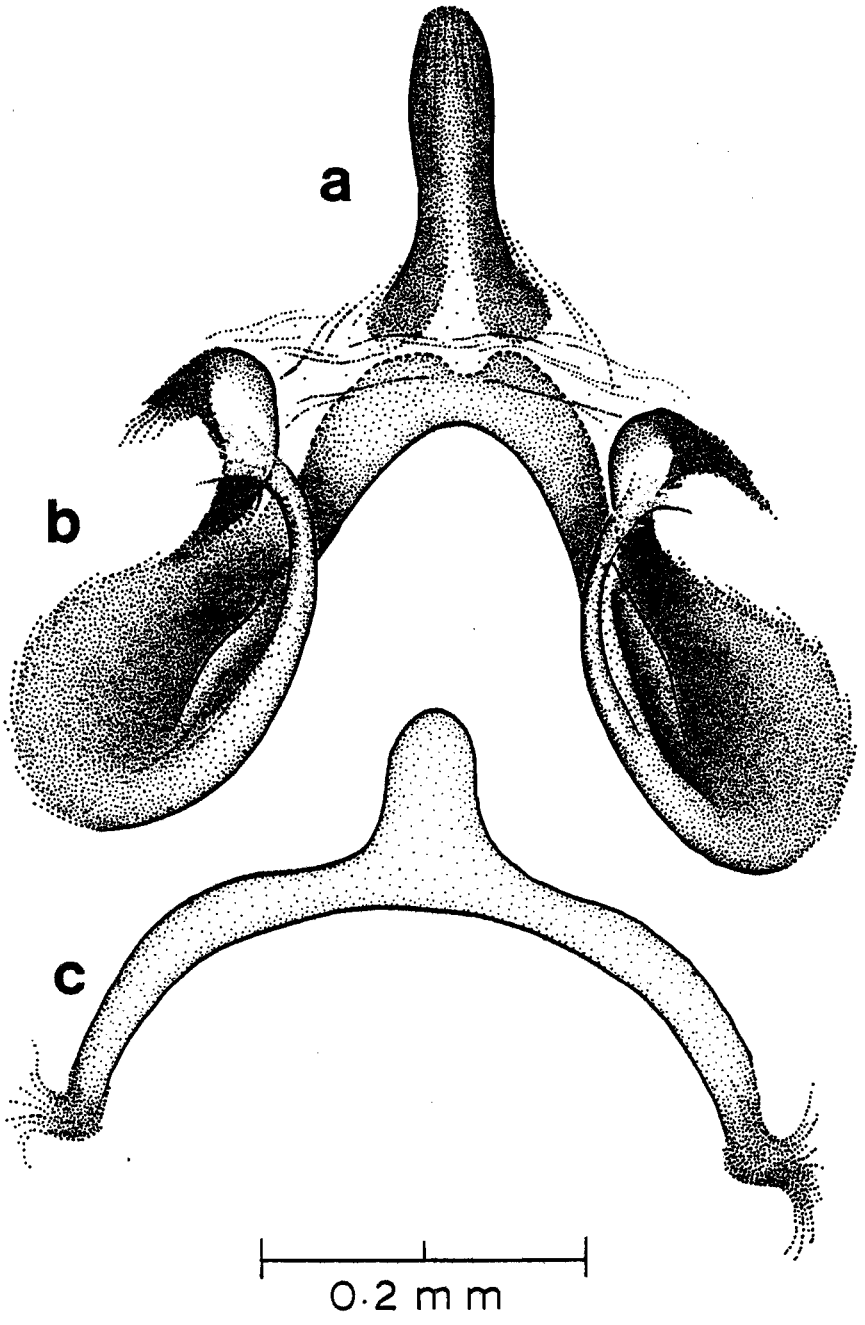

a
b
c
0·2 mm

Figure 94 (continued)

d. arcessus

e. gonarcus-entoprocessus

f. tignum

[based on a specimen collected by
B. Wright, Fairbanks, Alaska,
26.VI-1.VII.1979; NSM]

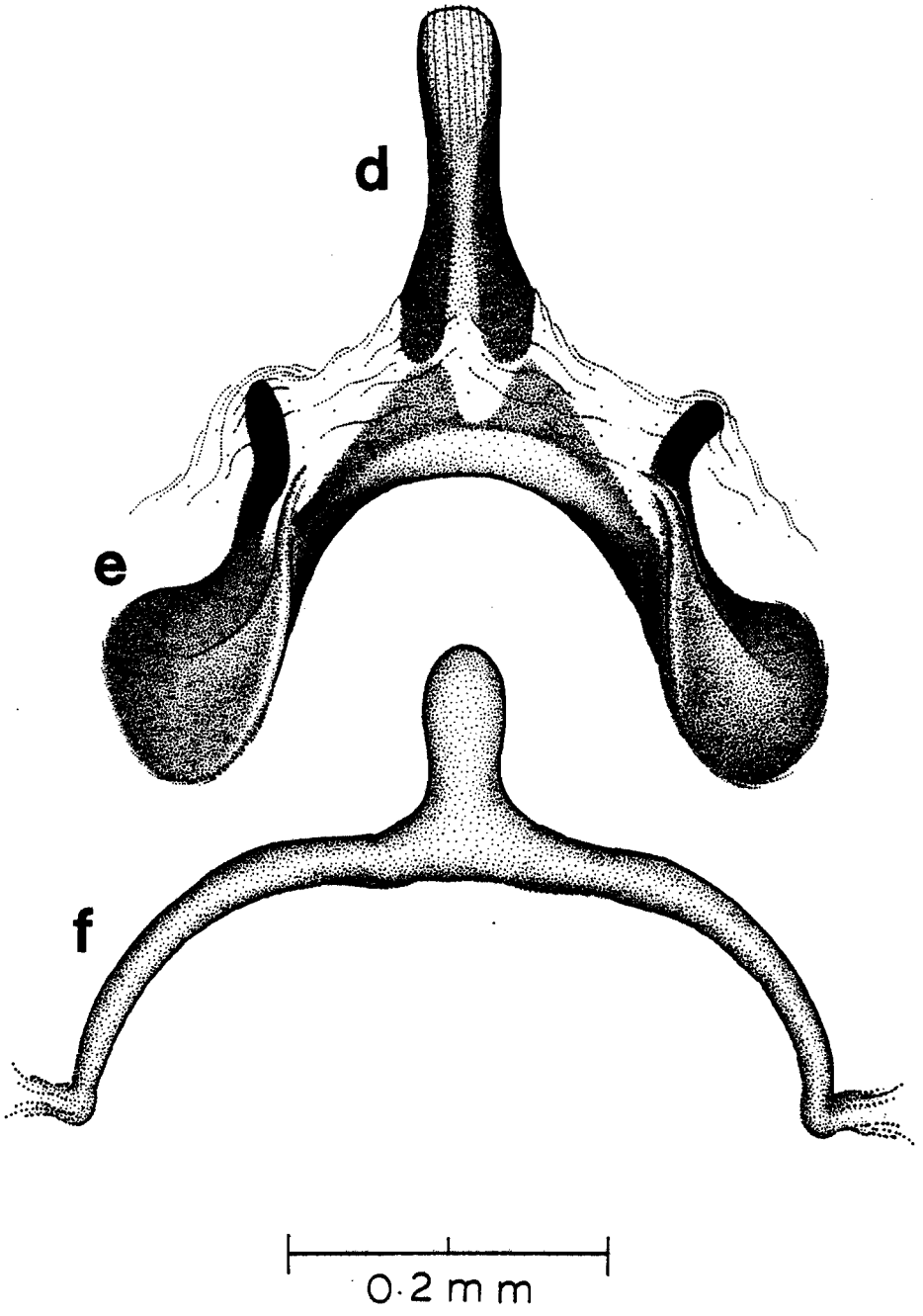

d
e
f
0·2 mm

Figure 94 (continued)

g. arcessus

h. gonarcus-entoprocessus

i. tignum

[based on a specimen collected by

G.J. Spencer, Winslow, British Columbia,

14.IX.1925; SEM]

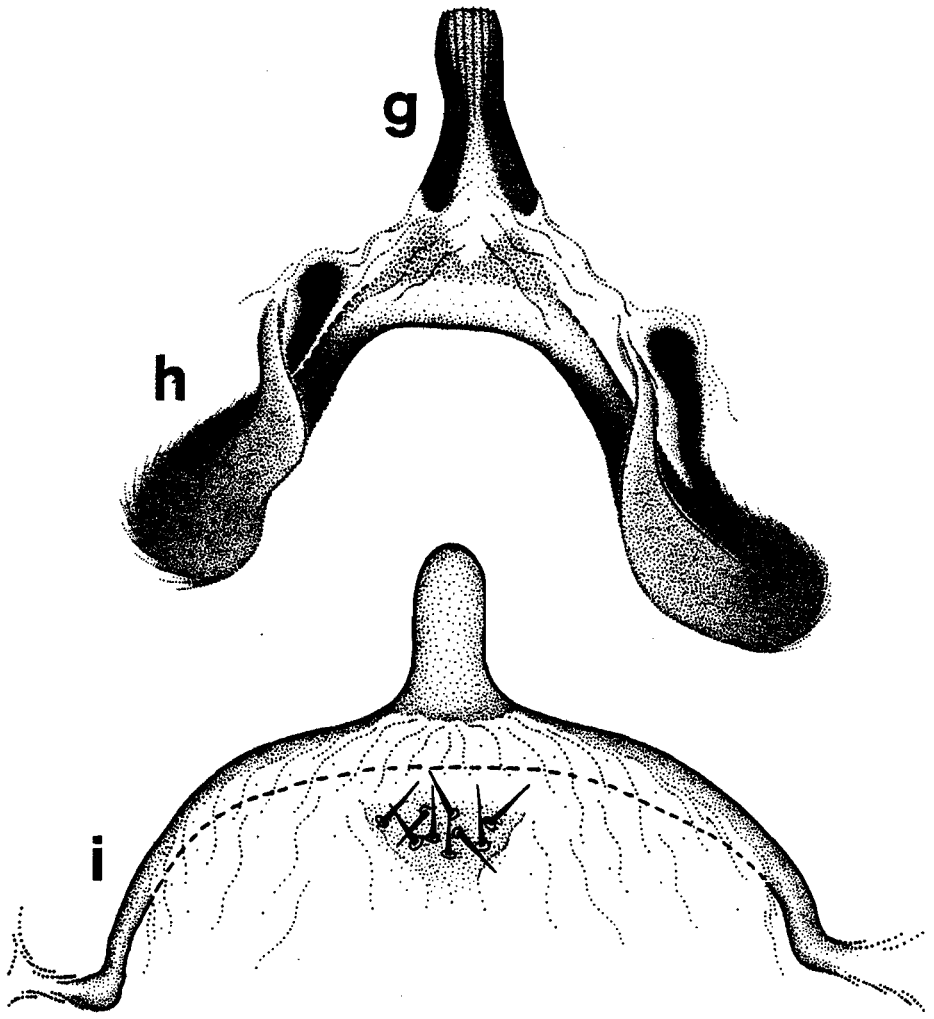

g
h
i
0·2 mm

Figure 94 (continued)

j. arcessus

k. gonarcus-entoprocessus

l. tignum

[based on a specimen collected by

W.S. McLeod, Edmonton, Alberta,

14.IV.1939; UMW]

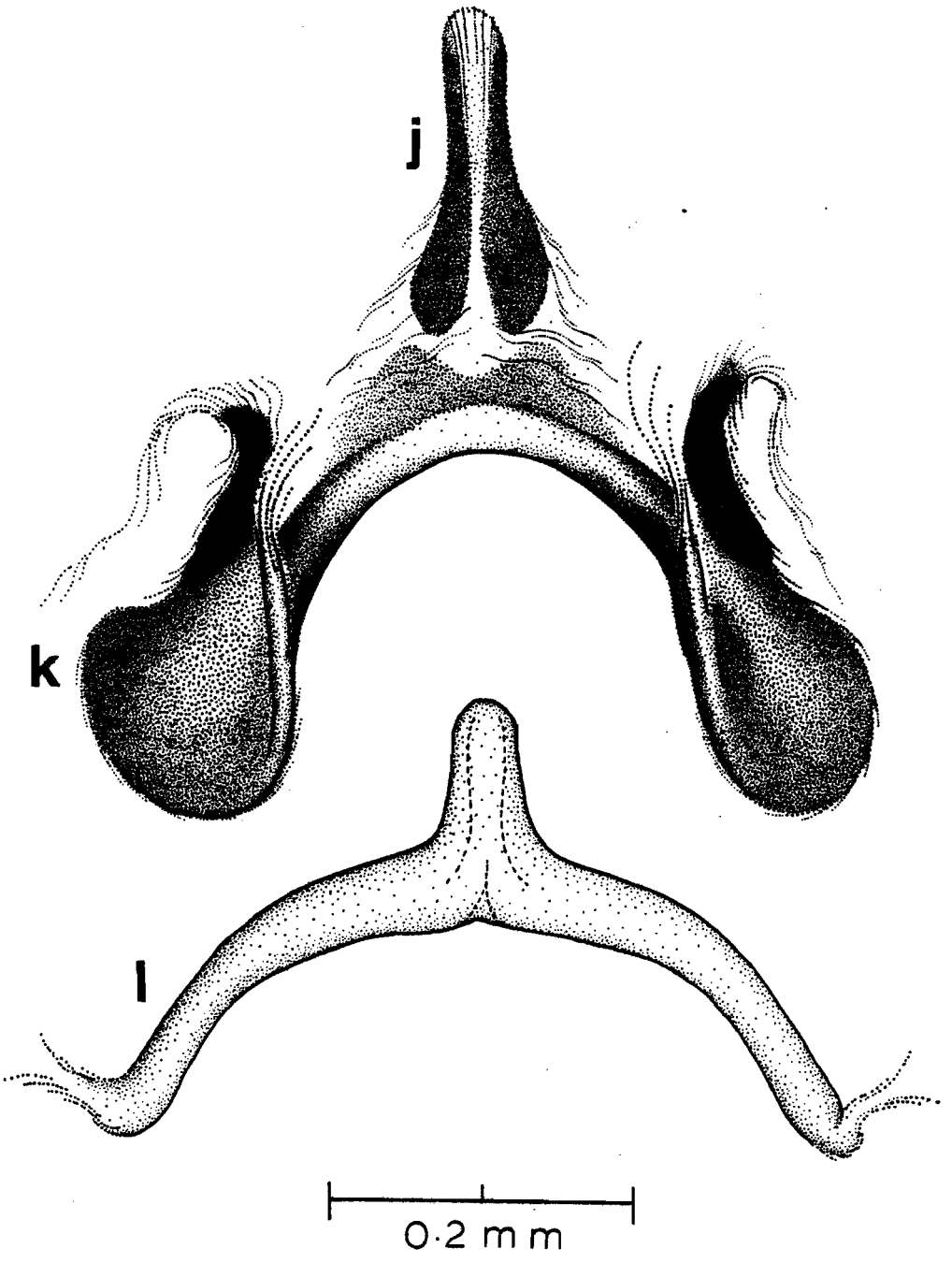

j
k
l
0·2 mm

Figure 95 Chrysoperla carnea: arcessus

a. Carberry, Manitoba

b. Fairbanks, Alaska

c. Winslow, British Columbia

d. Edmonton, Alberta

e. High Prairie, Alberta

[based on a specimen collected by

a) E.A.R. Liscombe, 22.VIII.1948; UMW

b) B. Wright, 26.VI-1.VII.1979; NSM

c) G.J. Spencer, 14.IX.1925; SEM

d) W.S. McLeod, 14.IV.1939; UMW

e) A.R. Brooks, 16.VII.1961; CNC,

determined as Chrysopa carnea

by P.A. Adams]

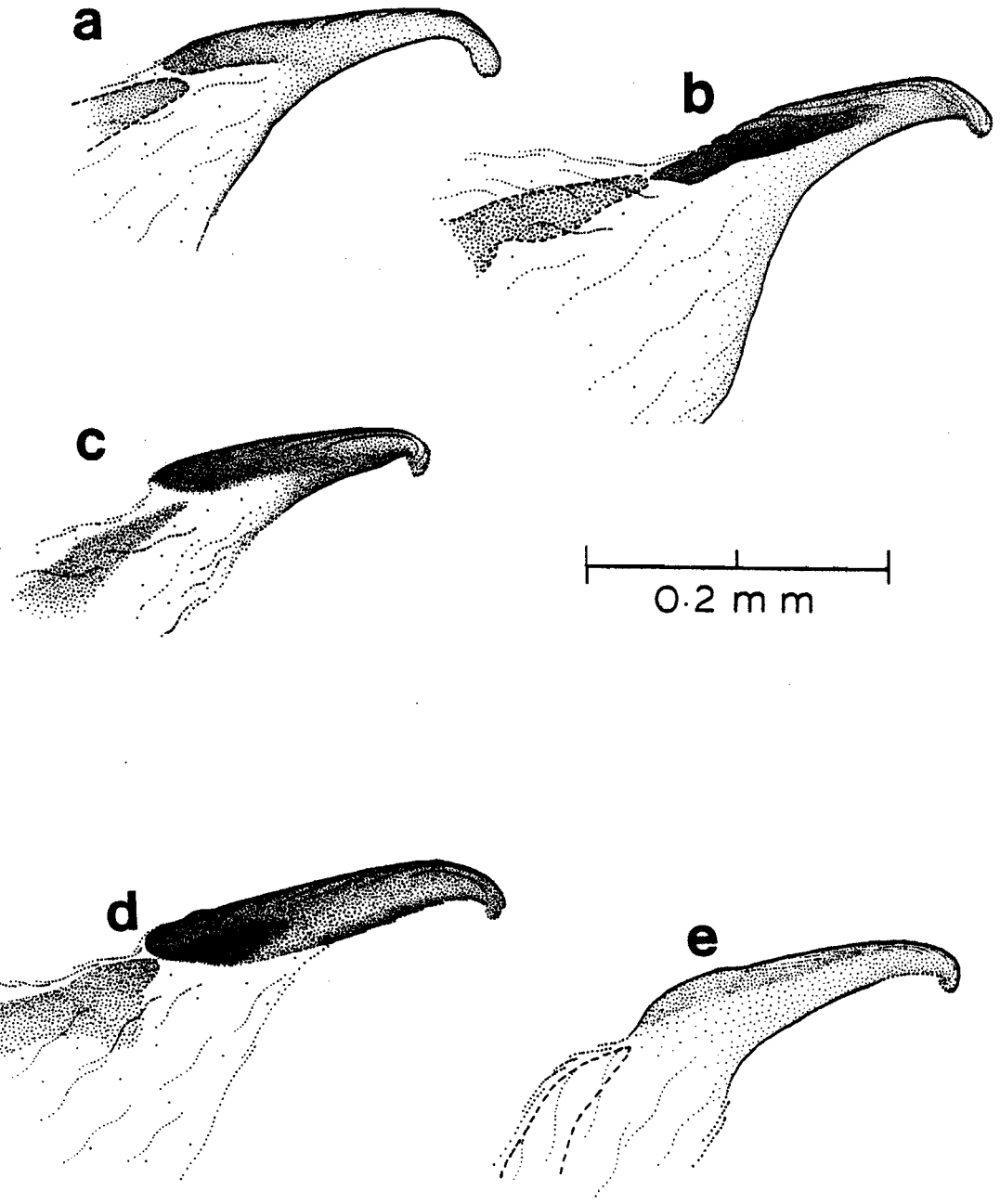

a
b
c
0·2 mm
d
e

Figure 96 *Chrysoperla carnea*: female structures

a. subgenitale

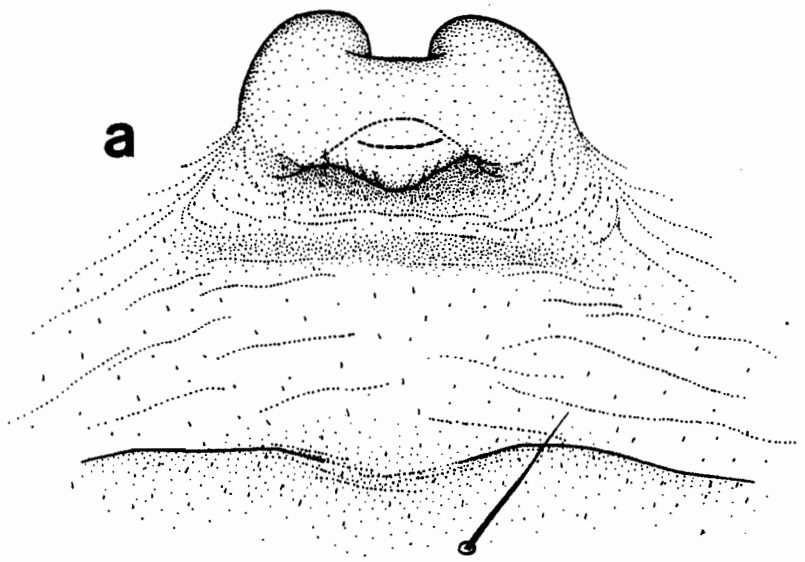
b. *ibid.*, lateral aspect

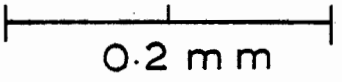
[based on a specimen collected by

A.R. Brooks, High Prairie, Alberta,

17.VII.1961; CNC, determined

as *Chrysopa carnea* by P.A. Adams]


a

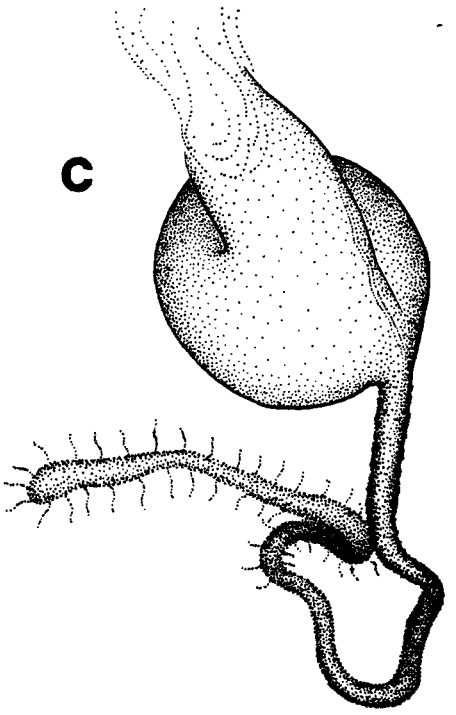

0·2 mm


b

Figure 96 (continued)

c. spermatheca

[based on a specimen collected by
A.R. Brooks, High Prairie, Alberta,
17.VII.1961; CNC, determined
as Chrysopa carnea by P.A. Adams]


c

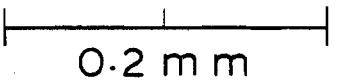
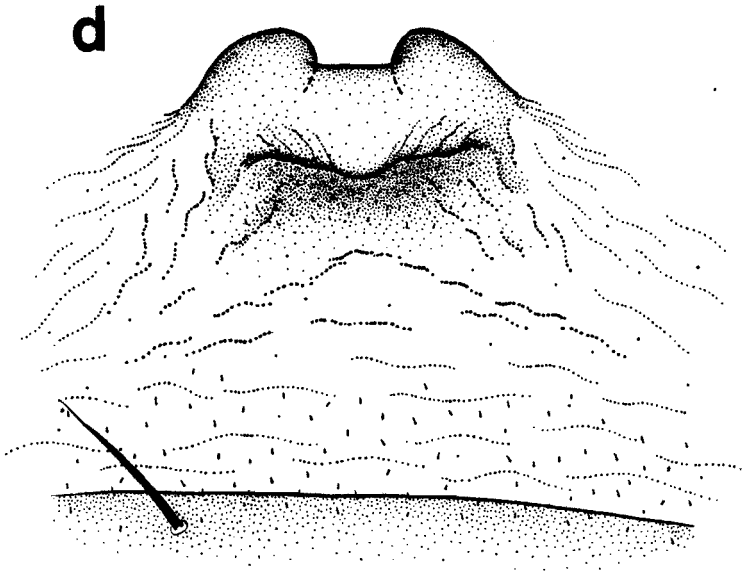

0·2 mm

Figure 96 (continued)

d. subgenitale

[based on a specimen collected by
D.H. Marlow, Kenora, Ontario,
10.VII.1978; UMW]


d

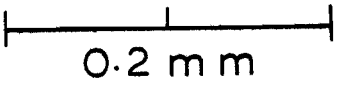

0·2 mm

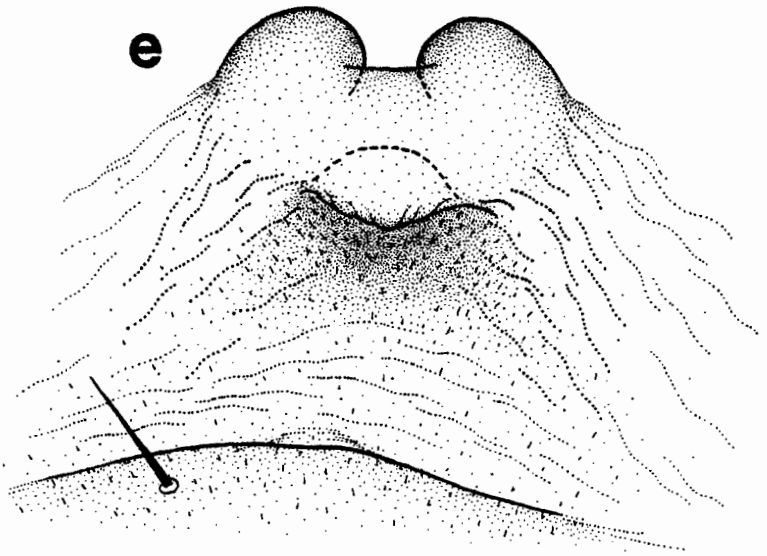
Figure 96 (continued)

e. subgenitale

[based on a specimen collected by

B. Wright & D.C. Ferguson, Sable Island,

Nova Scotia, 11-14.VIII.1978; NSM]


e

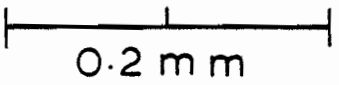

0·2 m m

Figure 97 Chrysoperla carnea: wing

a. fore wing

b. hind wing

[based on a specimen collected by

B. Wright, Fairbanks, Alaska,

26.VI-1.VII.1979; NSM, male]

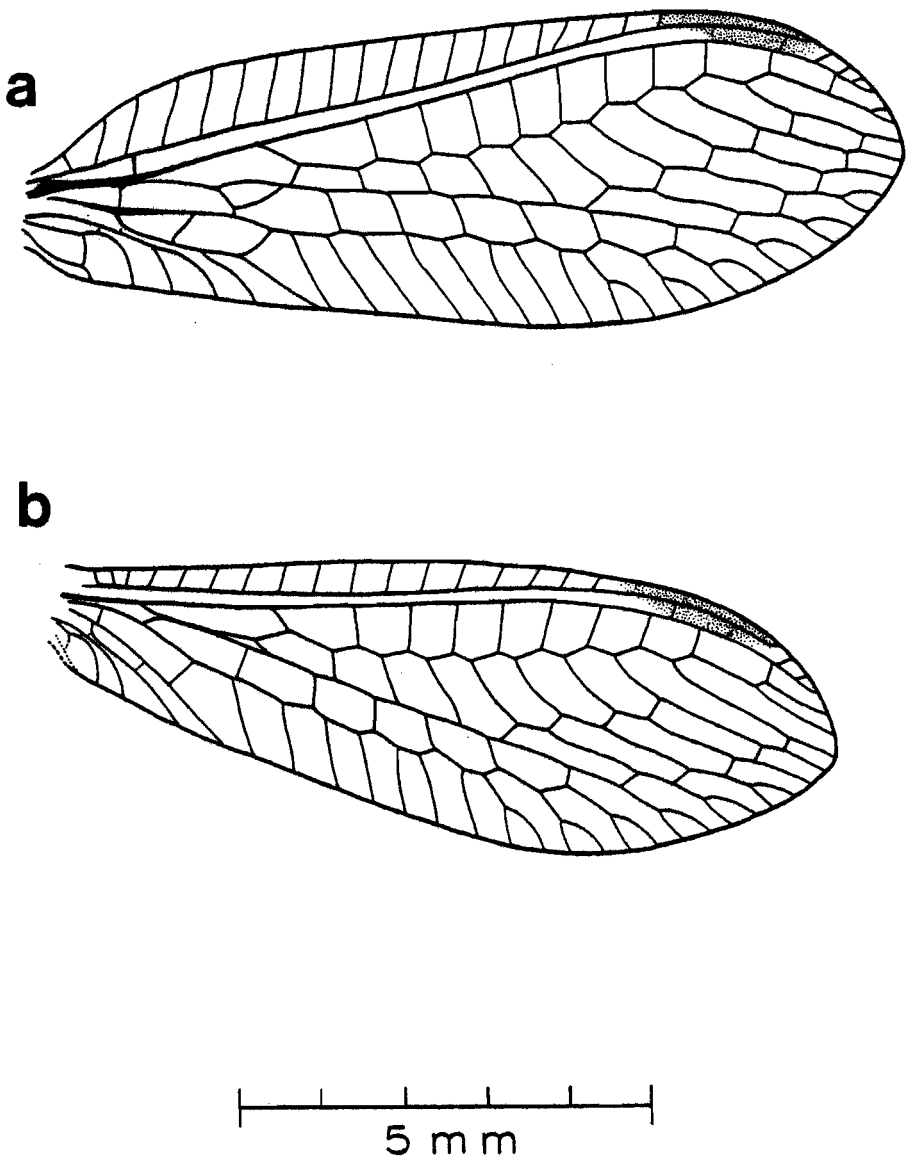

a
b
5 mm

Figure 97 (continued)

c. fore wing

d. hind wing

[based on a specimen collected by

H. Leech, Vernon, British Columbia,

8.XII.1935; SEM, male]

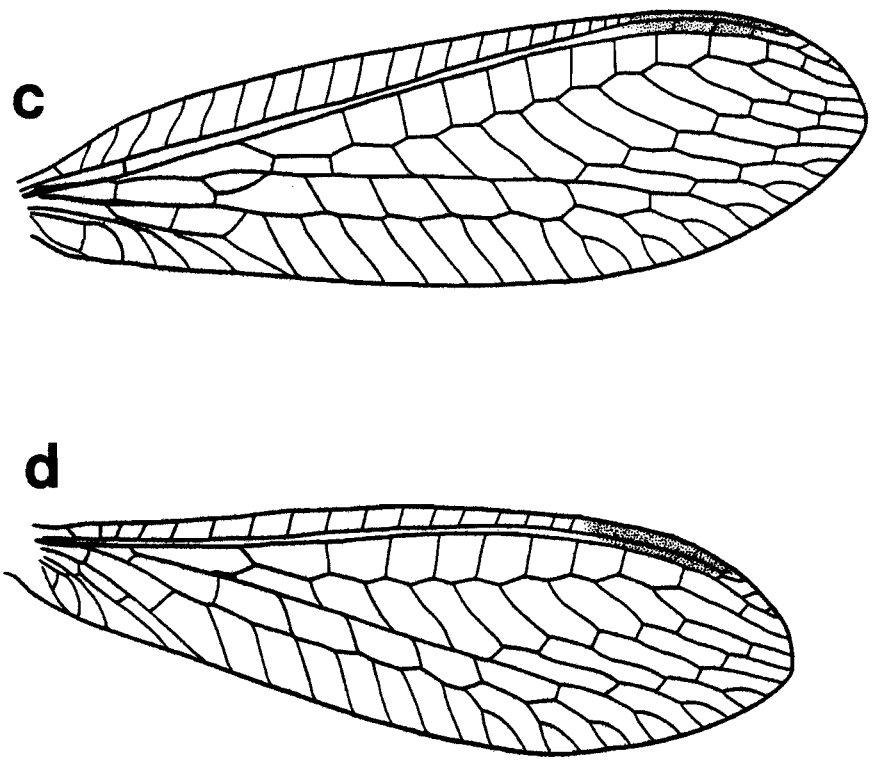

c
d
5 m m

Figure 97 (continued)

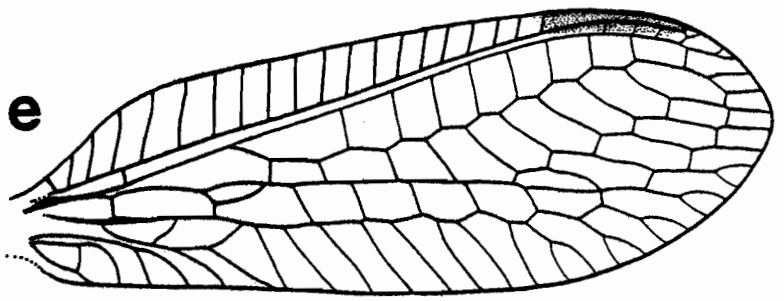
e. fore wing

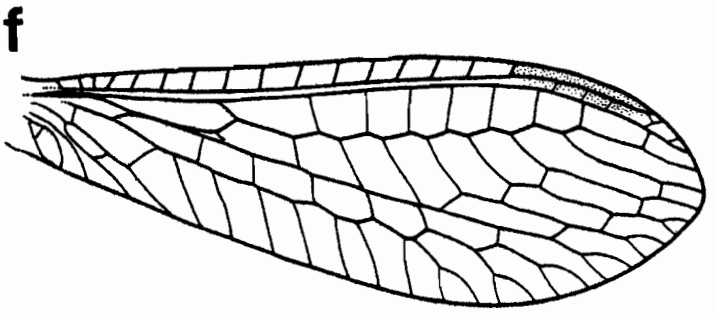
f. hind wing

[based on a specimen collected by

G.J. Spencer, Winslow, British Columbia,

14.IX.1925; SEM, male]


e


f

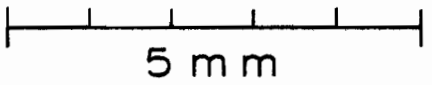
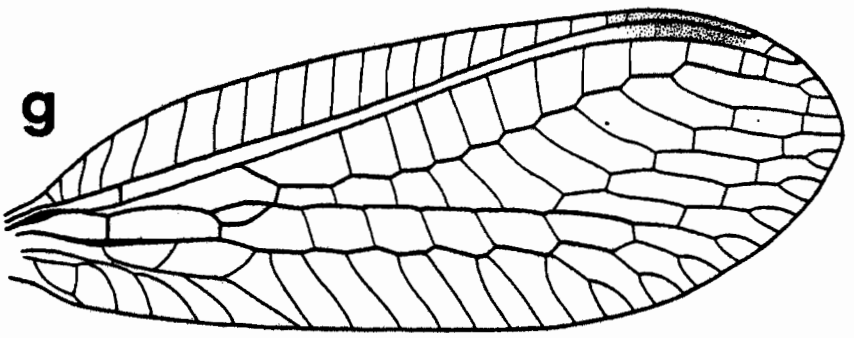

5 mm

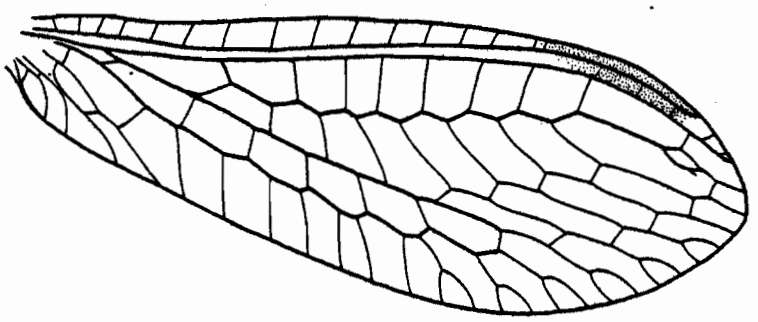
Figure 97 (continued)

g. fore wing

h. hind wing

[based on a specimen collected by
A.R. Brooks, High Prairie, Alberta,
16.VII.1961; CNC, determined
as Chrysopa carnea by P.A. Adams,
male]


g


h

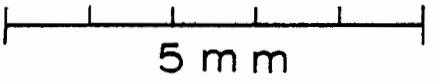

5 mm

Figure 97 (continued)

i. fore wing

j. hind wing

[based on a specimen collected by
A.R. Brooks, High Prairie, Alberta,
17.VII.1961; CNC, determined
as Chrysopa carnea by P.A. Adams,
female]

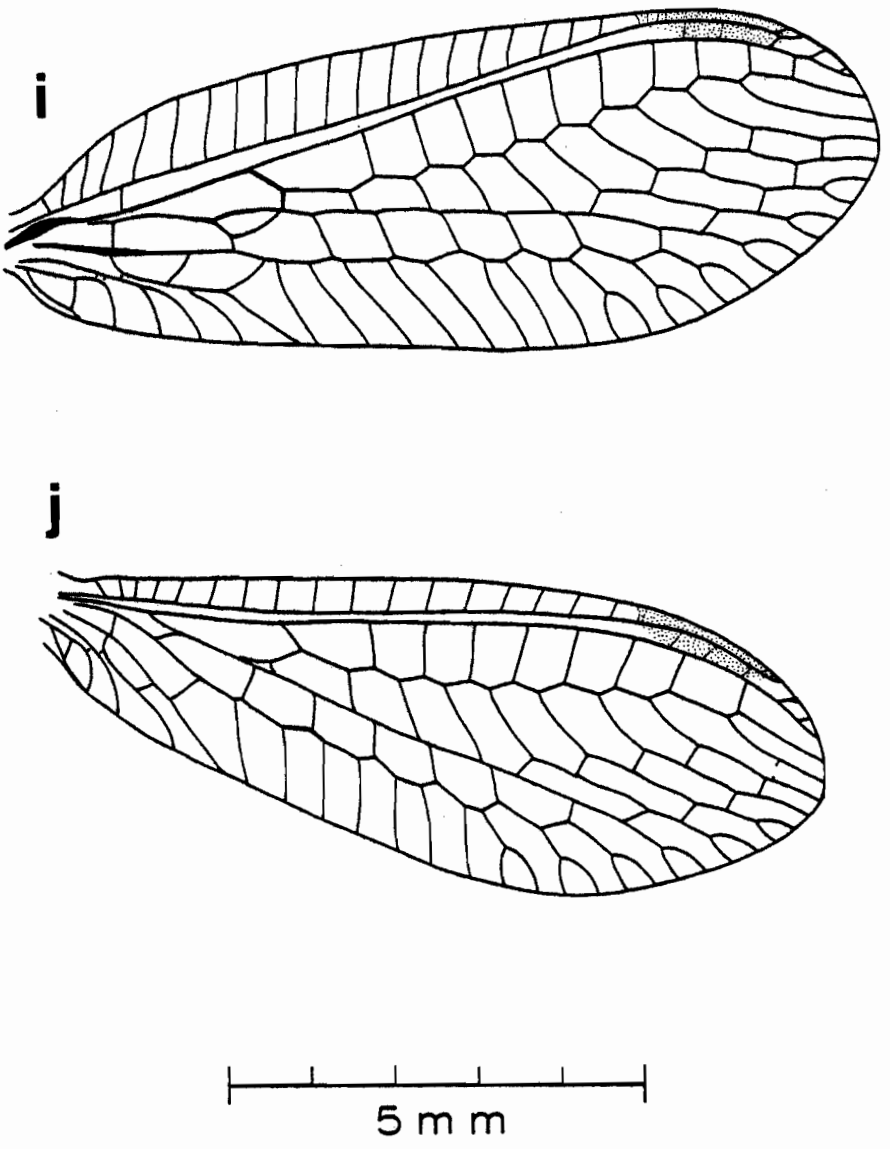

i
j
5 m m

Figure 97 (continued)

k. fore wing

l. hind wing

[based on a specimen collected by

W.S. McLeod, Edmonton, Alberta,

14.IV.1939; UMW, male]

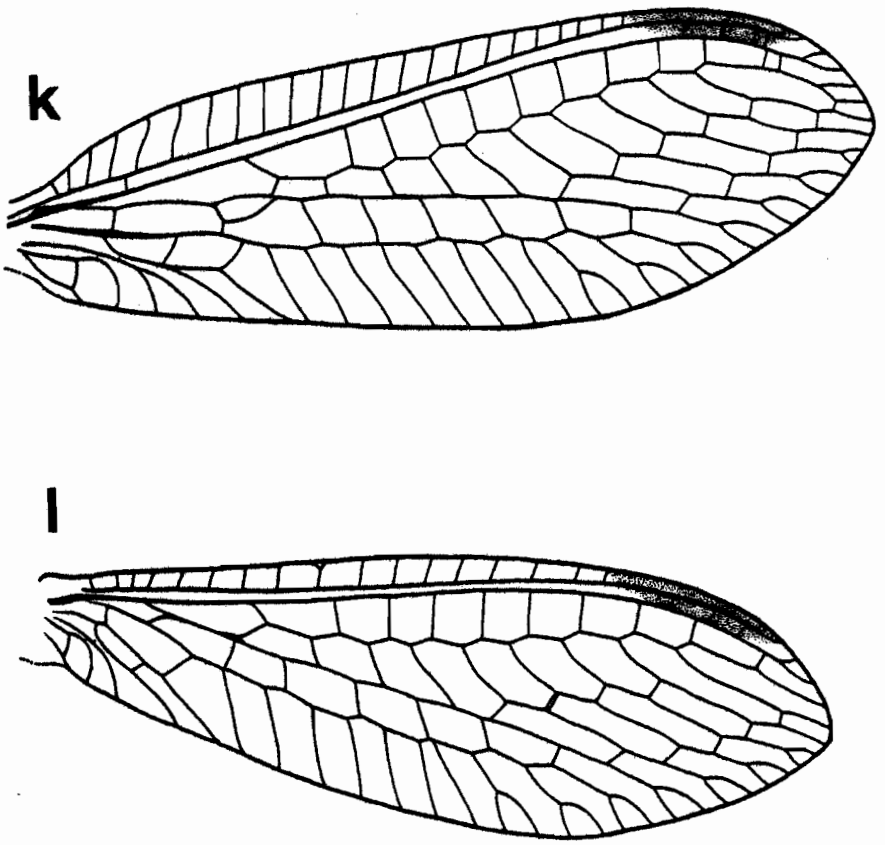

k
l
5 mm

Figure 97 (continued)

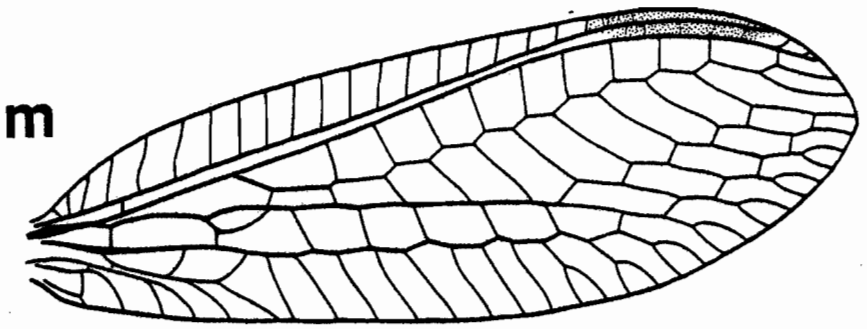
m. fore wing

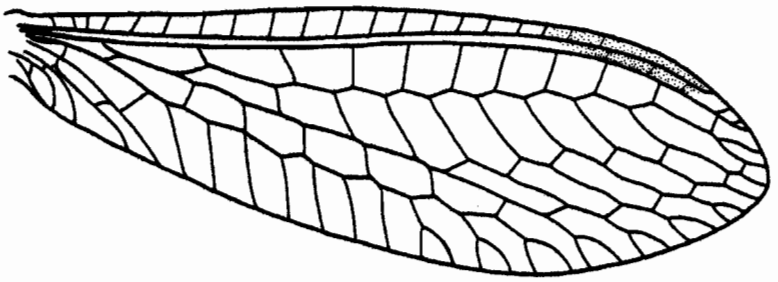
n. hind wing

[based on a specimen collected by

P.W. Arntfield, Winnipeg, Manitoba,

20.VIII.1980; UMW, male]


m


n

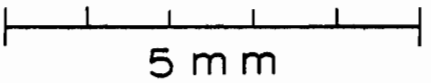

5 mm

Figure 98 Mandibles of *Chrysoperla* spp.

a. *C. rufilabris*; male

b. *C. harrisii*; female

[based on a specimen collected by

a) V.R. Vickery, Pt. Pelee Nat'l. Pk., Ontario, 4.VIII.1963; LEM

b) J.L. Martin, Baxter, Ontario, 28.VII.1959; LEM]

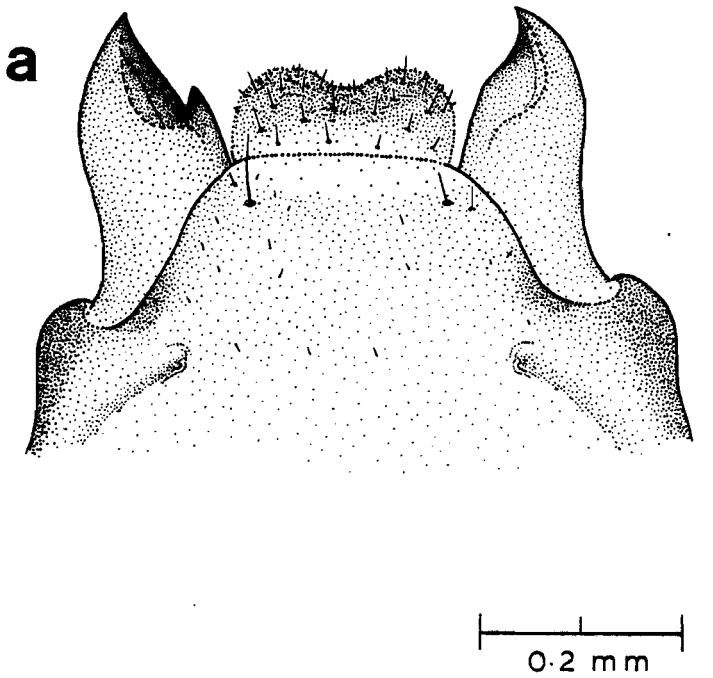

a
0·2 mm
b

Figure 98 (continued)

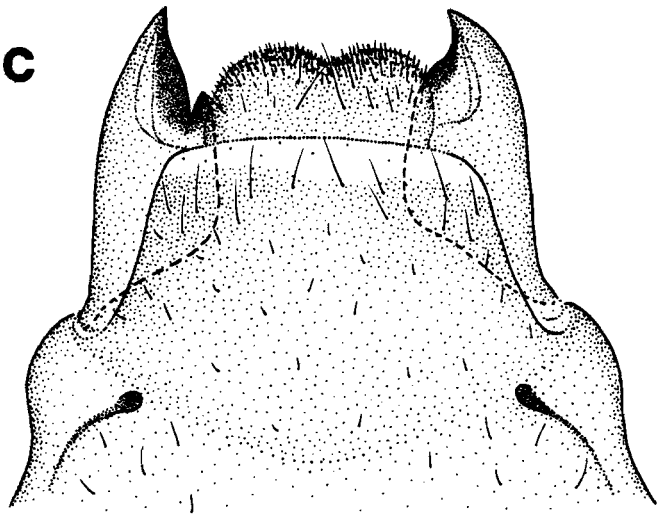
c. C. comanche; female

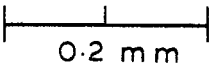
d. C. carnea; male

[based on a specimen collected by

c) W.R. Richards, Andreas Canyon, Palm Springs, California, 4.IV.1955; CNC, determined as Chrysopa comanche by P.A. Adams 1961

d) B. Wright, Fairbanks, Alaska, 26.VI-1.VII.1979; NSM]


c


0·2 mm

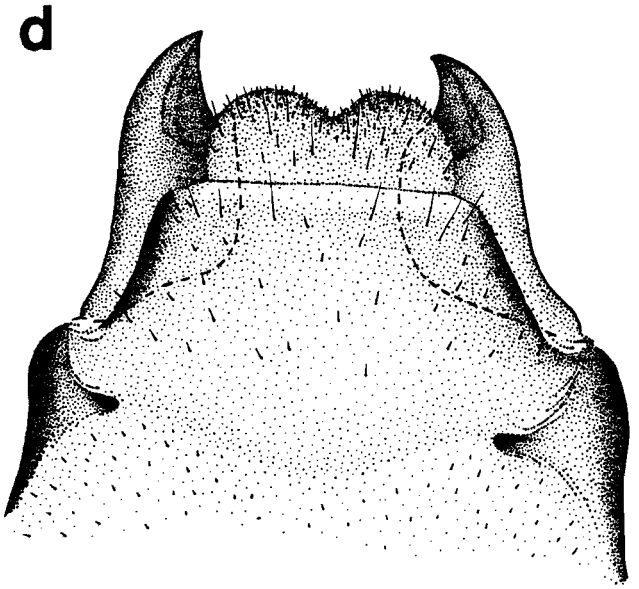

d

Figure 98 (continued)

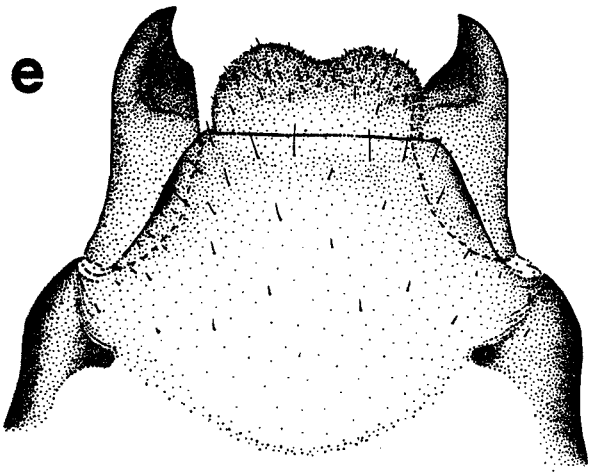
e. C. carnea; male

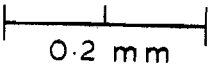
f. C. carnea; male

[based on a specimen collected by

e) G.J. Spencer, Winslow, British Columbia, 14.IX.1925; SEM

f) R.R. Hooper, Cypress Hills, Saskatchewan, 7.IX.1967; SMNH]


e


0·2 mm

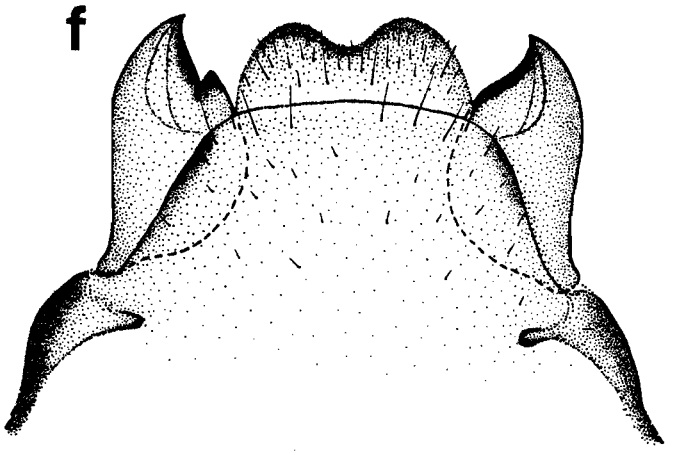

f

Figure 99 Nineta gravida: female head

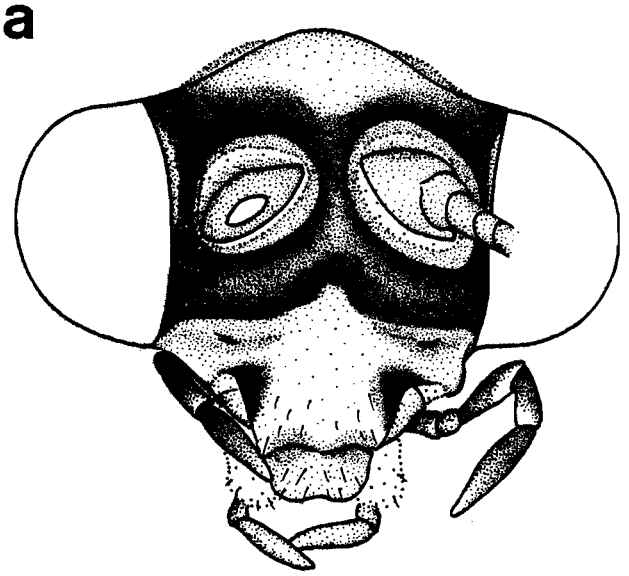
a. frontal

[based on a specimen collected by

W.H. Danby, Victoria, British Columbia;

CNC]

a

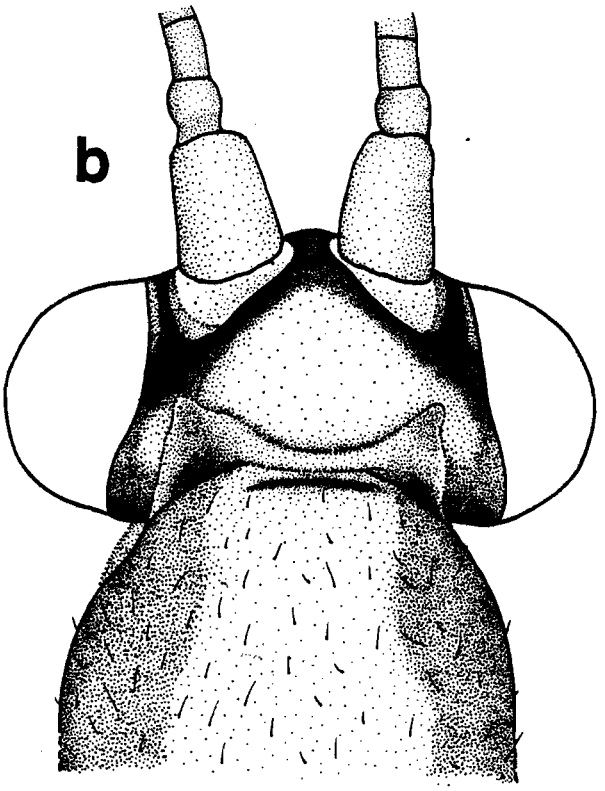


1 mm

Figure 99 (continued)

b. dorsal

[based on a specimen collected by
W.H. Danby, Victoria, British Columbia;
CNC]



1 mm

Figure 99 (continued)

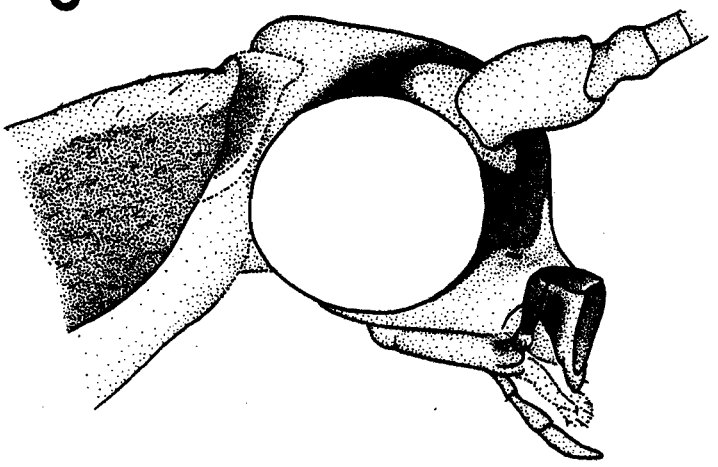
c. lateral

[based on a specimen collected by

W.H. Danby, Victoria, British Columbia;

CNC]

c



1 mm

Figure 100 *Nineta gravida*: variation in head

a. Bellingham, Washington; female

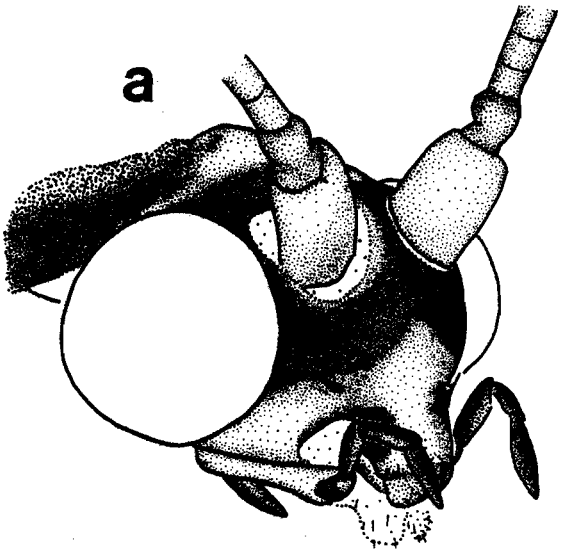
[based on a specimen collected by

J.F.G. Clarke, 20.VIII.1962; USNM,

determined as *Chrysopa gravida* by

O.S. Flint 1962, and as *Nineta*

gravida by P.A. Adams 1976]



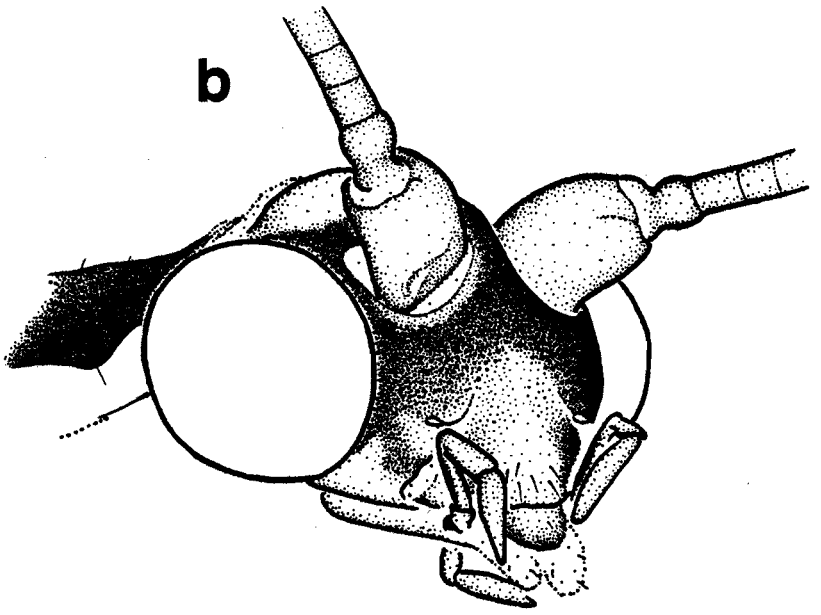
1 mm

Figure 100 (continued)

b. Yosemite, California; male

[based on a specimen collected by

[not recorded]; MCZ, Type 11384]


b

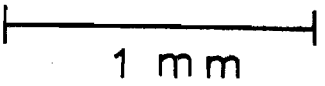

1 mm

Figure 101 Nineta gravida: wing

a. fore wing

b. hind wing

[based on a specimen collected by
J.F.G. Clarke, Bellingham, Washington,
20.VIII.1962; USNM, determined
as Chrysopa gravida by O.S. Flint
1962, and as Nineta gravida by
P.A. Adams 1976, female]

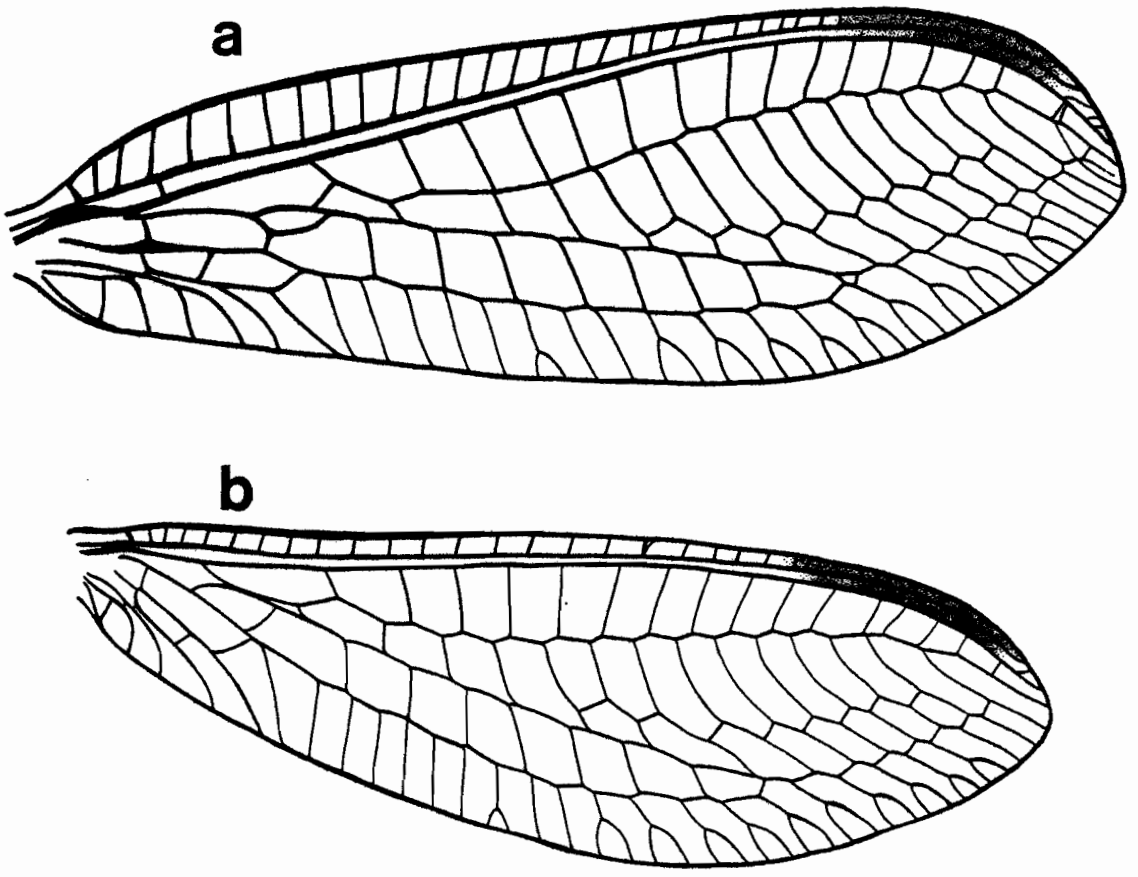
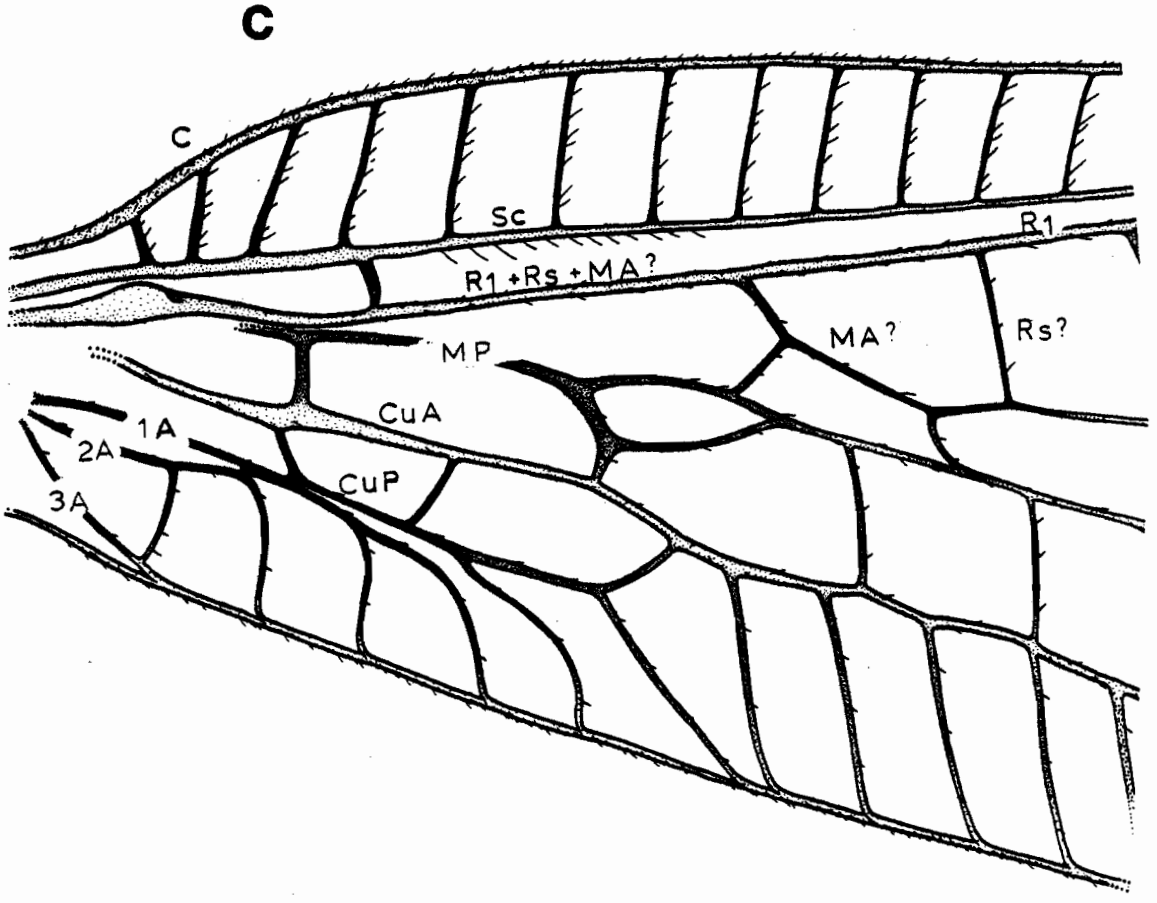

a
b
5 mm

Figure 101 (continued)

c. intramedian cell

[based on a specimen collected by
J.F.G. Clarke, Bellingham, Washington,
20.VIII.1962; USNM, determined
as Chrysopa gravida by O.S. Flint
1962, and as Nineta gravida by
P.A. Adams 1976, female]



5 mm

Figure 102 Nineta gravida: male structures

a. terminalia with structures everted

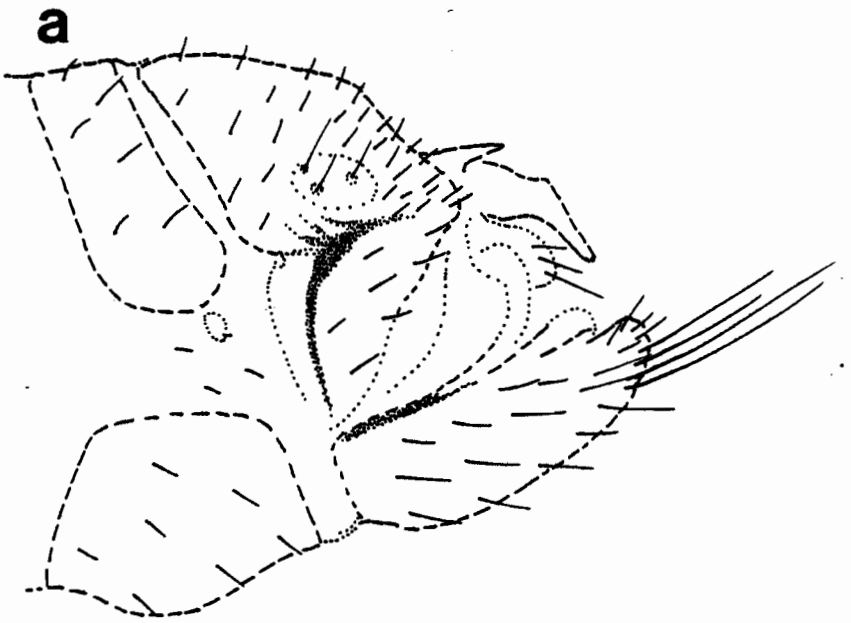
[based on a specimen collected by

[not recorded], Yosemite, California;

MCZ, Type 11384, original

drawing by P.A. Adams with

permission in litt. 4.XII.1980]


a

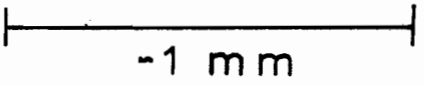
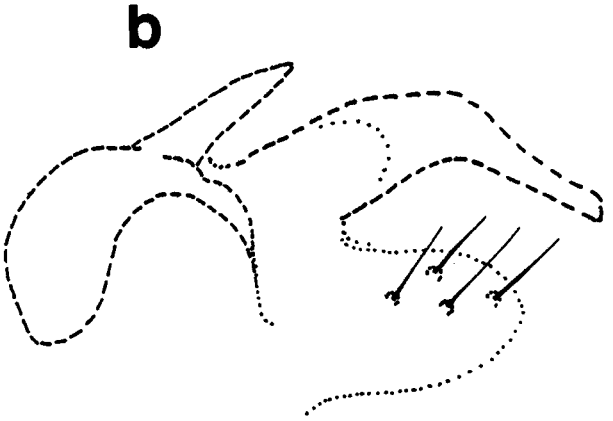

1 mm

Figure 102 (continued)

b. arcessus

[based on a specimen collected by
[not recorded], Yosemite, California;
MCZ, Type 11384, original
drawing by P.A. Adams with
permission in litt. 4.XII.1980]


b

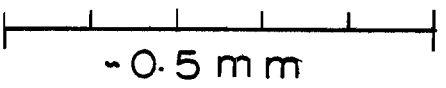
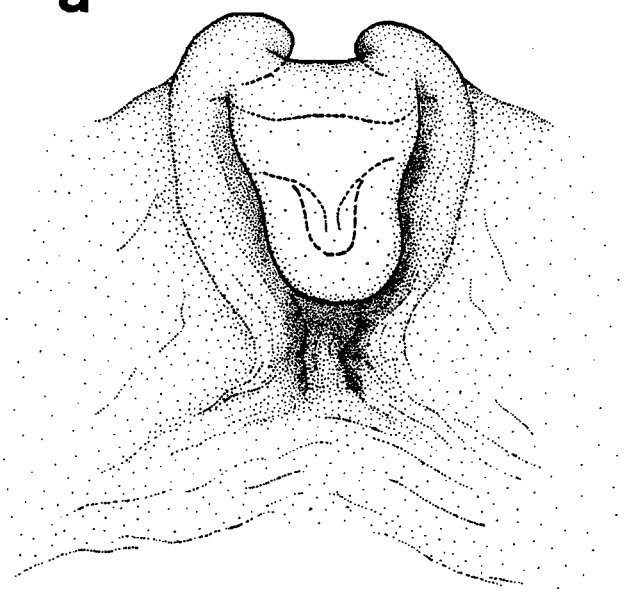

~0.5 mm

Figure 103 Nineta gravida: female structures

a. subgenitale

[based on a specimen collected by
[not recorded], Departure Bay, British
Columbia, 13.VI.1908; CNC,
determined as Chrysopa gravida
by R.C. Smith and P.A. Adams]

a



0·2 mm

Figure 103 (continued)

b. subgenitale

c. ibid., lateral aspect

[based on a specimen collected by
J.F.G. Clarke, Bellingham, Washington,
20.VIII.1962; USNM, determined
as Chrysopa gravida by O.S. Flint
1962, and as Nineta gravida by
P.A. Adams 1976]

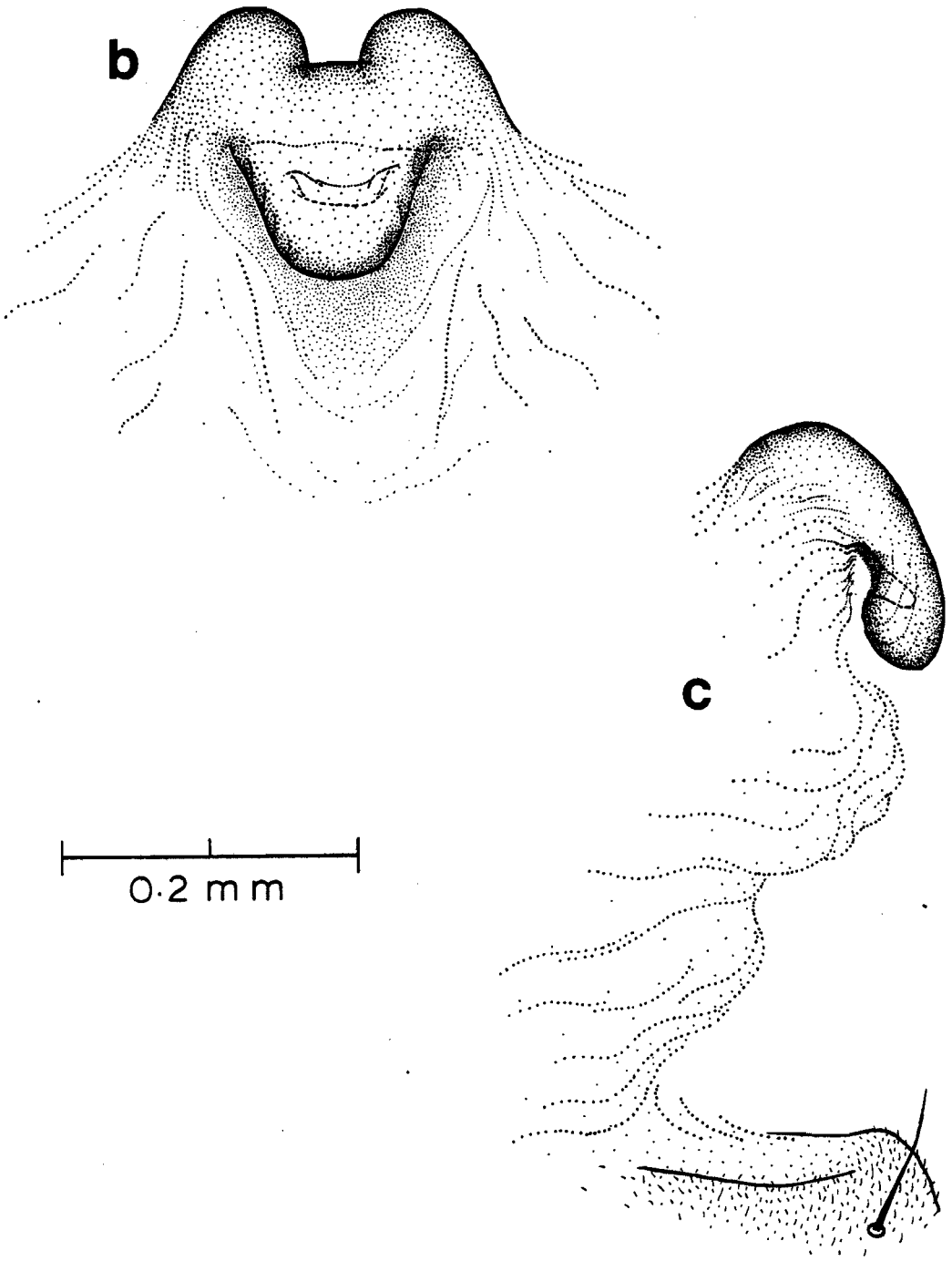
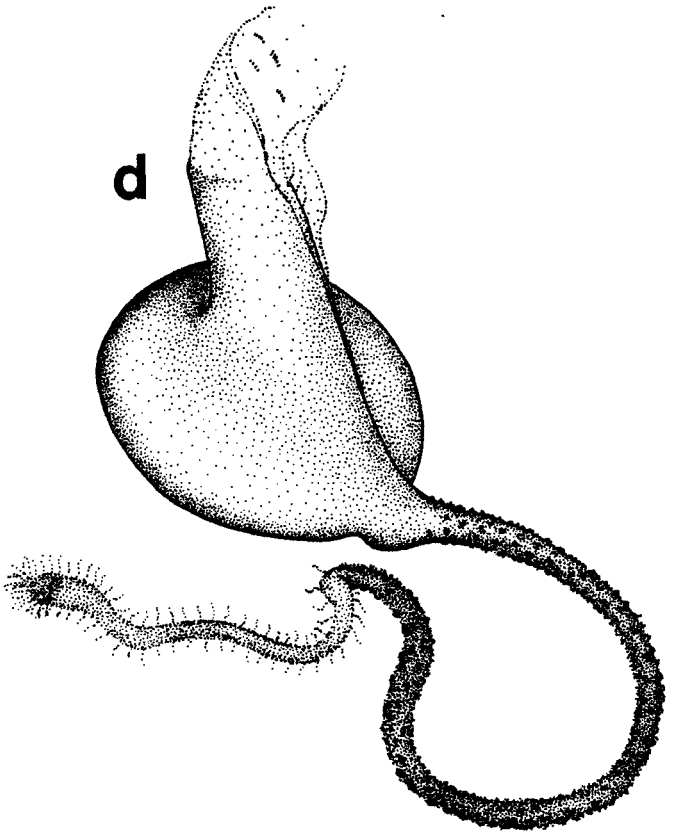

b
c
0·2 mm

Figure 103 (continued)

d. spermatheca

[based on a specimen collected by
[not recorded], Departure Bay, British
Columbia, 13.VI.1908; CNC,
determined as Chrysopa gravida
by R.C. Smith and P.A. Adams]



0·2 mm

Figure 103 (continued)

e. spermatheca

f. ibid., lateral aspect

[based on a specimen collected by
J.F.G. Clarke, Bellingham, Washington,
20.VIII.1962; USNM, determined
as Chrysopa gravida by O.S. Flint
1962, and as Nineta gravida by
P.A. Adams 1976]

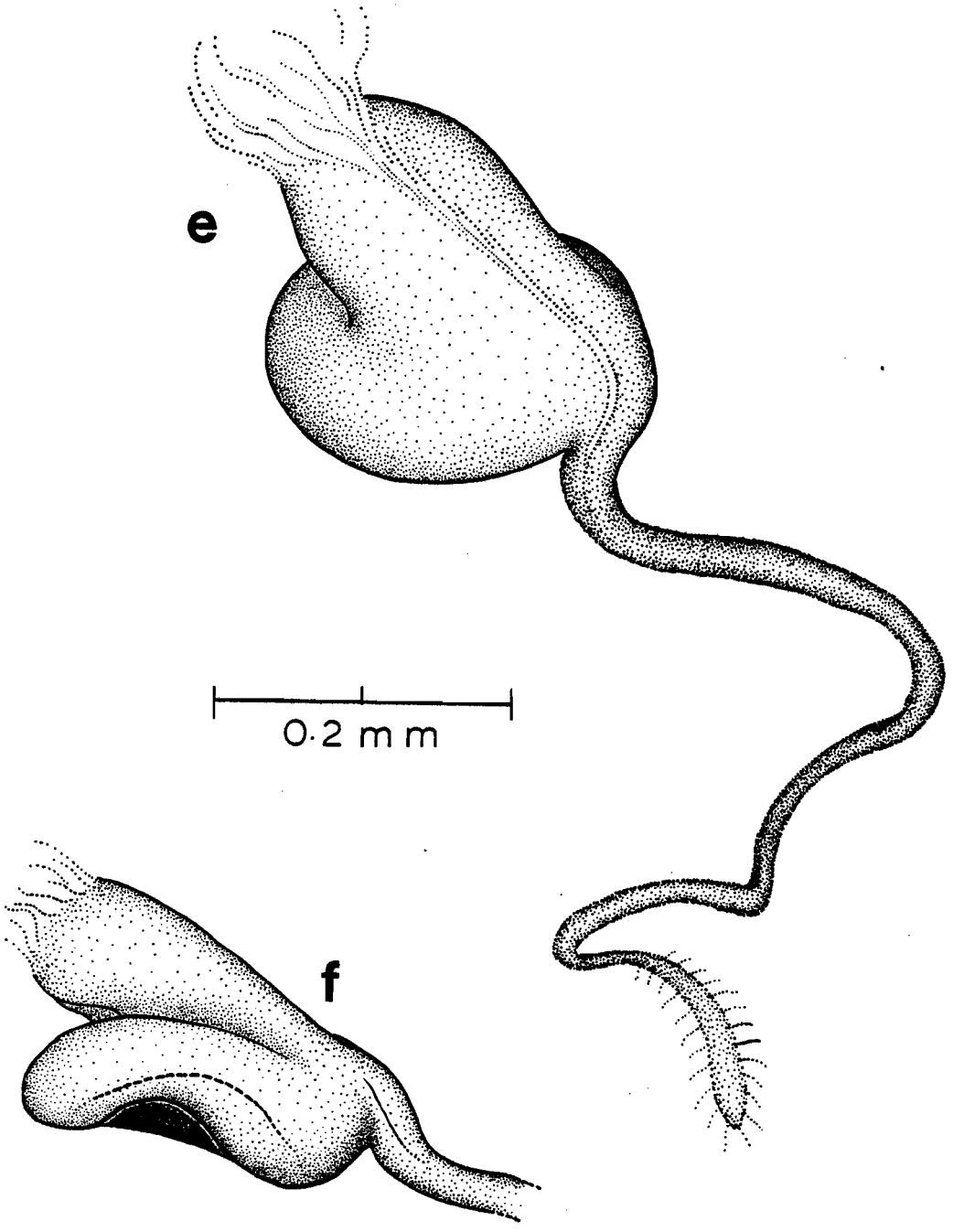
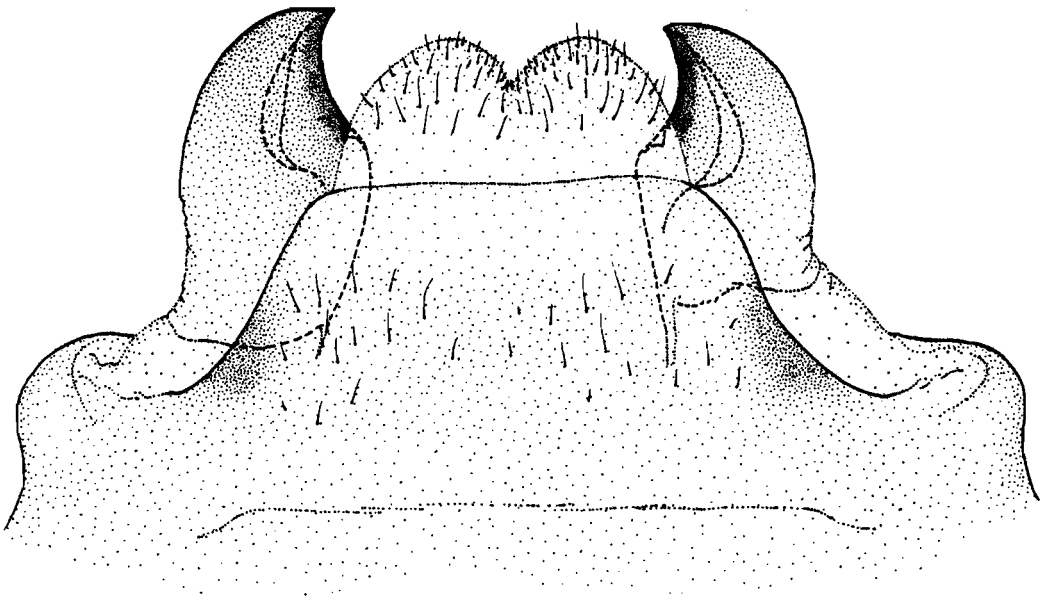

e
0·2 mm
f

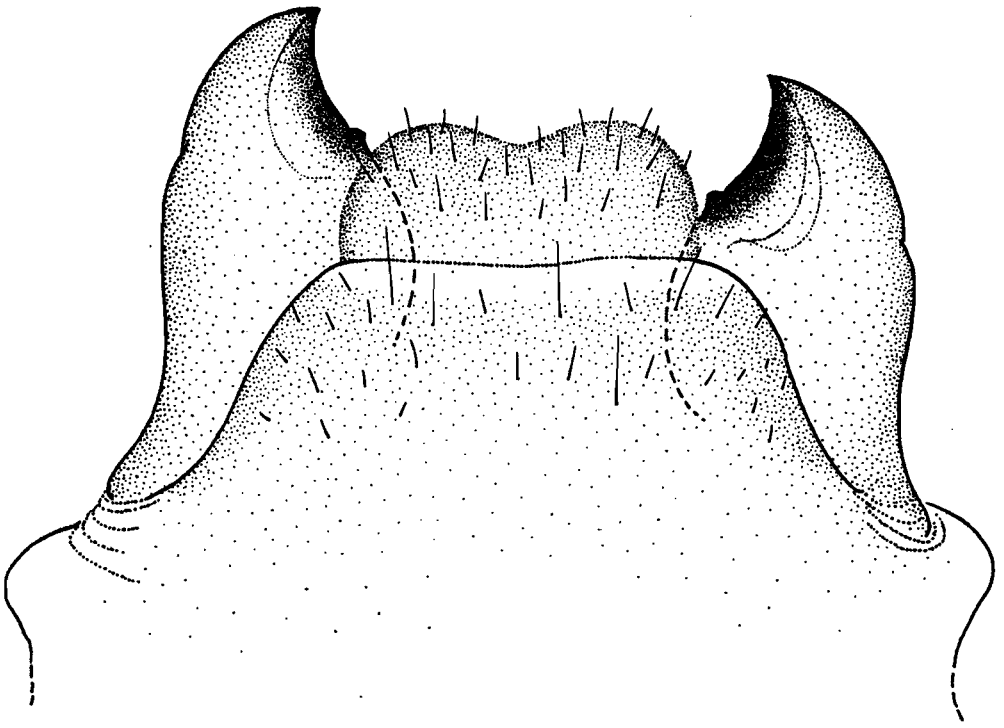
Figure 104 Nineta gravida: mandibles

[based on a specimen collected by
[not recorded], Departure Bay, British
Columbia, 13.VI.1908; CNC,
determined as Chrysopa gravida
by R.C. Smith and P.A. Adams]



0·2 mm

Figure 105 Nineta flava: mandibles



0.2 mm

Figure 106 Nineta flava: wing

a. fore wing

b. hind wing

[based on a specimen collected by
J. Marshall, Waddon, Surrey, England,
1.VI.1976; BMNH, determined
as Chrysopa flava by P.C. Barnard
1976, male]

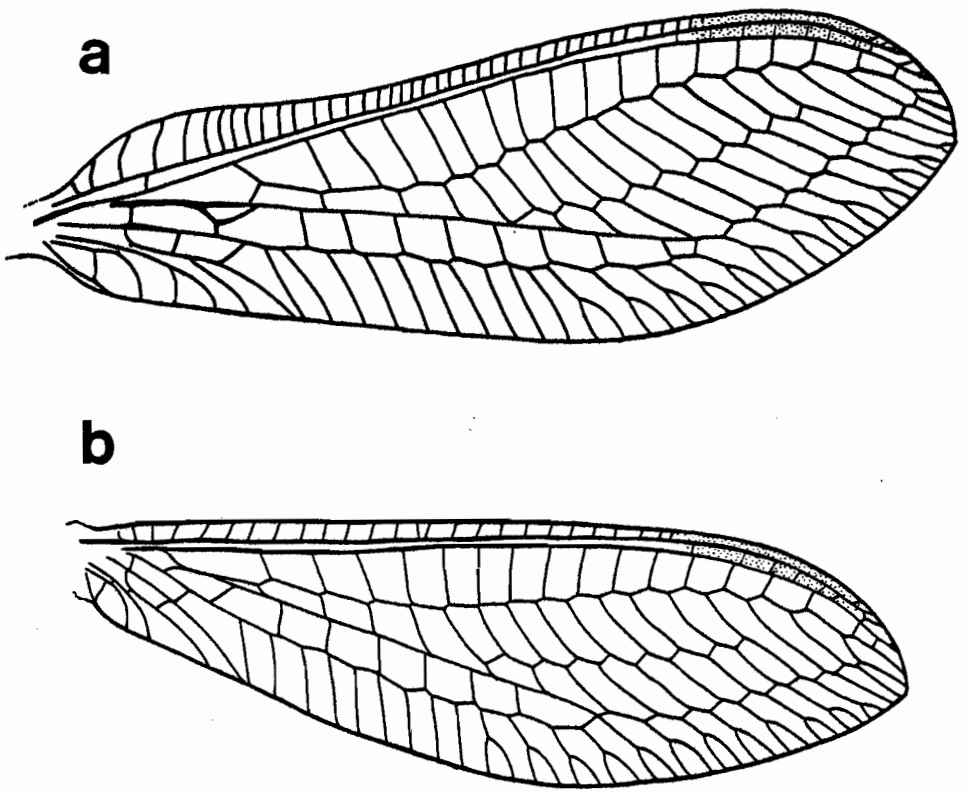
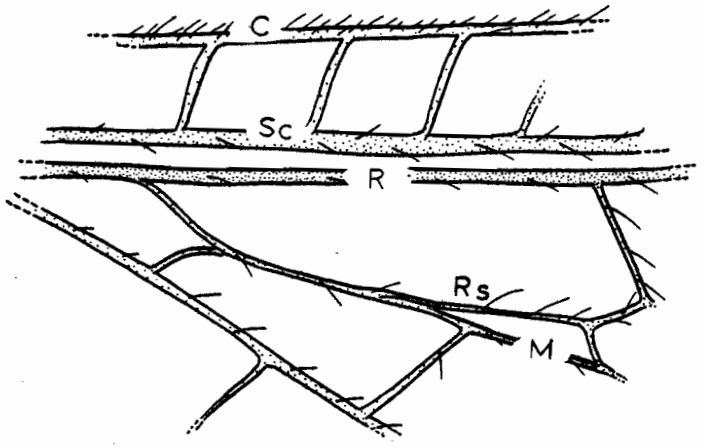

a
b
5 mm

Figure 106 (continued)

c. hind wing, showing incomplete fusion of Rs and M

[based on a specimen collected by J. Marshall, Waddon, Surrey, England, 1.VI.1976; BMNH, determined as Chrysopa flava by P.C. Barnard 1976, male]

c

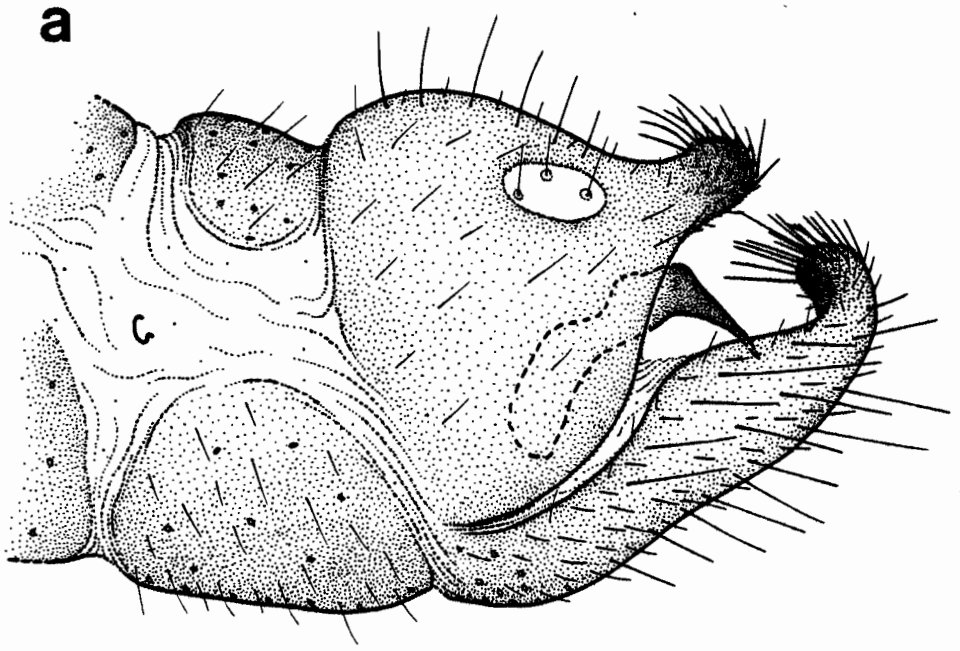


1 mm

Figure 107 Nineta flava: male structures

a. terminalia with structures everted

[based on a specimen collected by
J. Marshall, Waddon, Surrey, England,
1.VI.1976; BMNH, determined
as Chrysopa flava by P.C. Barnard
1976]



1 mm

Figure 107 (continued)

b. arcessus

c. entoprocessus

d. gonarcus

[based on a specimen collected by
J. Marshall, Waddon, Surrey, England,
1.VI.1976; BMNH, determined
as Chrysopa flava by P.C. Barnard
1976]

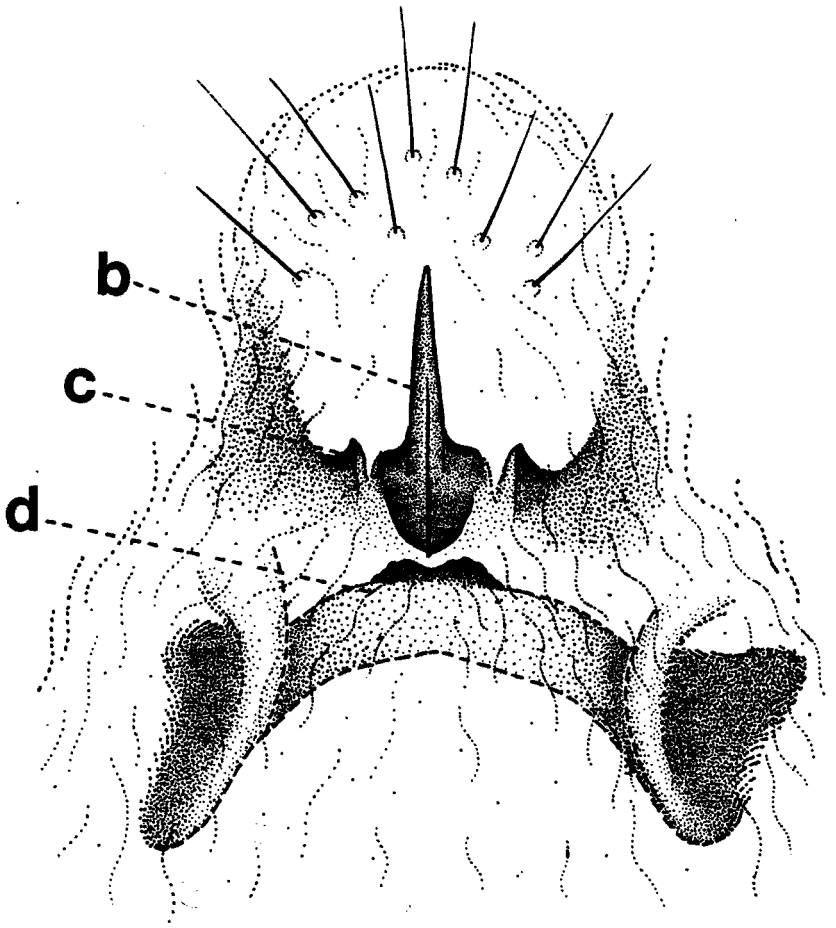

b
c
d
0·2 mm

Figure 107 (continued)

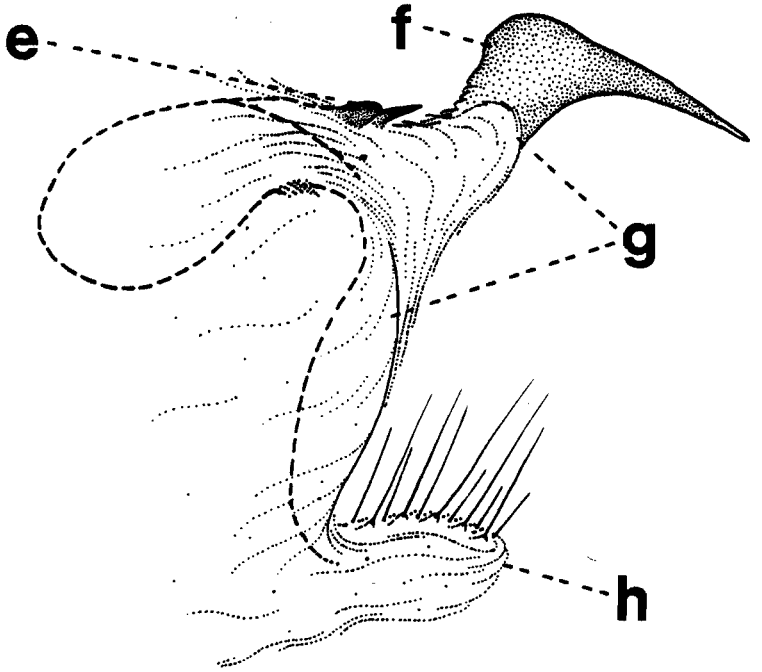
e. gonarcus, lateral aspect

f. arcessus, lateral aspect

g. entoprocessus, lateral aspect

h. gonosaccus

[based on a specimen collected by
J. Marshall, Waddon, Surrey, England,
1.VI.1976; BMNH, determined
as Chrysopa flava by P.C. Barnard
1976]



0·2 mm

Figure 108 Glenochrysa lineaticornis: male head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

J.A. Garland, Ile-Perrot, Québec,

29.VI.1980; LEM]

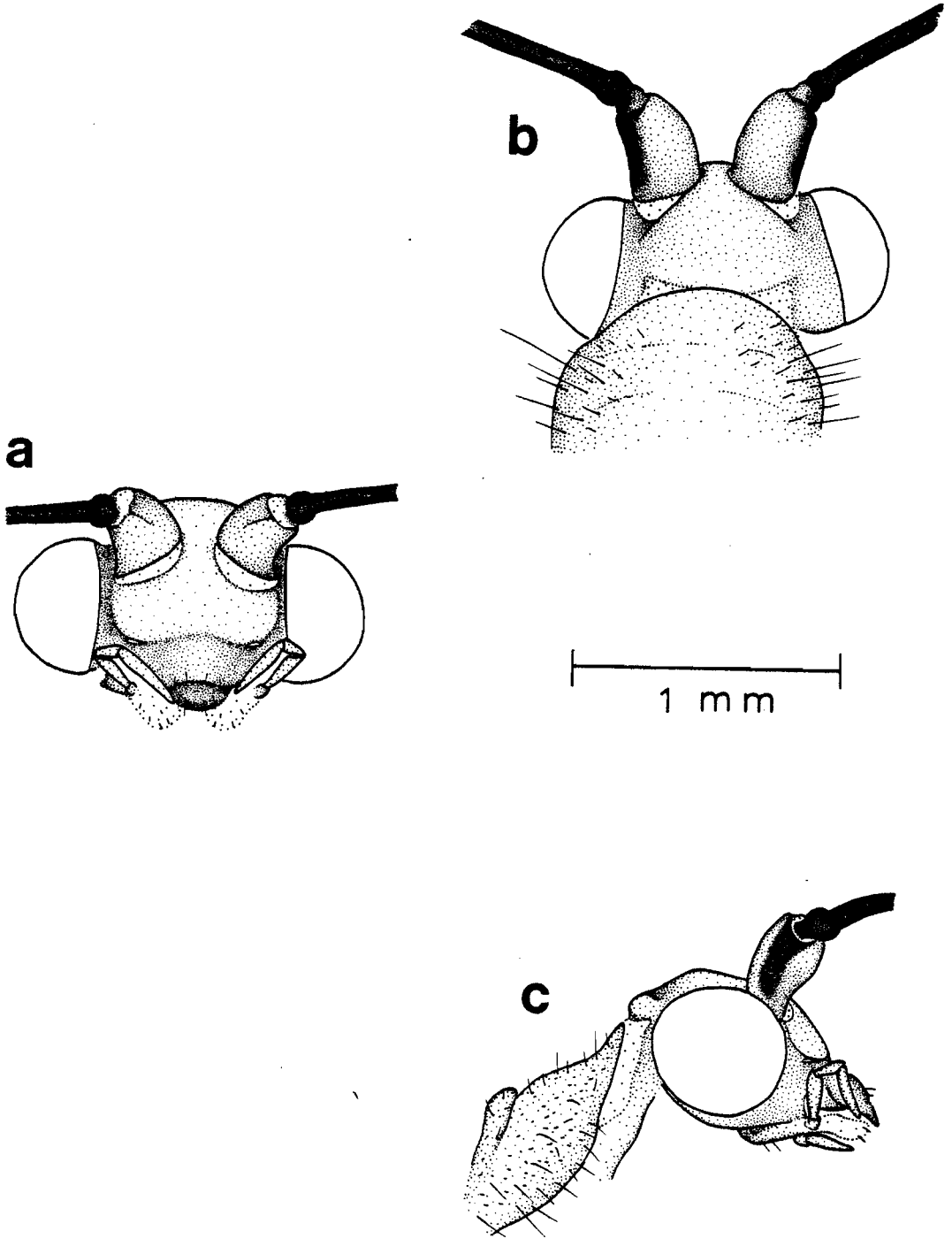

b
a
1 mm
c

Figure 109 Glenochrysa lineaticornis: wing

a. fore wing

b. hind wing

[based on a specimen collected by

J.A. Garland, Ile-Perrot, Québec,

29.VI.1980; LEM, male]

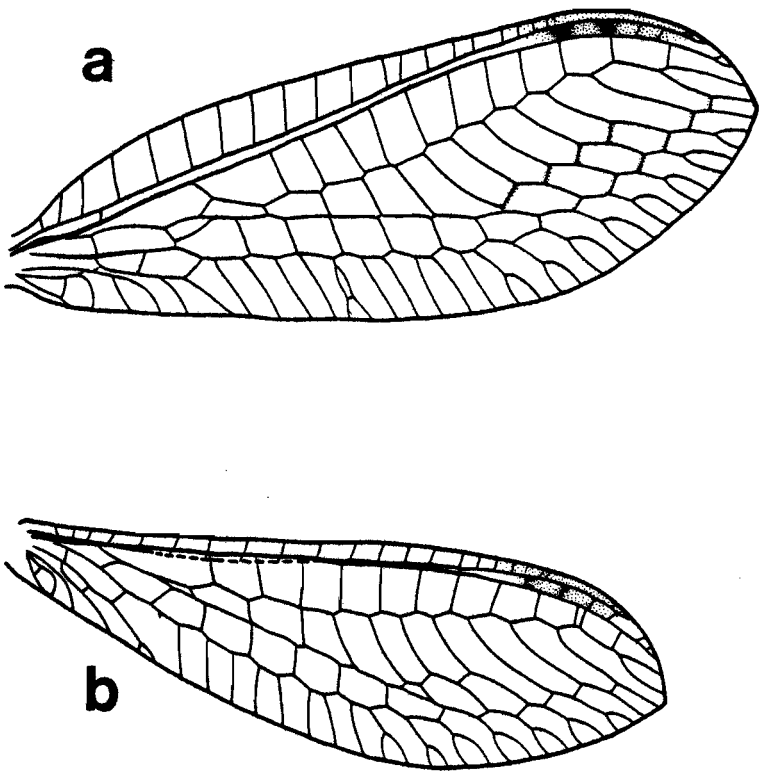

a
b
5 mm

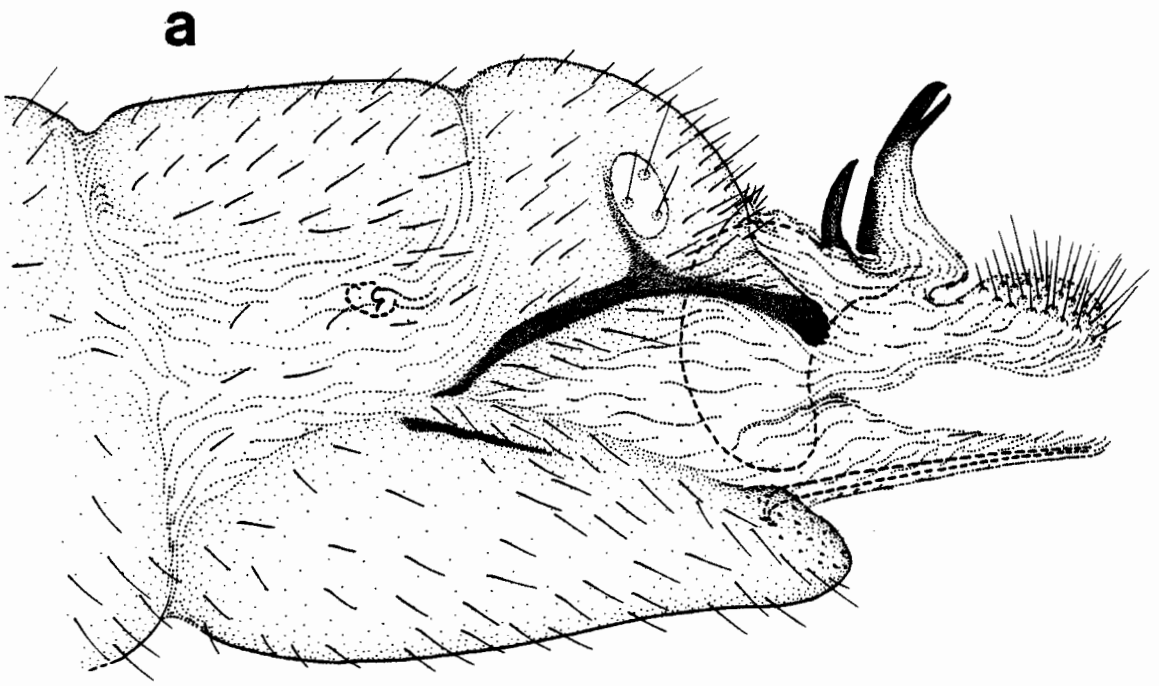
Figure 110 *Glenochrysa lineaticornis*: male structures

a. terminalia with structures everted

[based on a specimen collected by

J.A. Garland, Ile-Perrot, Québec,

29.VI.1980; LEM]


a

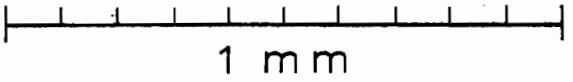

1 mm

Figure 110 (continued)

b. dorsal apodeme, caudal aspect

c. gonapsis

[based on a specimen collected by
J.A. Garland, Ile-Perrot, Québec,
29.VI.1980; LEM]

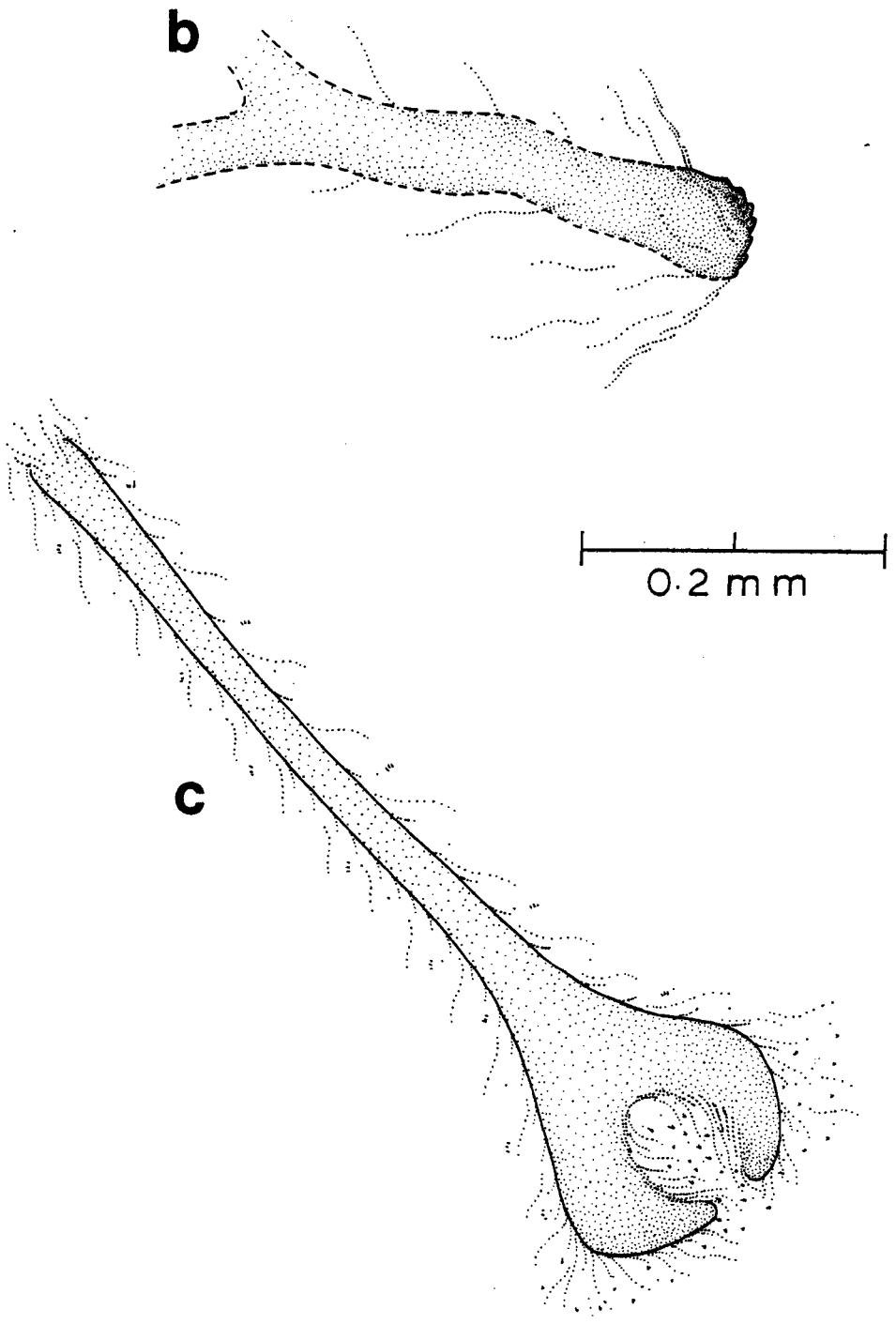

b
0·2 mm
c

Figure 110 (continued)

d. arcessus

e. entoprocessus

f. gonarcus

[based on a specimen collected by
J.A. Garland, Ile-Perrot, Québec,
29.VI.1980; LEM]

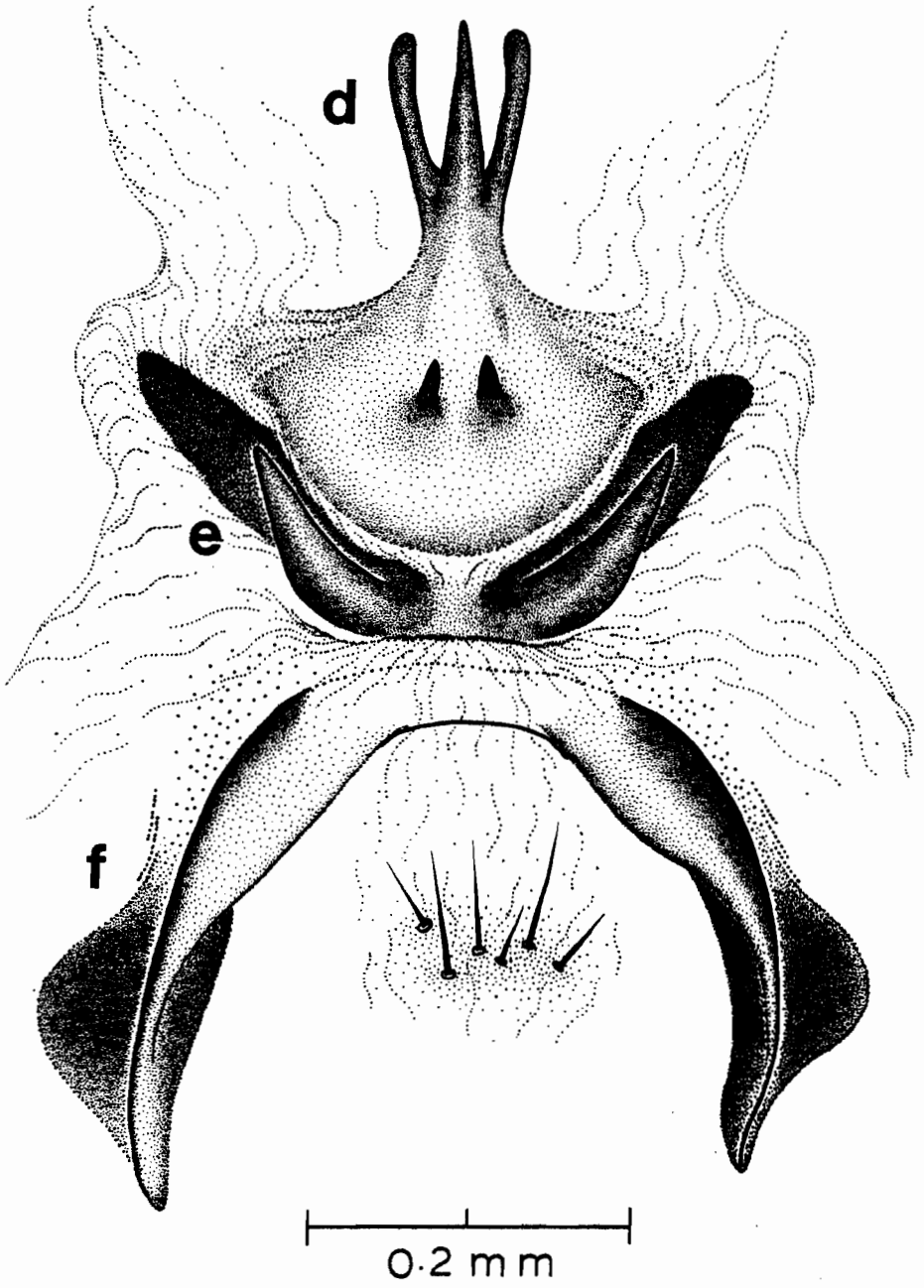

d
e
f
0·2 mm

Figure 110 (continued)

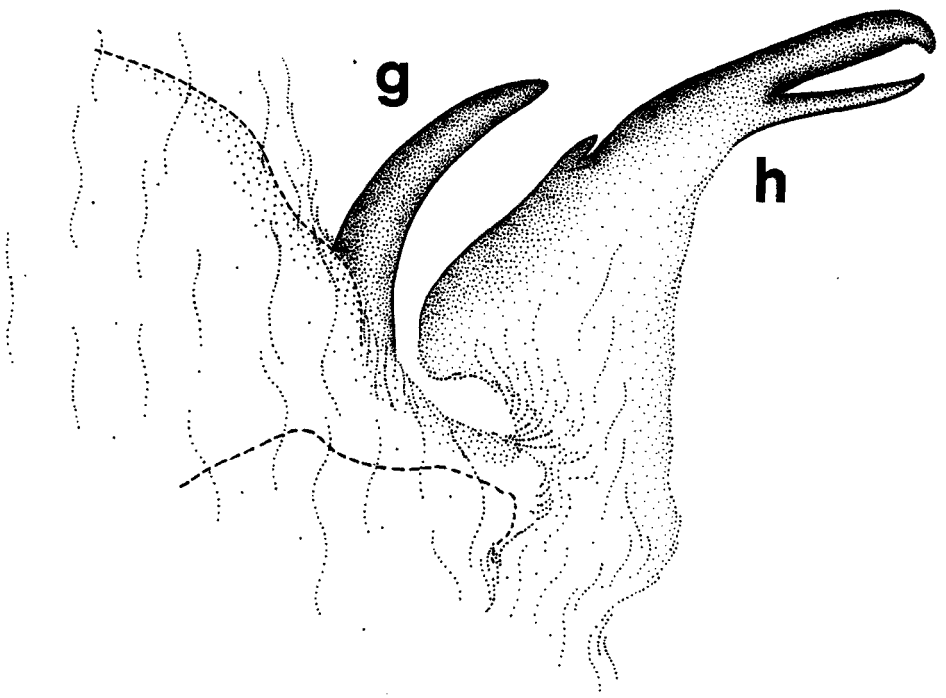
g. entoprocessus, lateral aspect

h. arcessus, lateral aspect

[based on a specimen collected by

J.A. Garland, Ile-Perrot, Québec,

29.VI.1980; LEM]



0·2 mm

Figure 111 Glenochrysa lineaticornis: female structures

a. subgenitale

[based on a specimen collected by

F.O. Morrison, Weirs Beach, New Hampshire,

15.VII.1967; LEM]

a

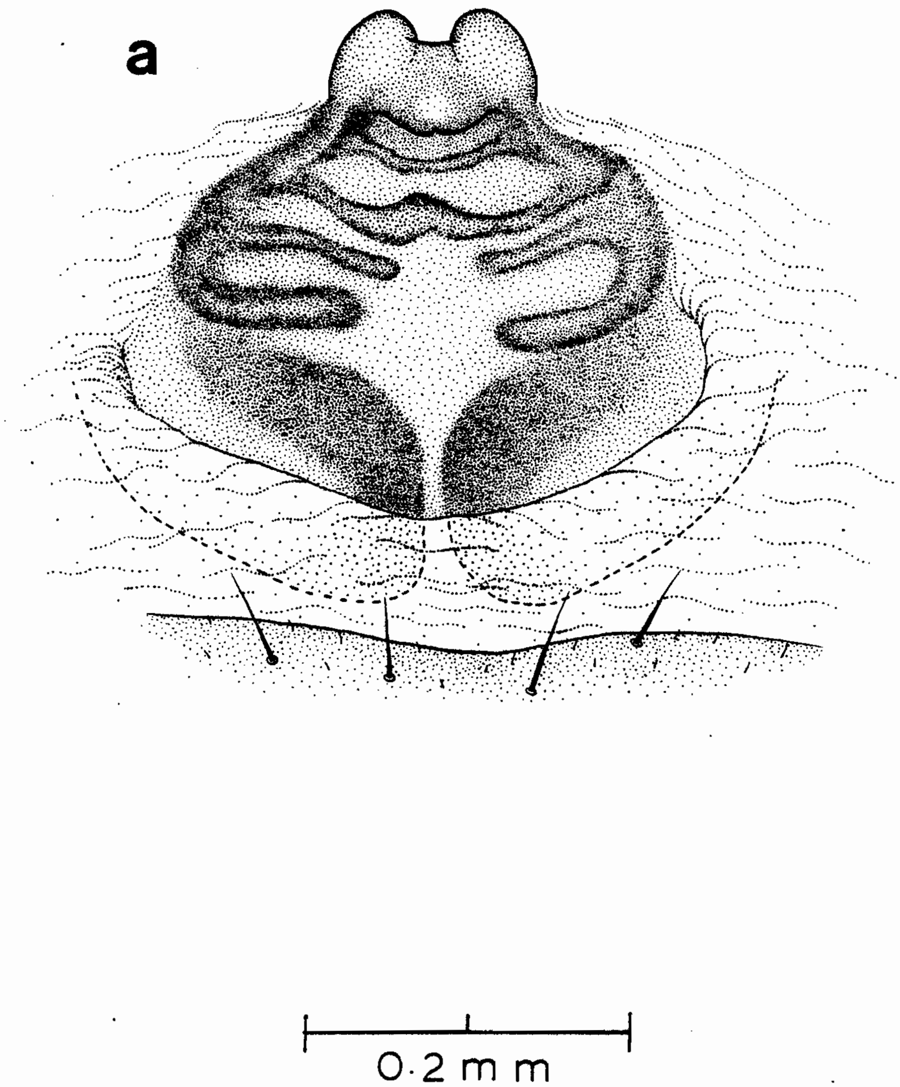


Figure 111 (continued)

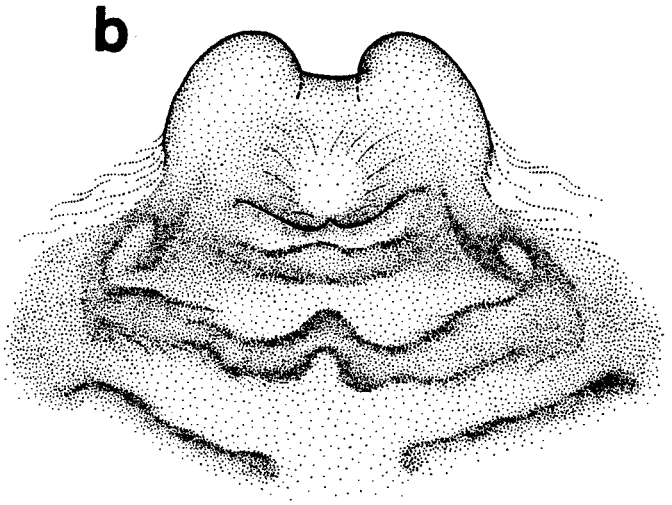
b. apical lobe

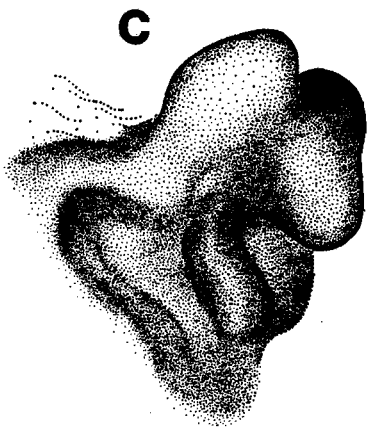
c. ibid., lateral aspect

[based on a specimen collected by

F.O. Morrison, Weirs Beach, New Hampshire,

15.VII.1967; LEM]





0·2 mm

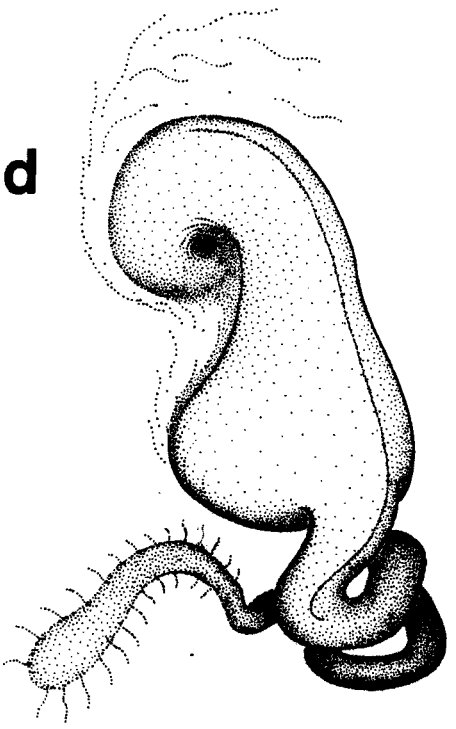
Figure 111 (continued)

d. spermatheca

[based on a specimen collected by

F.O. Morrison, Weirs Beach, New Hampshire,

15.VII.1967; LEM]


d

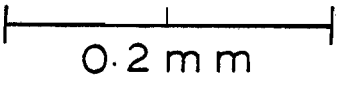
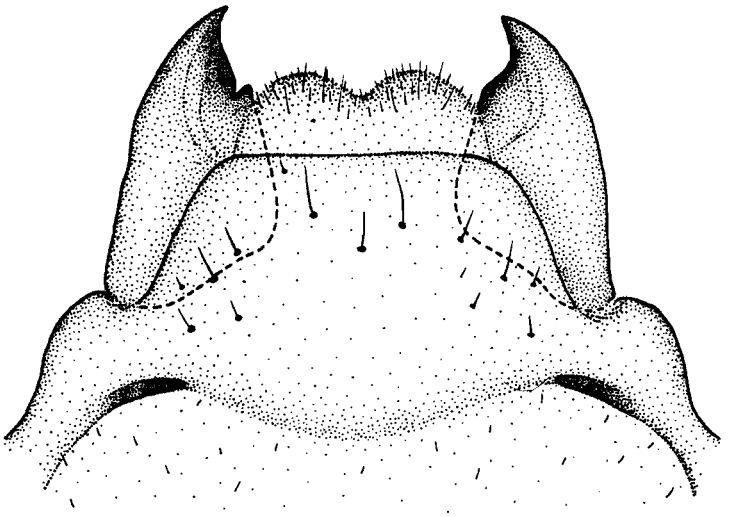

0·2 mm

Figure 112 Glenochrysa lineaticornis: mandibles

[based on a specimen collected by
J.A. Garland, Ile-Perrot, Québec,
29.VI.1980; LEM, male]



0.2 mm

Figure 113 Oviedus placitus: male head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

F.O. Morrison, Weirs Beach, New Hampshire,

19.VIII.1966; LEM]

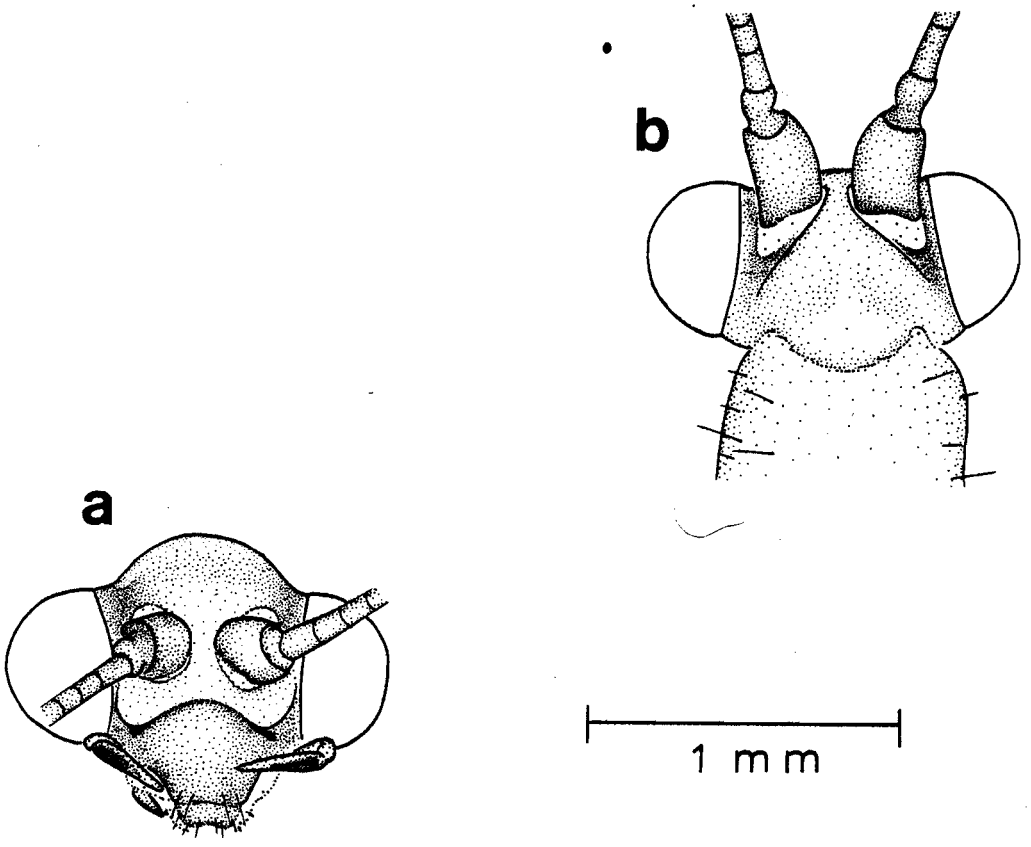

b
a
1 mm
c

Figure 114 Oviedus placitus: wing

a. fore wing

b. hind wing

[based on a specimen collected by

F.O. Morrison, Weirs Beach, New Hampshire,

19.VIII.1966; LEM, male]

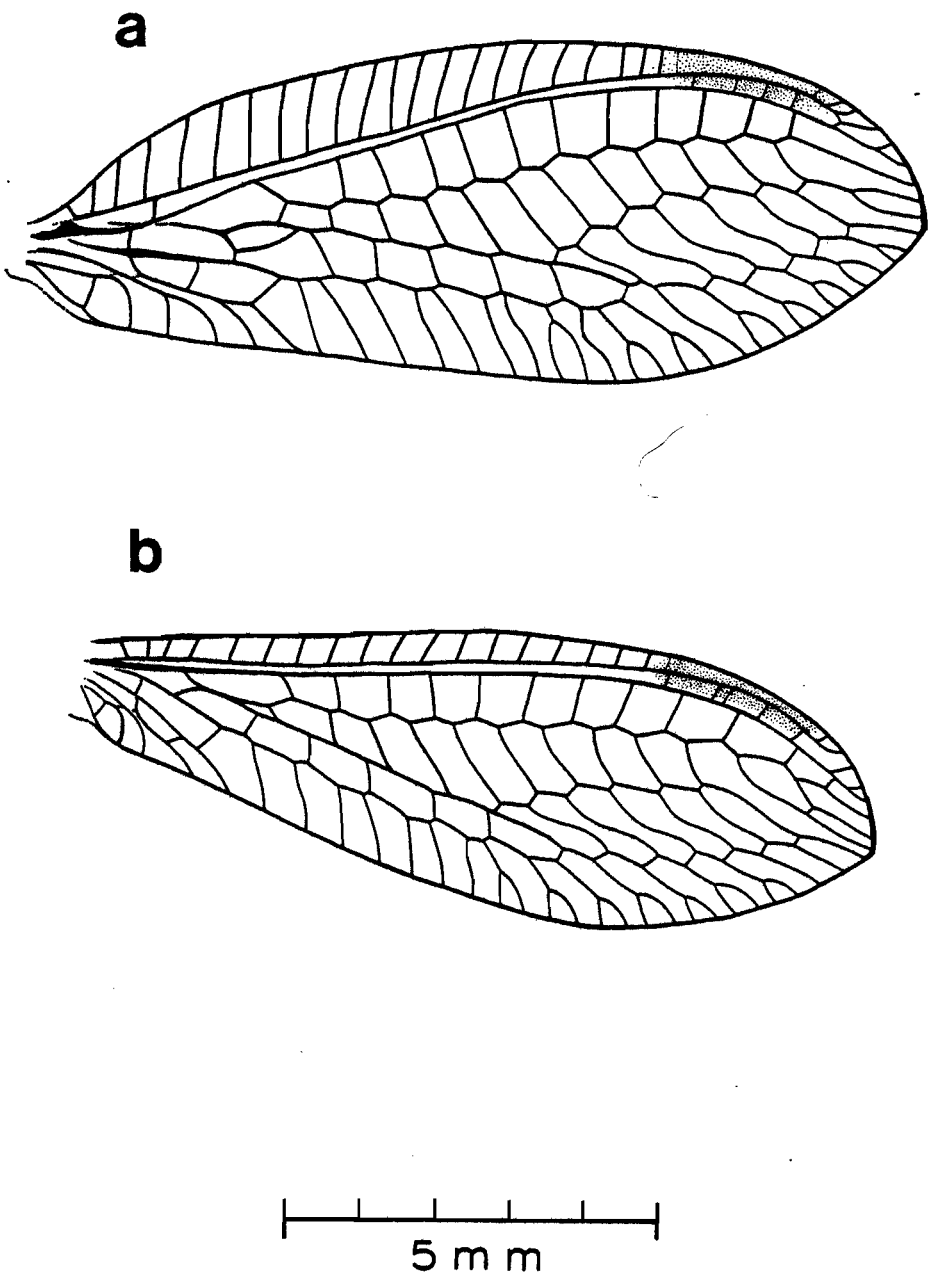

a
b
5 m m

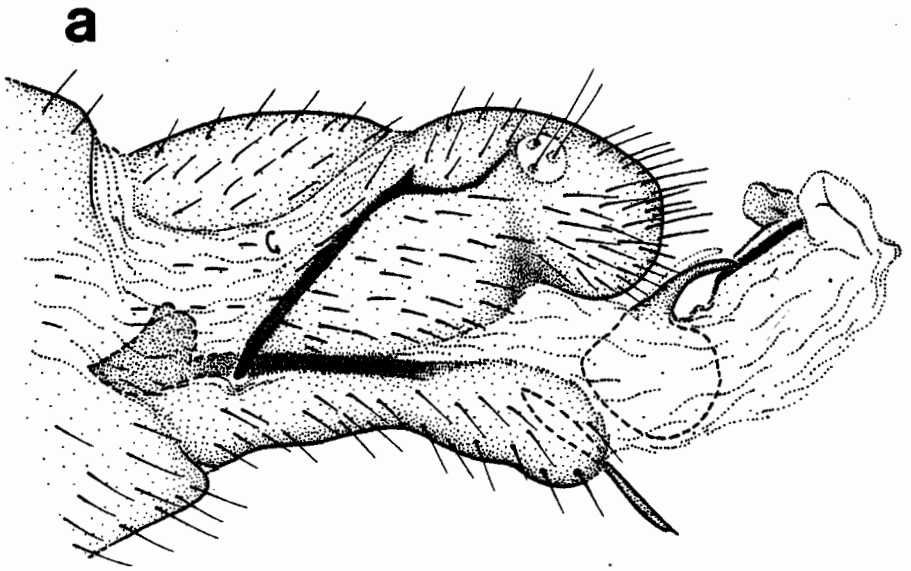
Figure 115 Oviedus placitus: male structures

a. terminalia with structures everted

[based on a specimen collected by

F.O. Morrison, Weirs Beach, New Hampshire,

19.VIII.1966; LEM]


a
C

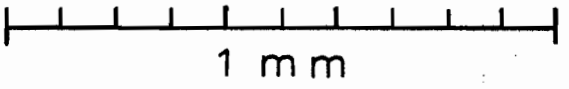

1 mm

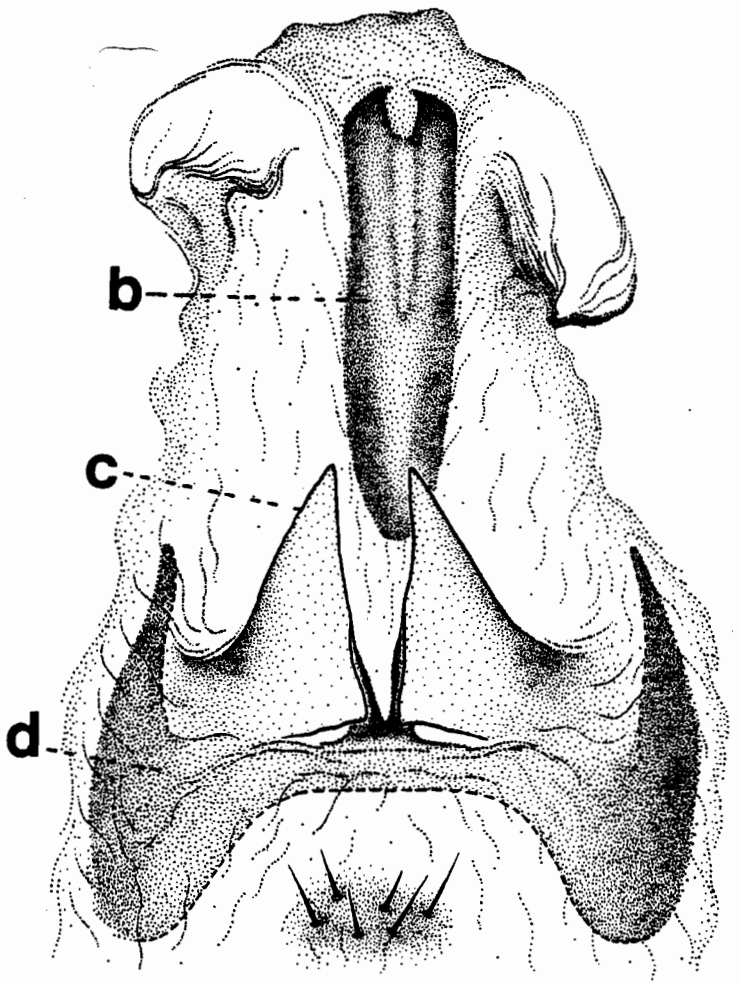
Figure 115 (continued)

b. mediuncus

c. entoprocessus

d. gonarcus

[based on a specimen collected by
F.O. Morrison, Weirs Beach, New Hampshire,
19.VIII.1966; LEM]



0·2 mm

Figure 115 (continued)

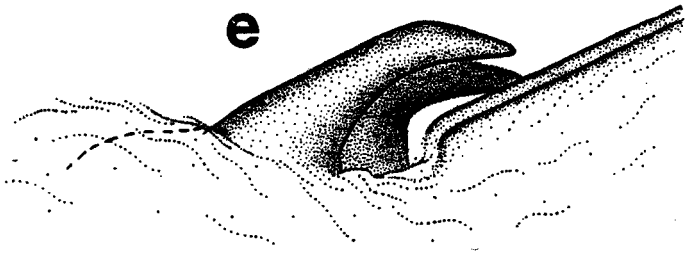
e. entoprocessus, lateral aspect

f. gonapsis

[based on a specimen collected by

F.O. Morrison, Weirs Beach, New Hampshire,

19.VIII.1966; LEM]


e

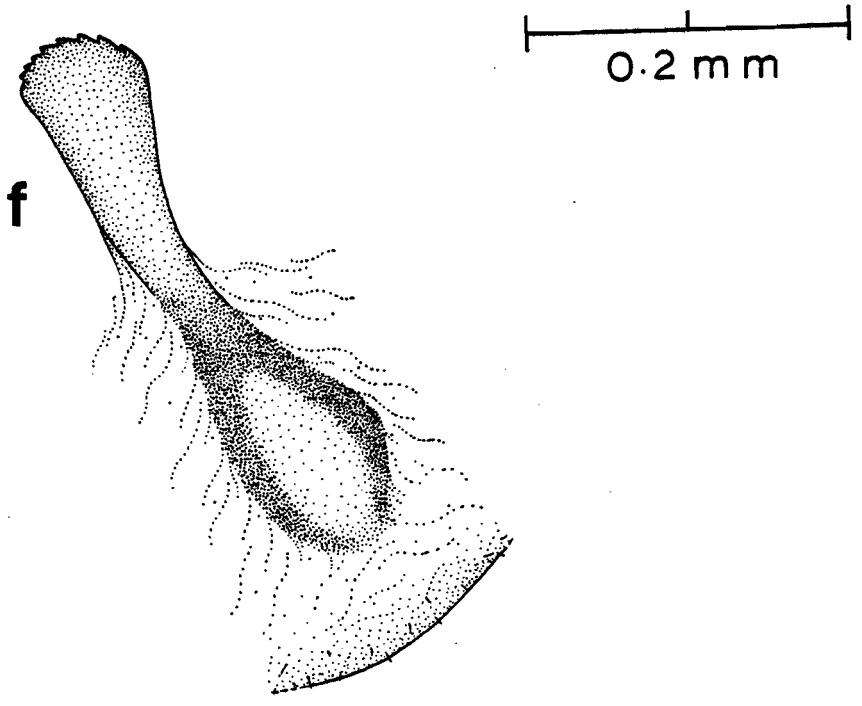
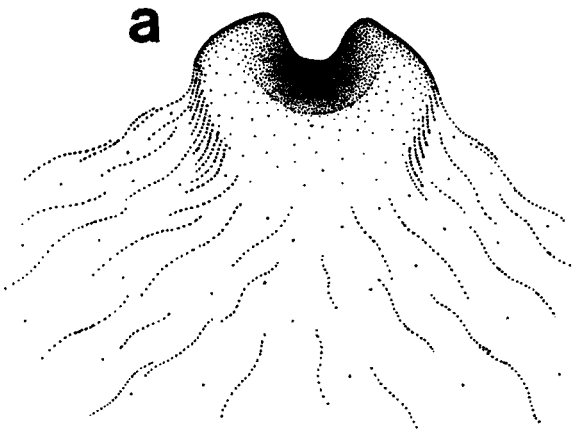

0·2 mm
f

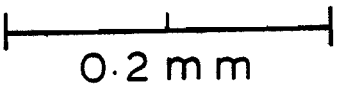
Figure 116 Oviedus placitus: female structures

a. subgenitale

b. praegenitale

[based on a specimen collected by
R.H. Parry, Chatterton, Ontario,
7-8.VIII.1968; UG]


a


0·2 mm

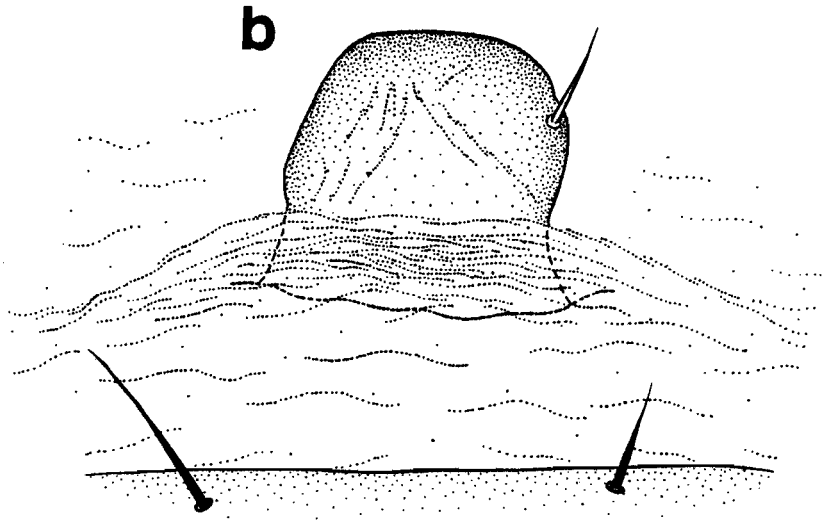

b

Figure 116 (continued)

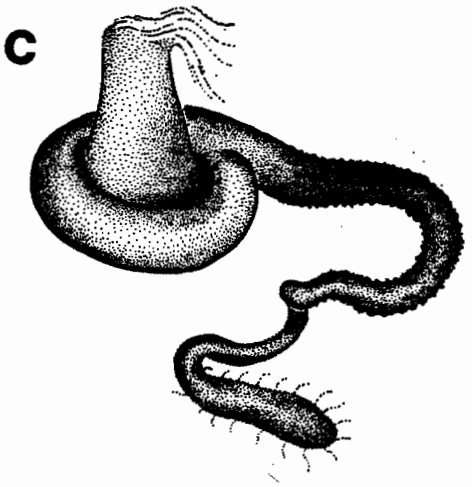
c. spermatheca

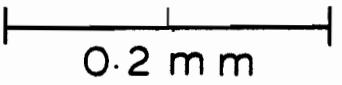
d. ibid., lateral aspect

[based on a specimen collected by

R.H. Parry, Chatterton, Ontario,

7-8.VIII.1968; UG]


c


0·2 mm

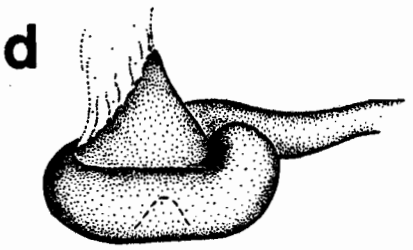
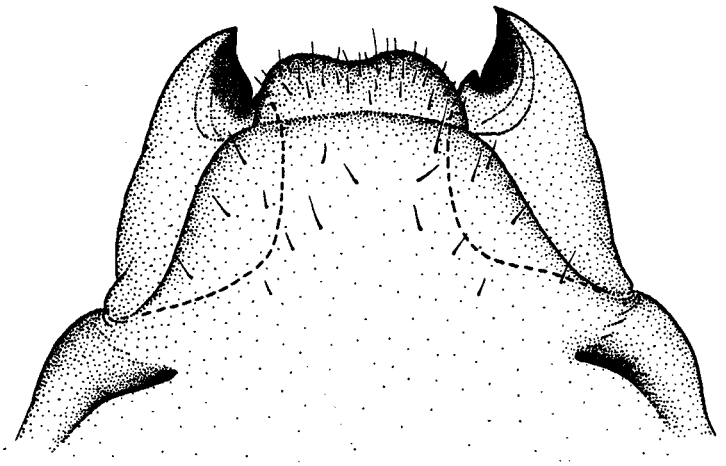

d

Figure 117 Oviedus placitus: mandibles

[based on a specimen collected by
R.H. Parry, Chatterton, Ontario,
7-8.VIII.1968; UG, female]



0·2 mm

Figure 118 Malladá perfectus: female head

a. frontal

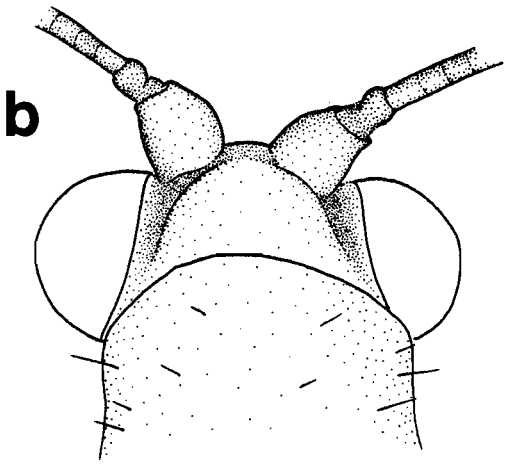
b. dorsal

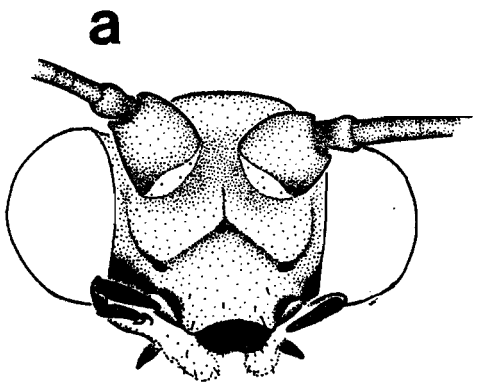
c. lateral

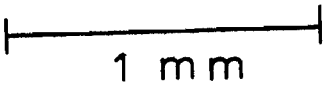
[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

10.VIII.1976; LEM]


b


a


1 mm

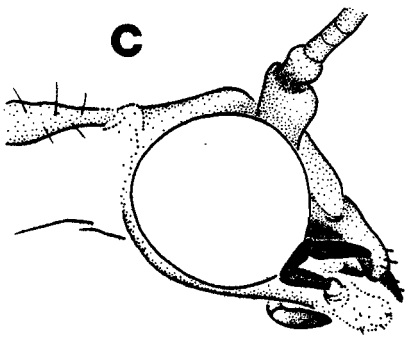

c

Figure 119 Malladà perfectus: wing

a. fore wing

b. hind wing

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

10.VIII.1976; LEM, female]

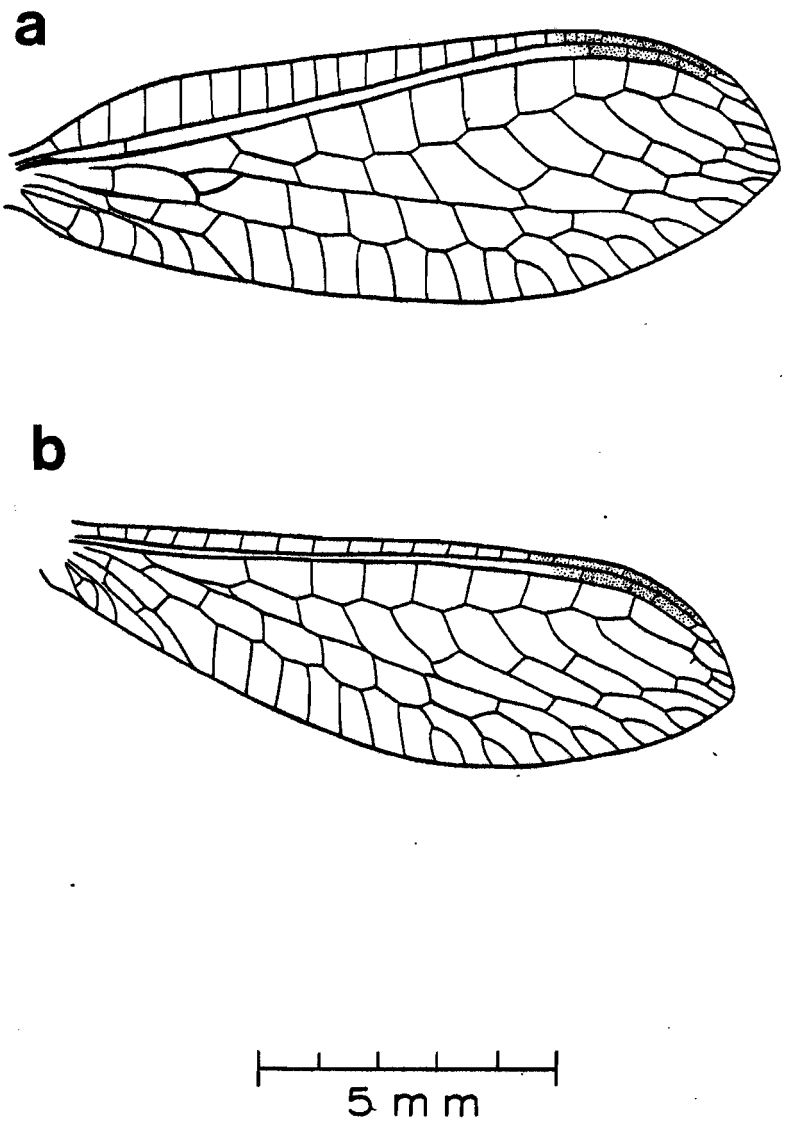

a
b
5 mm

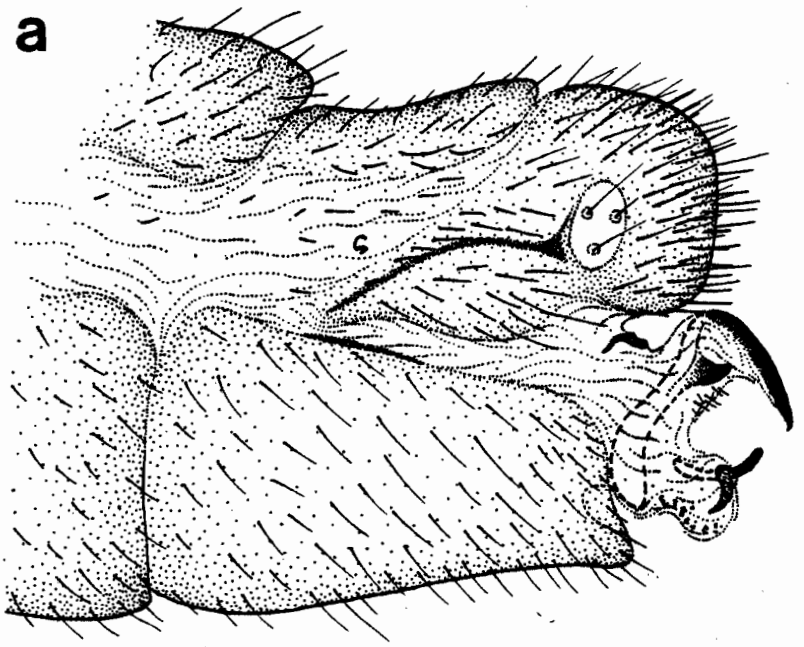
Figure 120 Malláda perfectus: male structures

a. terminalia with structures everted

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

28.VII.1976; LEM]



1 mm

Figure 120 (continued)

b. arcessus

c. entoprocessus

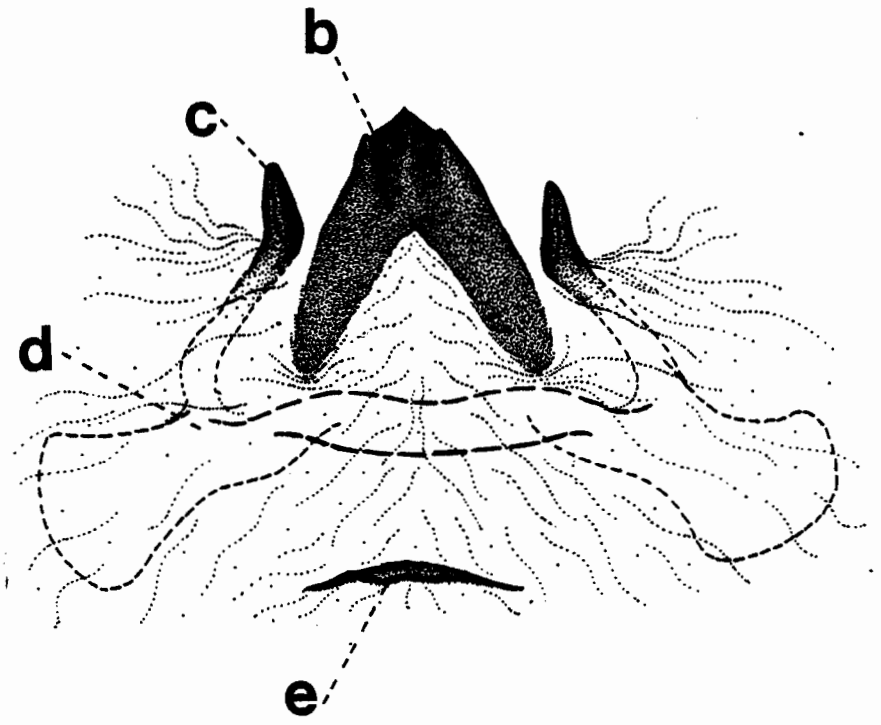
d. gonarcus

e. tignum

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

18.VIII.1976; LEM]



0·2 mm

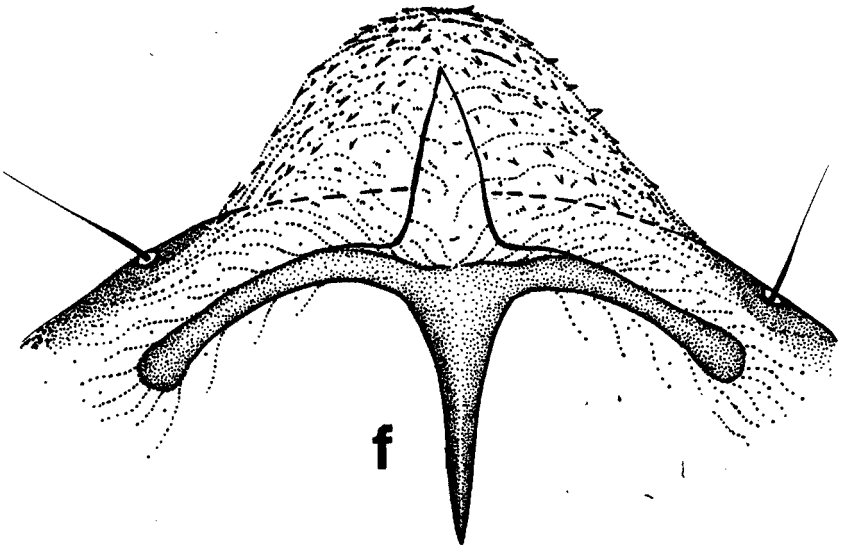
Figure 120 (continued)

f. gonapsis

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

18.VIII.1976; LEM]



0·2 mm

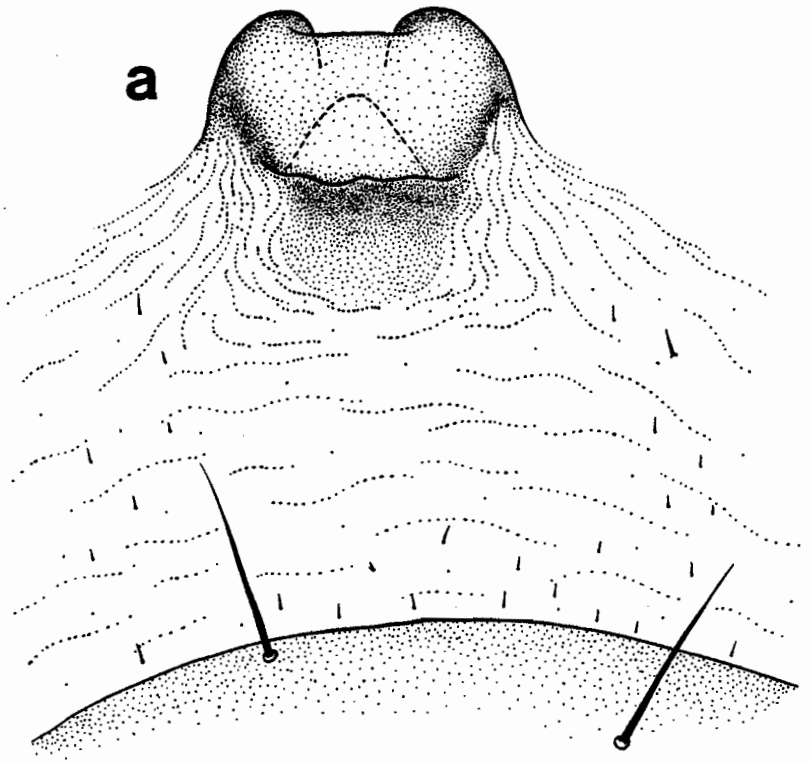
Figure 121 Mallada perfectus: female structures

a. subgenitale

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

10.VIII.1976; LEM]



0·2 mm

Figure 121 (continued)

b. subgenitale, lateral aspect

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

10.VIII.1976; LEM]

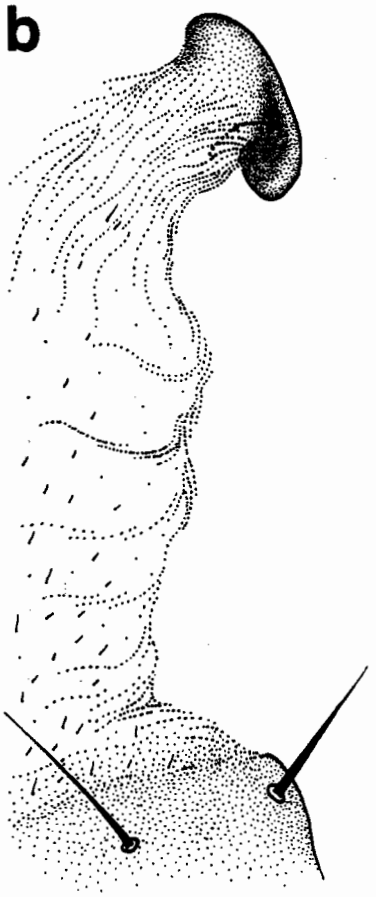

b
0·2 mm

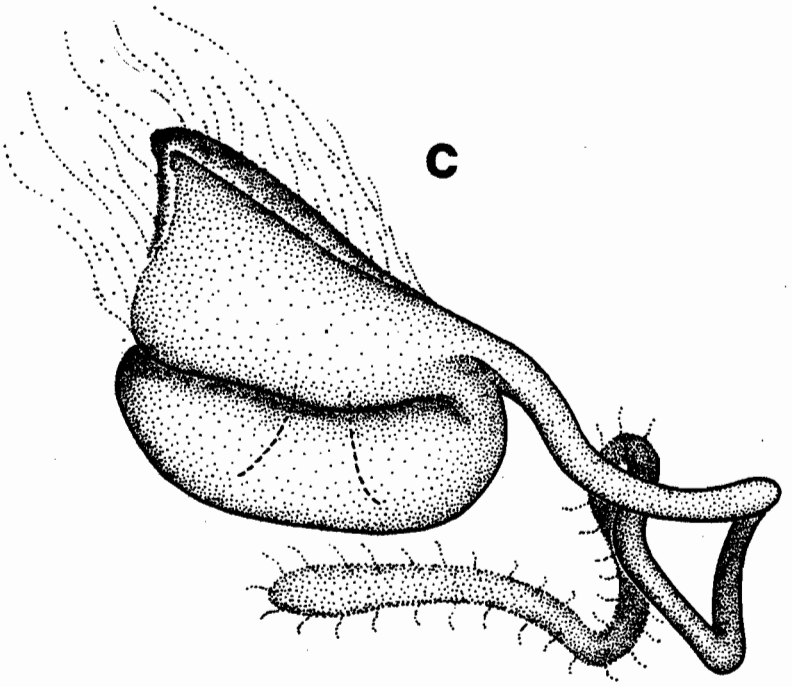
Figure 121 (continued)

c. spermatheca

[based on a specimen collected by

J.A. Garland, Penticton, British Columbia,

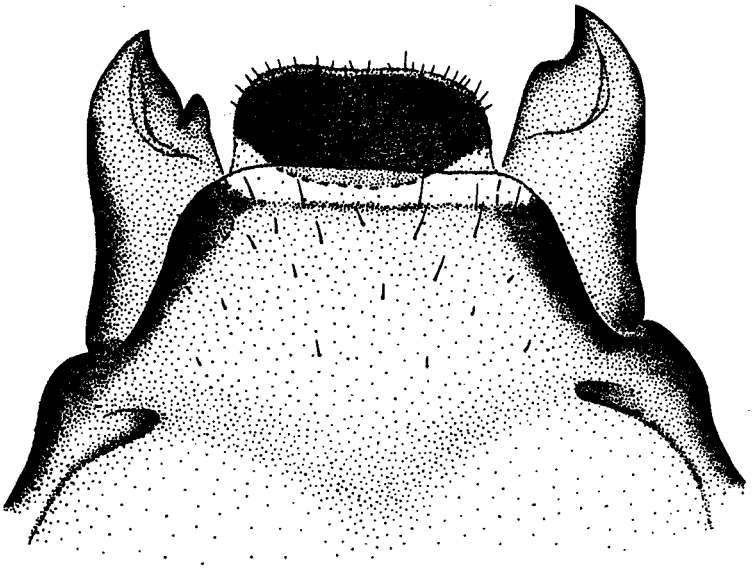
10.VIII.1976; LEM]



0·2 mm

Figure 122 Malláda perfectus: mandibles

[based on a specimen collected by
J.A. Garland, Penticton, British Columbia,
10.VIII.1976; LEM, female]



0·2 mm

Figure 123 Malladá slossonae: male head

a. frontal

b. dorsal

c. lateral

[based on a specimen collected by

E. Oleksuik, Pinery Prov. Pk., Lambton Co.,

Ontario, 3.VII.1977; ROM]

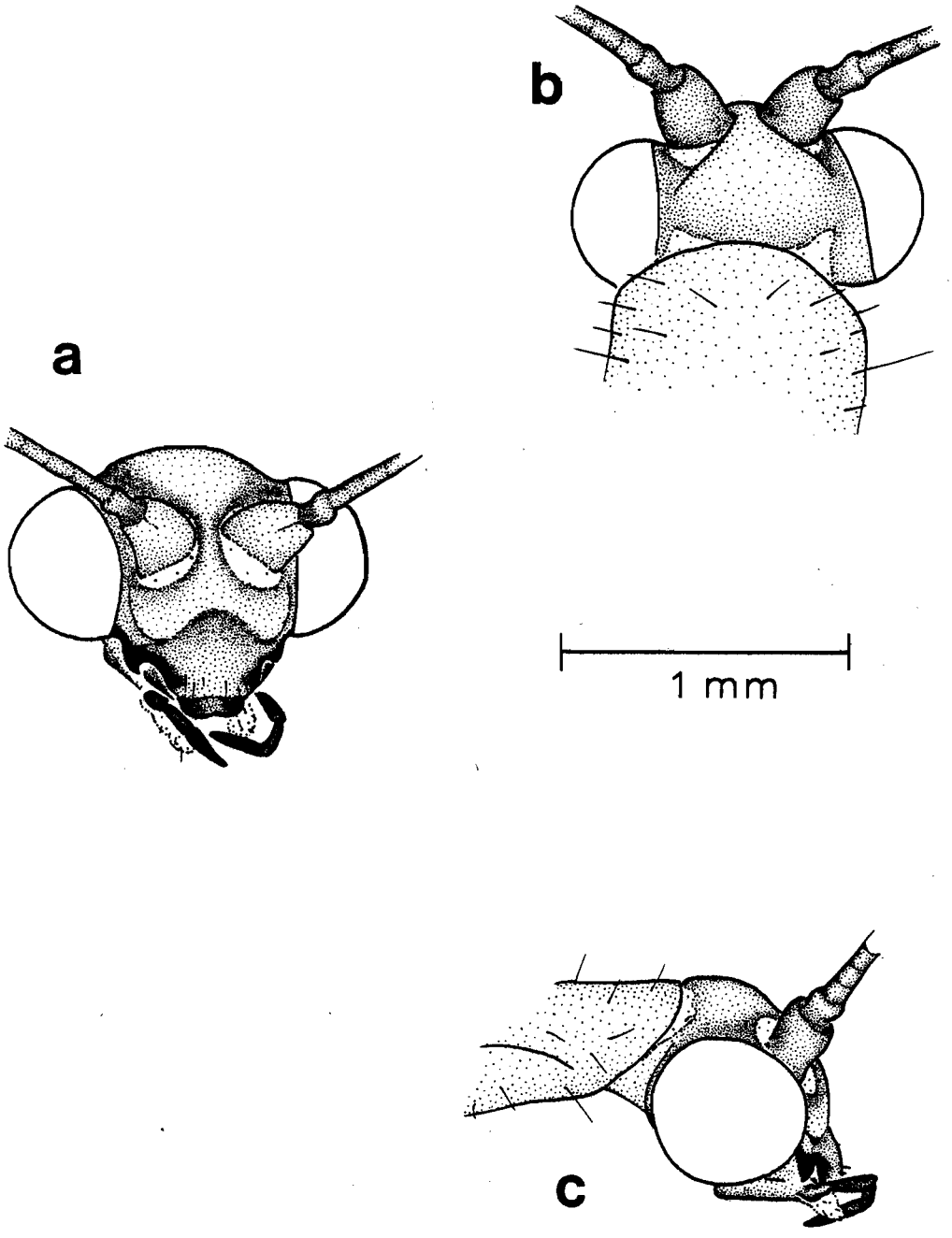

b
a
1 mm
c

Figure 124 Malladá slossonae: wing

a. fore wing

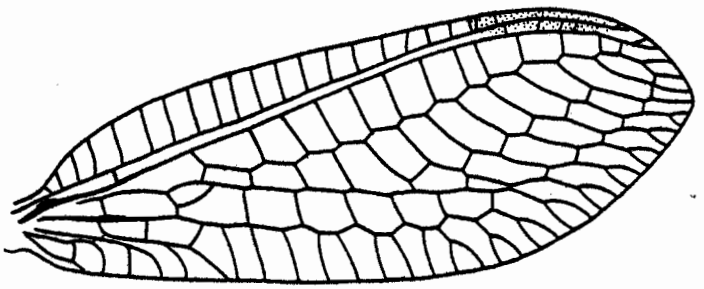
b. hind wing

[based on a specimen collected by

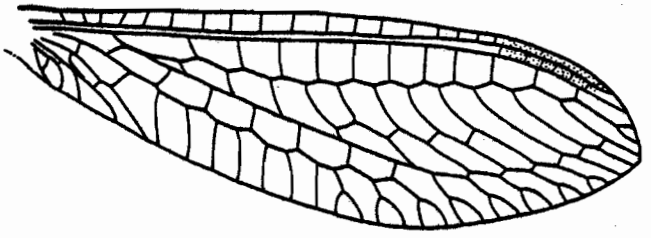
E. Oleksuik, Pinery Prov. Pk., Lambton Co.,

Ontario, 3.VII.1977; ROM]

a



b



5 mm

Figure 125 Malláda slossonae: male structures

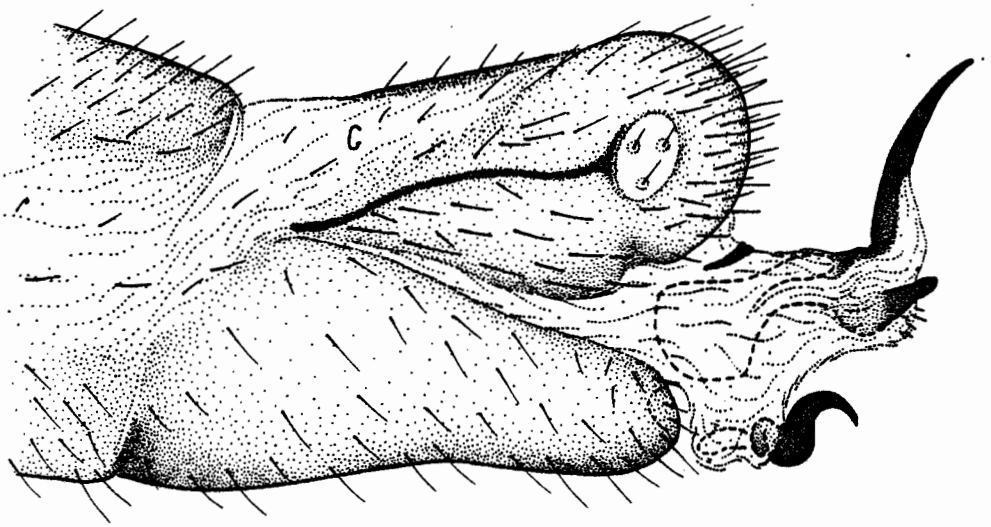
a. terminalia with structures everted

[based on a specimen collected by

E. Oleksuik, Pinery Prov. Pk., Lambton Co.,

Ontario, 3.VII.1977; ROM]

a



1 mm

Figure 125 (continued)

b. arcessus

c. entoprocessus

d. gonarcus

e. tignum

[based on a specimen collected by
E. Oleksuik, Pinery Prov. Pk., Lambton Co.,
Ontario, 3.VII.1977; ROM]

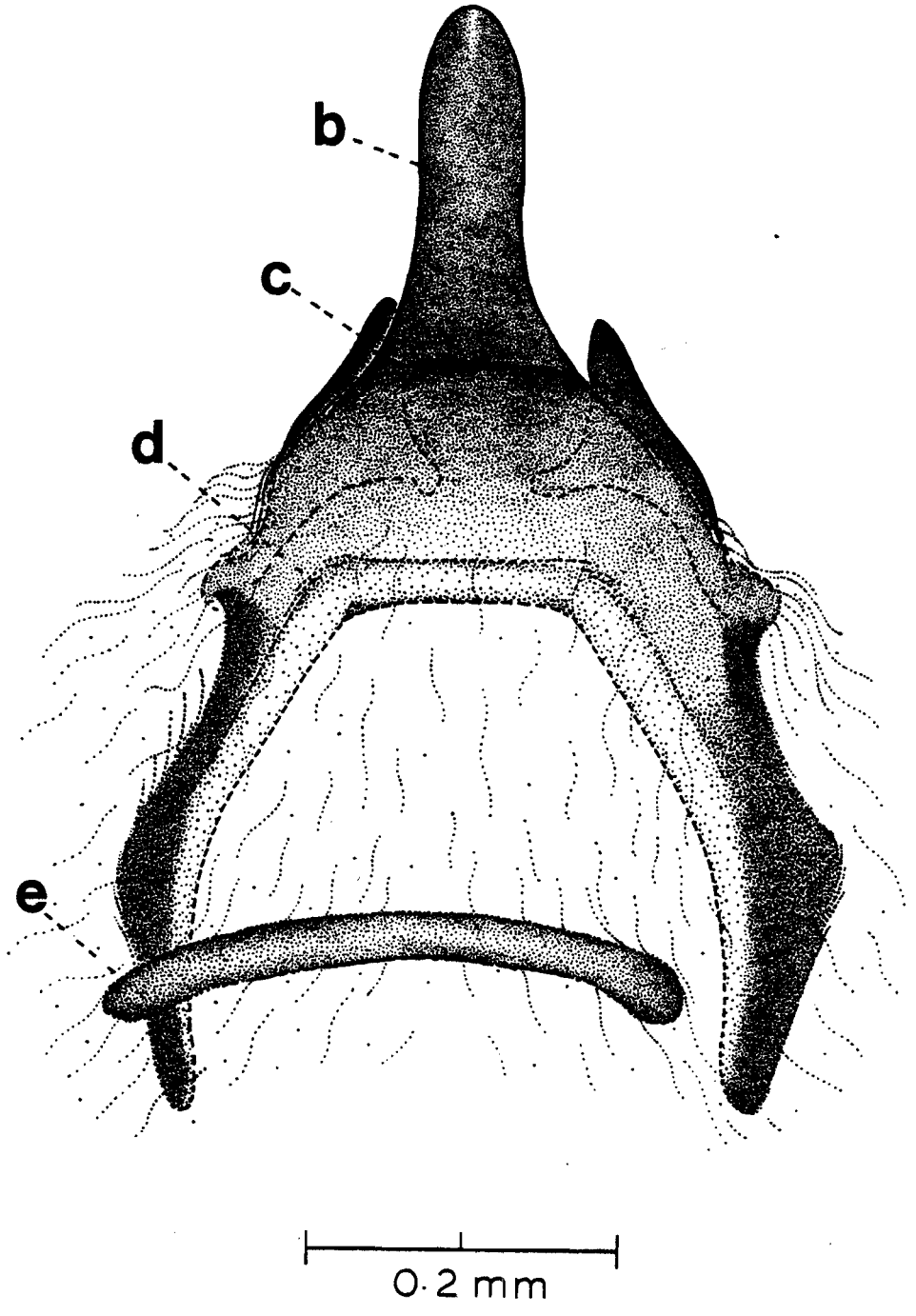

b
c
d
e
0·2 mm

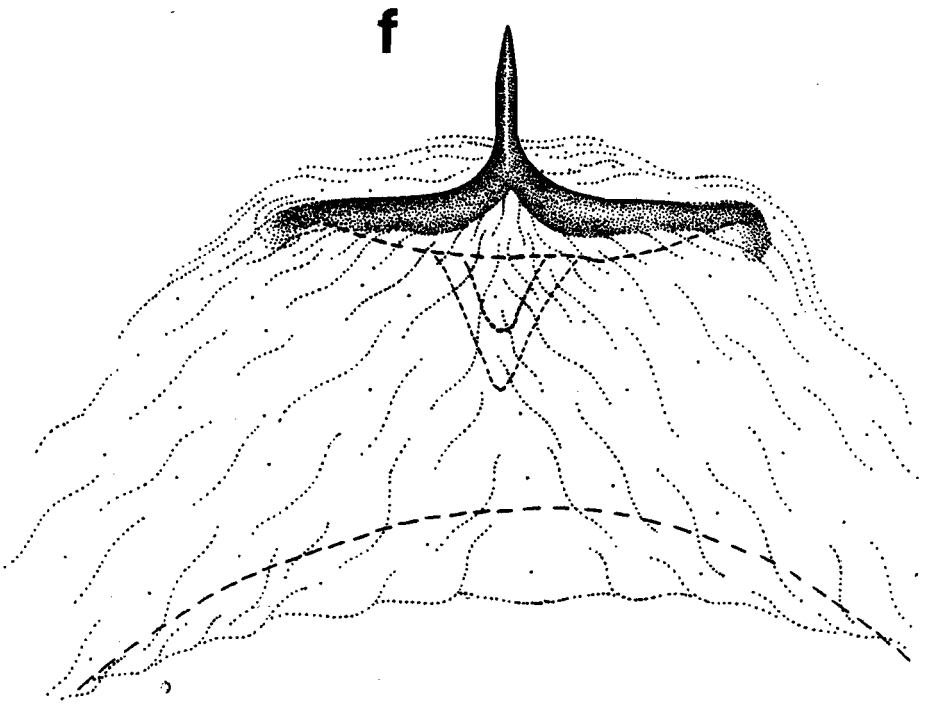
Figure 125 (continued)

f. gonapsis

[based on a specimen collected by

E. Oleksuik, Pinery Prov. Pk., Lambton Co.,

Ontario, 3.VII.1977; ROM]


f

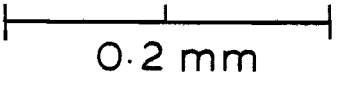

0·2 mm

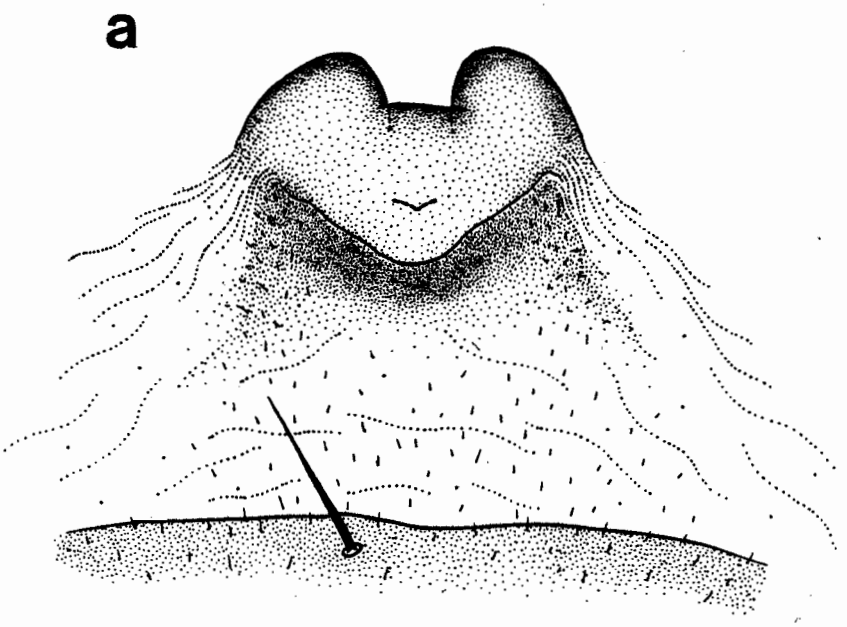
Figure 126 Mallada slossonae: female structures

a. subgenitale

[based on a specimen collected by

J.C.E. Riotte & L. Kohalmi, Kendal, Ontario,

17.VII.1967; ROM]


a

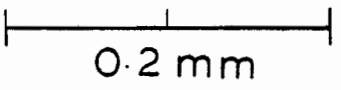

0·2 mm

Figure 126 (continued)

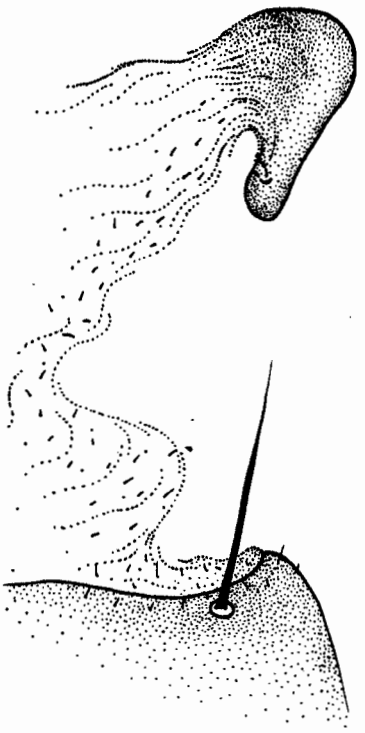
b. subgenitale, lateral aspect

[based on a specimen collected by

J.C.E. Riotte & L. Kohalmi, Kendal, Ontario,

17.VII.1967; ROM]

b



0·2 mm

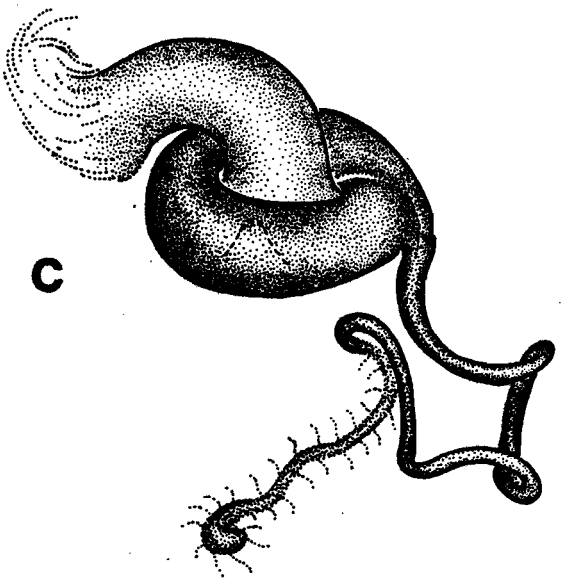
Figure 126 (continued)

c. spermatheca

[based on a specimen collected by

J.C.E. Riotte & L. Kohalmi, Kendal, Ontario,

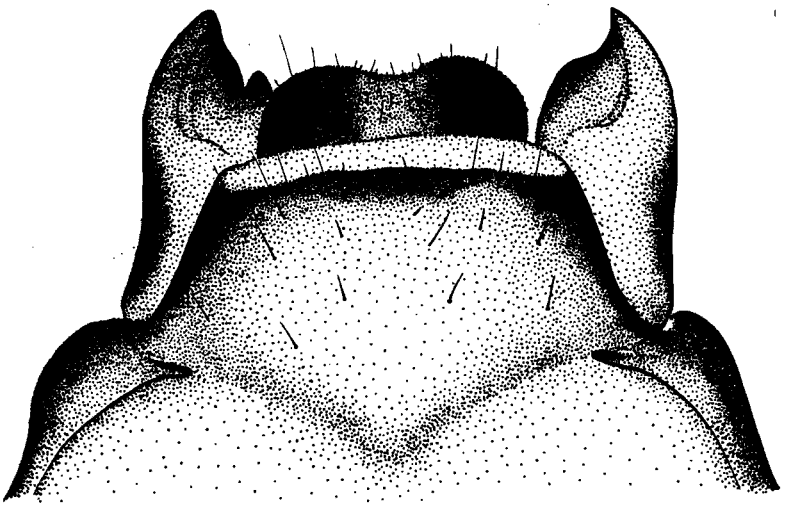
17.VII.1967; ROM]



0·2 mm

Figure 127 Malladá slossonae: mandibles

[based on a specimen collected by
J.C.E. Riotte & L. Kohalmi, Kendal, Ontario,
17.VII.1967; ROM, female]



0·2 mm

Figure 128 Nothochrysa californica: female head

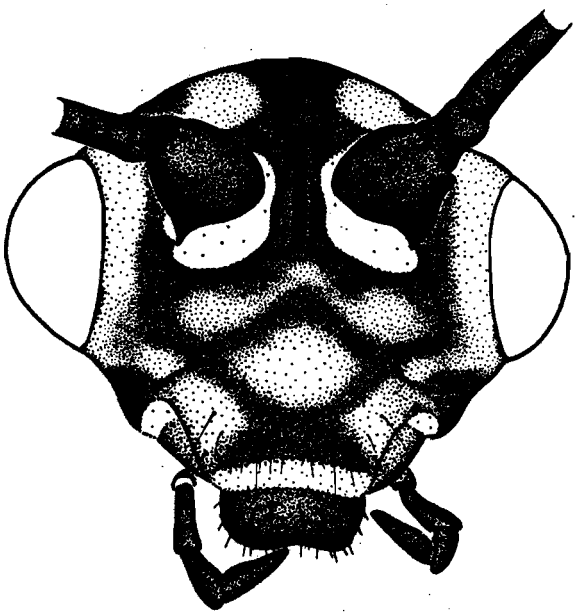
a. frontal

[based on a specimen collected by

H.B. Leech, Mt. Seymour, Vancouver,

British Columbia, 31.V.1931; SEM]

a



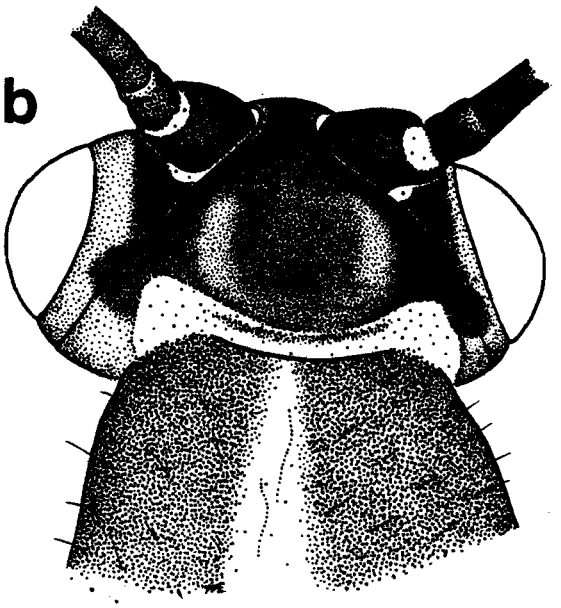
1 mm

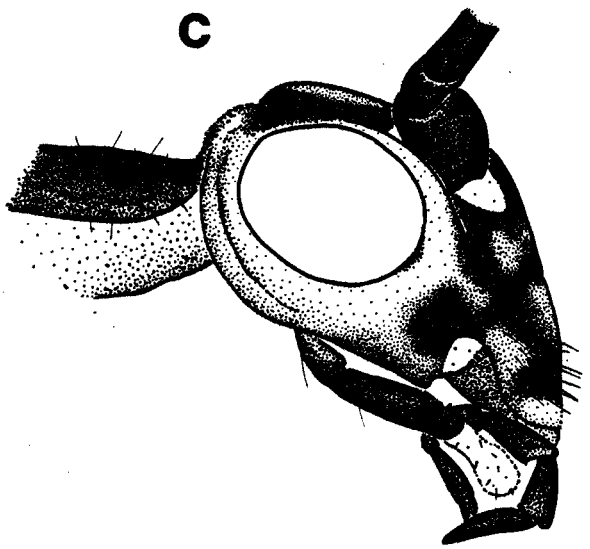
Figure 128 (continued)

b. dorsal

c. lateral

[based on a specimen collected by
H.B. Leech, Mt. Seymour, Vancouver,
British Columbia, 31.V.1931; SEM]


b


c

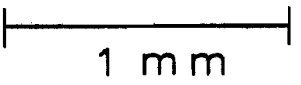

1 mm

Figure 129 Nothochrysa californica: wing

a. fore wing

b. hind wing

[based on a specimen collected by
H.B. Leech, Mt. Seymour, Vancouver,
British Columbia, 31.V.1931;
SEM, female]

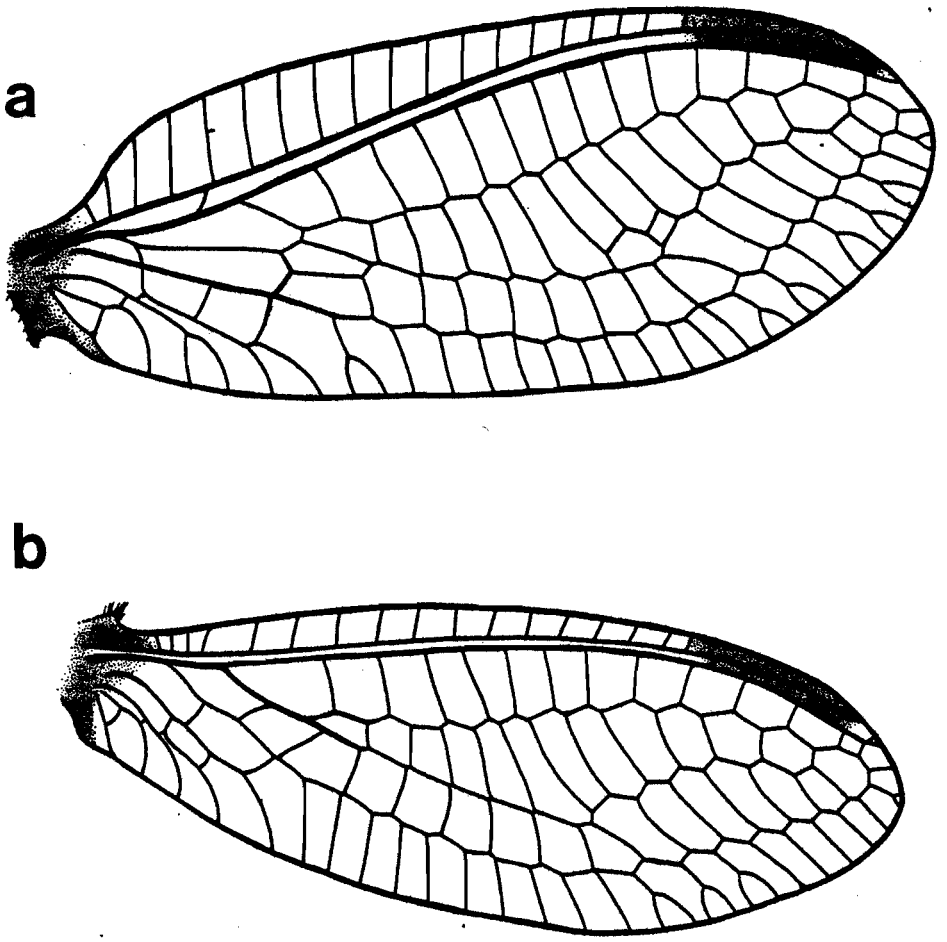

a
b
5 mm

Figure 130 Nothochrysa californica: male structures

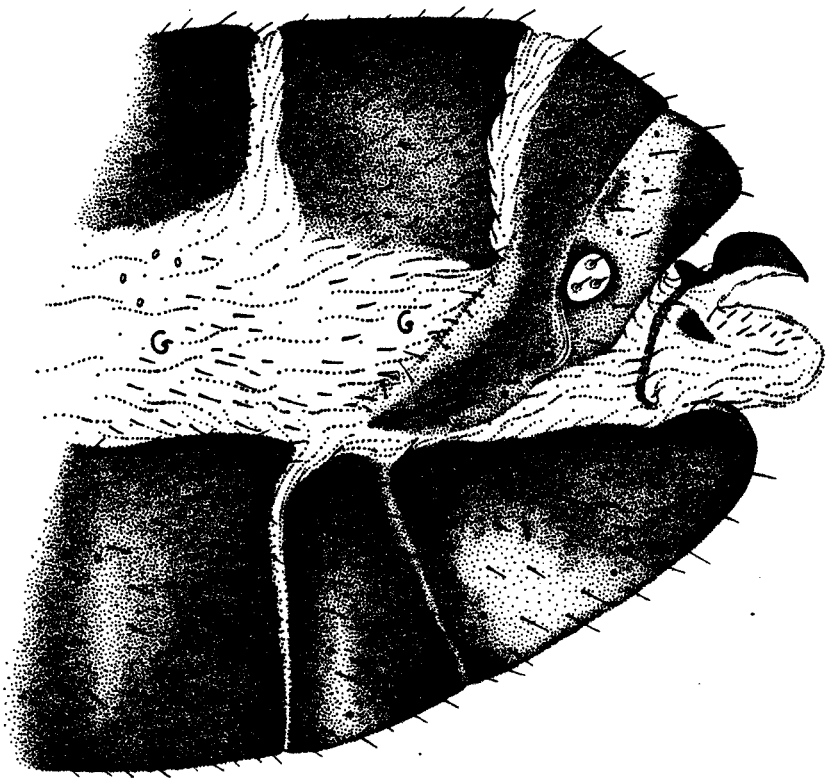
a. terminalia with structures everted

[based on a specimen collected by

G.J. Spencer, Vancouver, British Columbia,

emerged 24.IV.1932; SEM]

a



1 mm

Figure 130 (continued)

b. arcessus

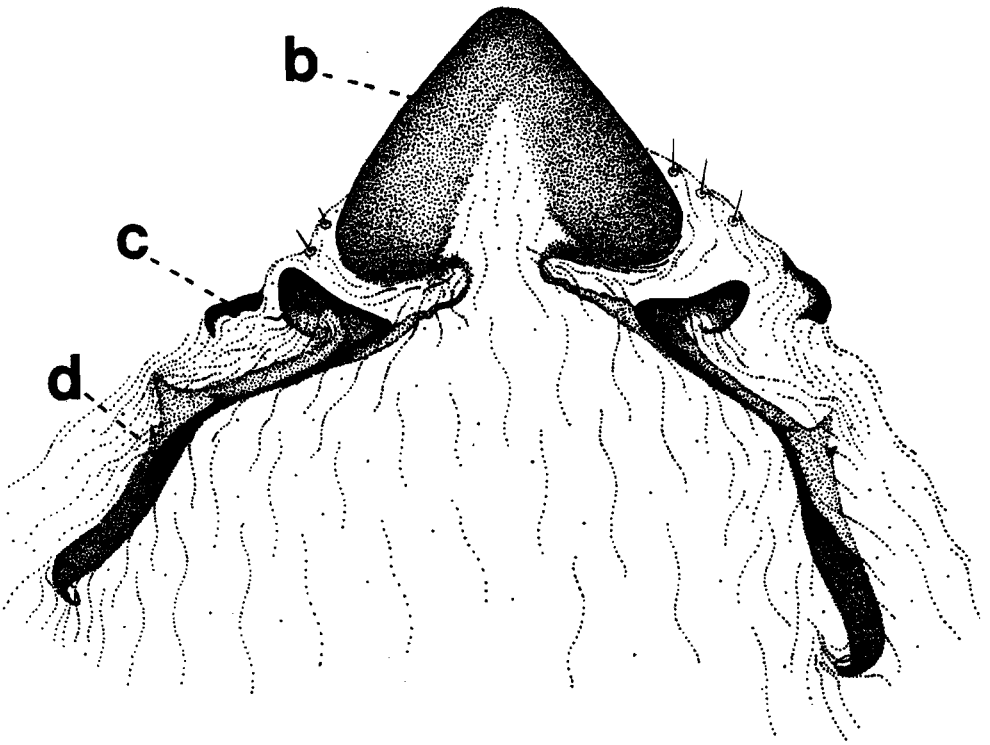
c. entoprocessus

d. gonarcus

[based on a specimen collected by

G.J. Spencer, Vancouver, British Columbia,

emerged 24.IV.1932; SEM]



0·2 mm

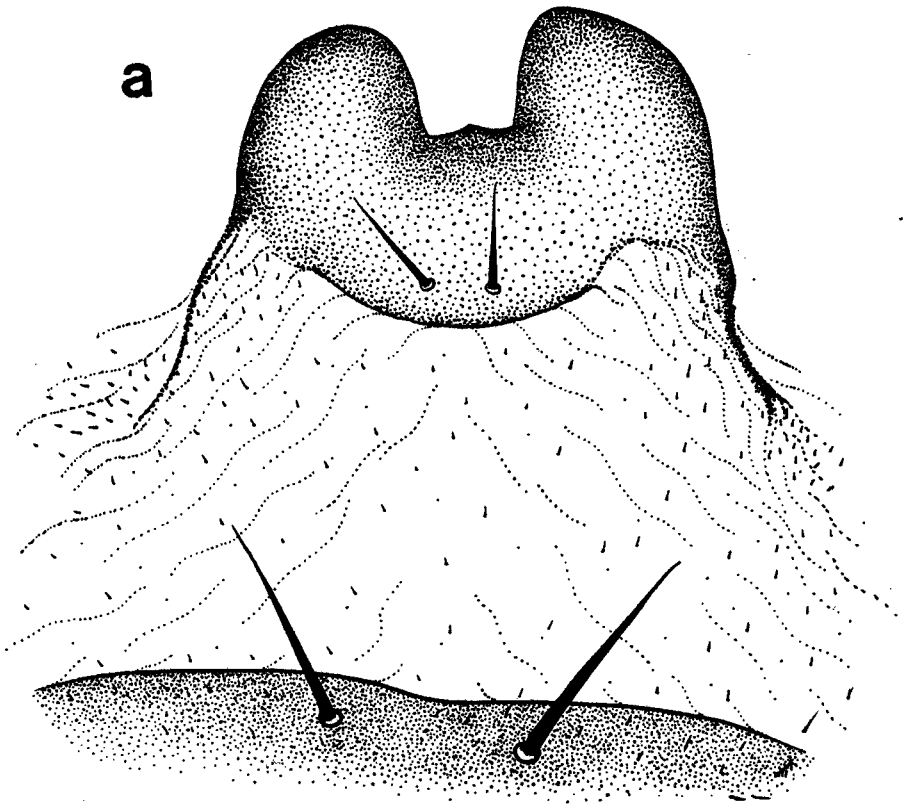
Figure 131 Nothochrysa californica: female structures

a. subgenitale

[based on a specimen collected by

H.B. Leech, Mt. Seymour, Vancouver,

British Columbia, 31.V.1931; SEM]



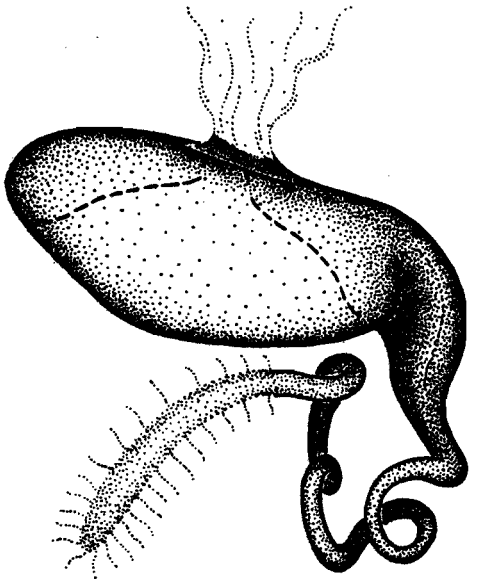
0·2 mm

Figure 131 (continued)

b. spermatheca

[based on a specimen collected by
H.B. Leech, Mt. Seymour, Vancouver,
British Columbia, 31.V.1931; SEM]

b



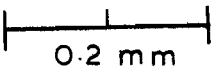
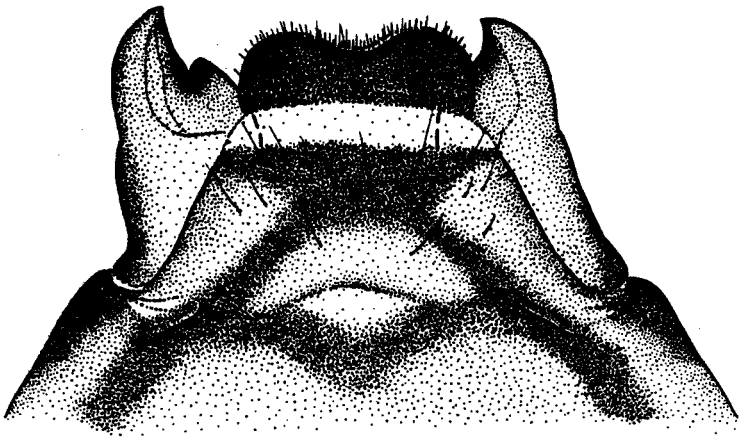
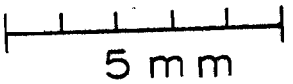


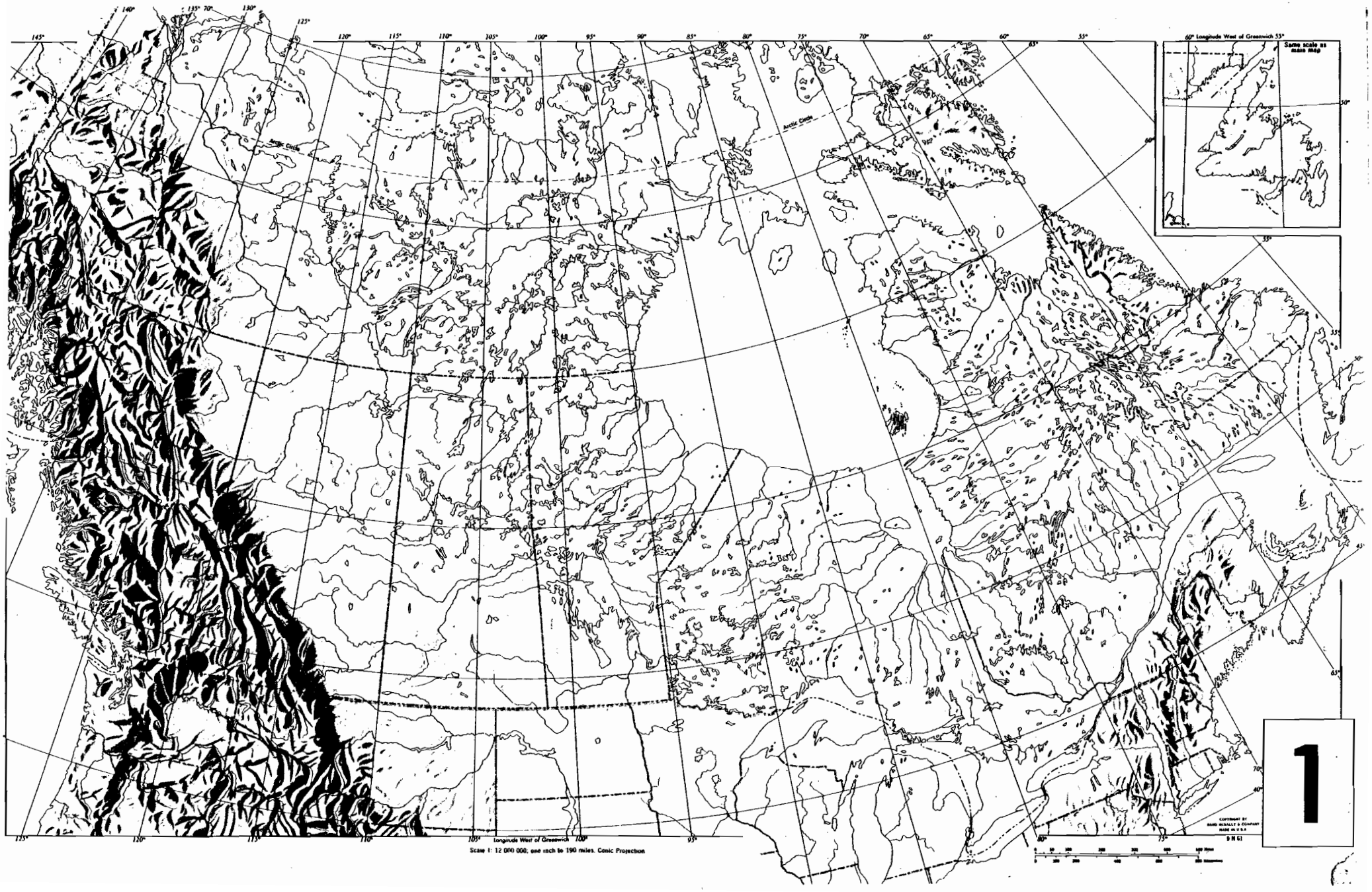
Figure 132 Nothochrysa californica: mandibles

[based on a specimen collected by
H.B. Leech, Mt. Seymour, Vancouver,
British Columbia, 31.V.1931; SEM,
female]

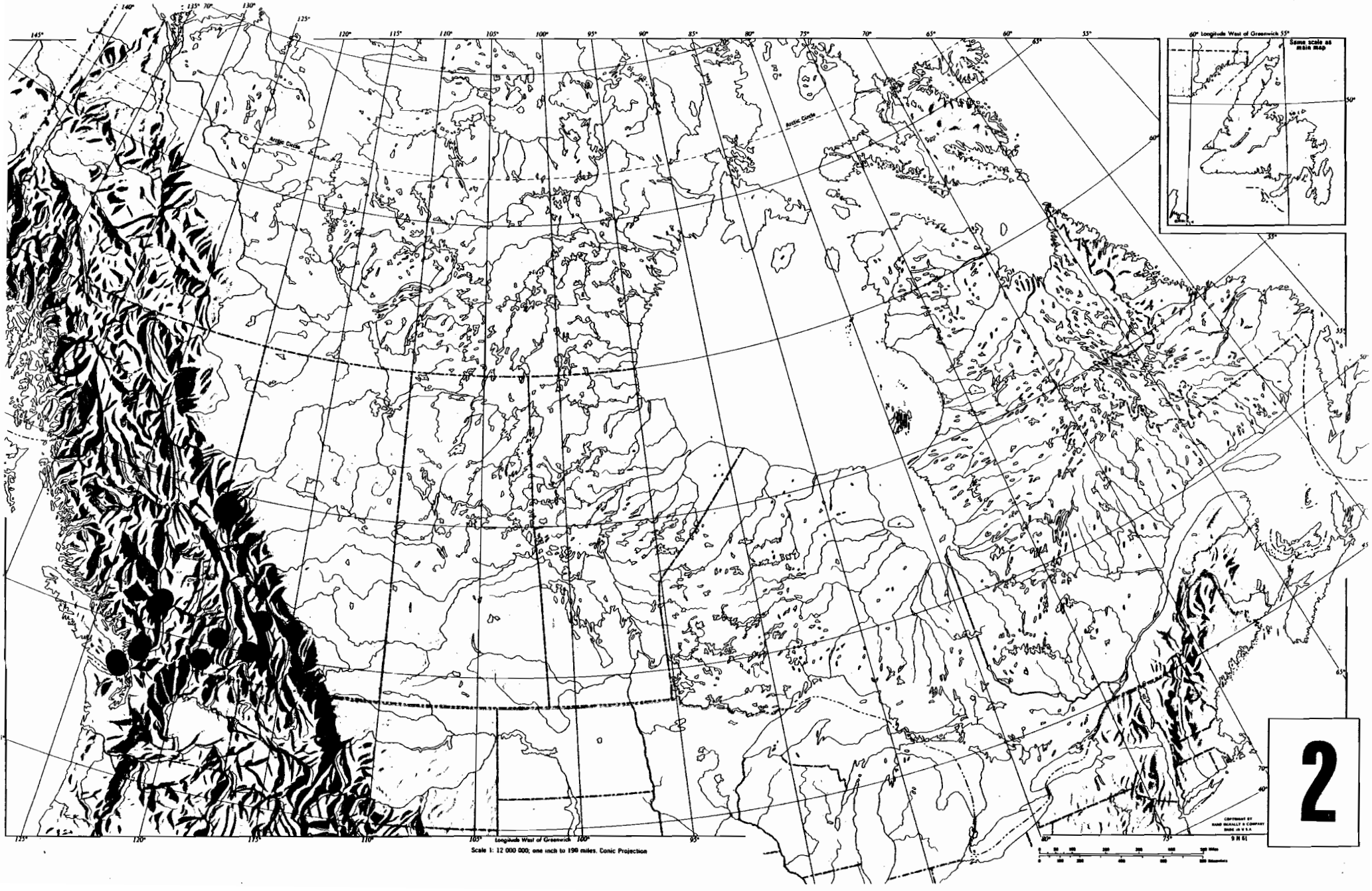



5 mm

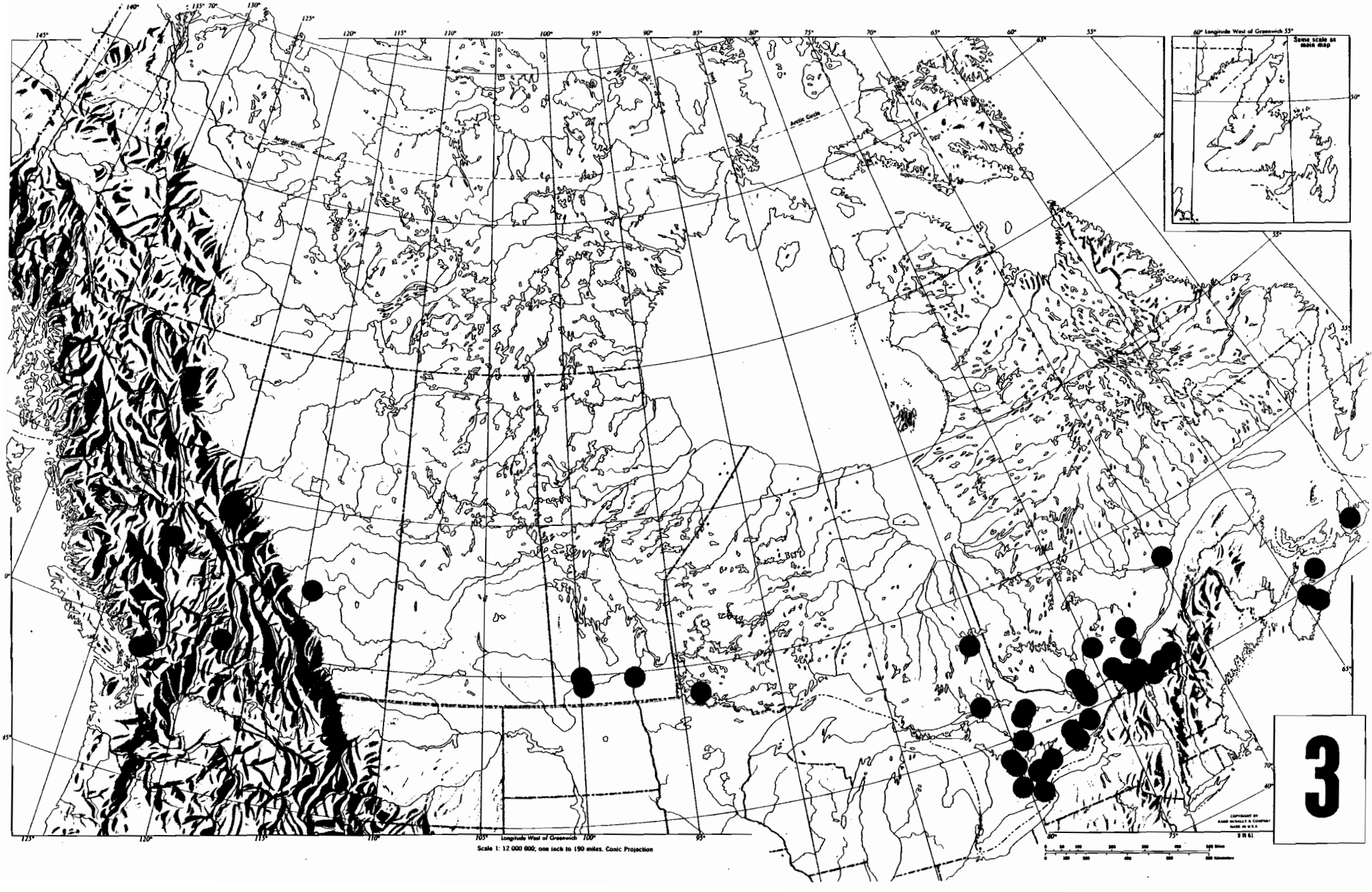
Map 1 Distribution in Canada of *Meleoma schwarzi*


60° Longitude West of Greenwich 55°
Same scale as main map
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000, one inch to 190 miles. Conic Projection
1

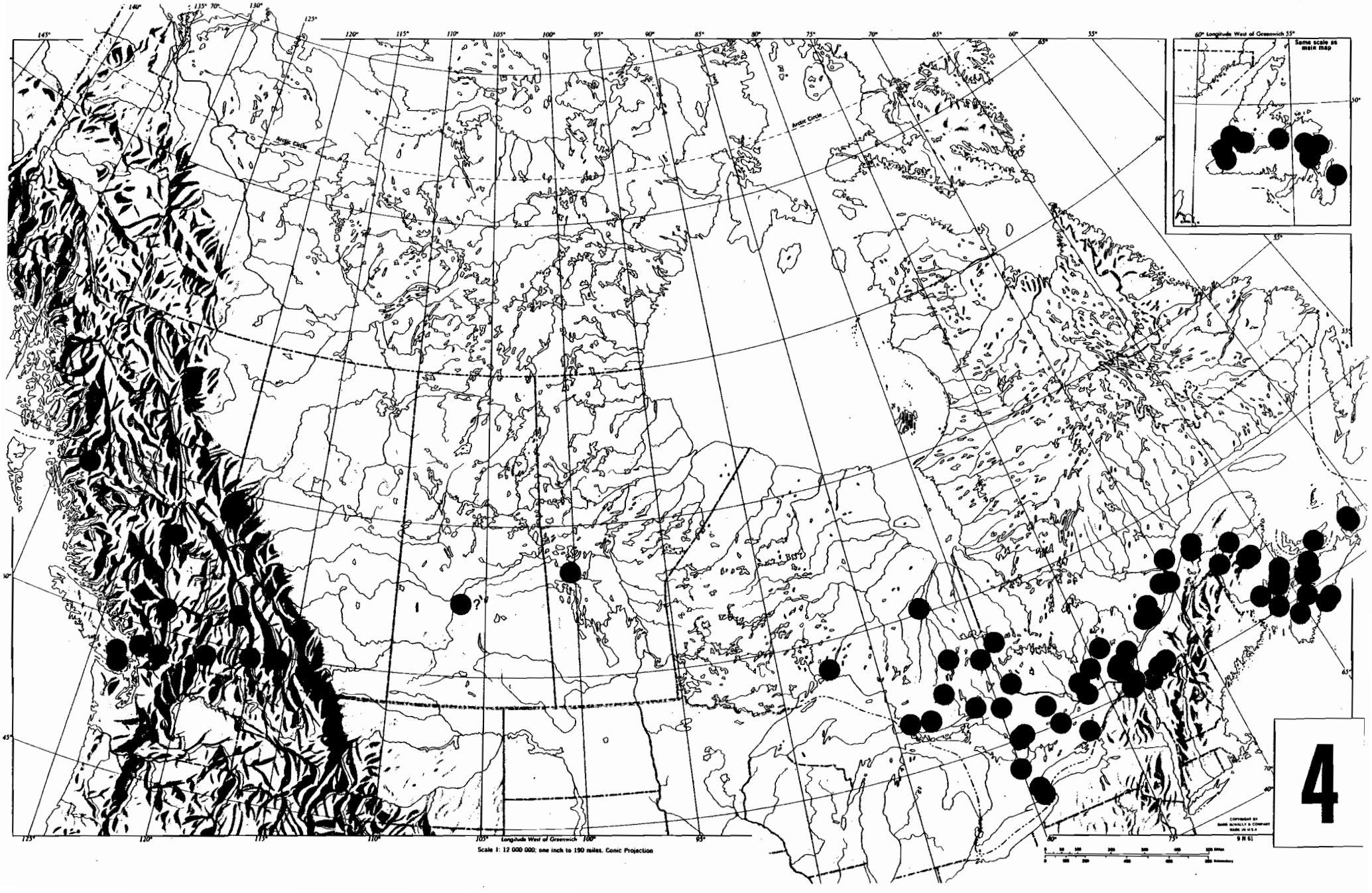
Map 2 Distribution in Canada of *Meleoma dolicharthra*


Arctic Circle
Arctic Circle
60° Longitude West of Greenwich 55°
Same scale as main map
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
2

Map 3 Distribution in Canada of Melecma signoretti


60° Longitude West of Greenwich 55°
Same scale as main map
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
3

Map 4 Distribution in Canada of *Meleoma emuncta*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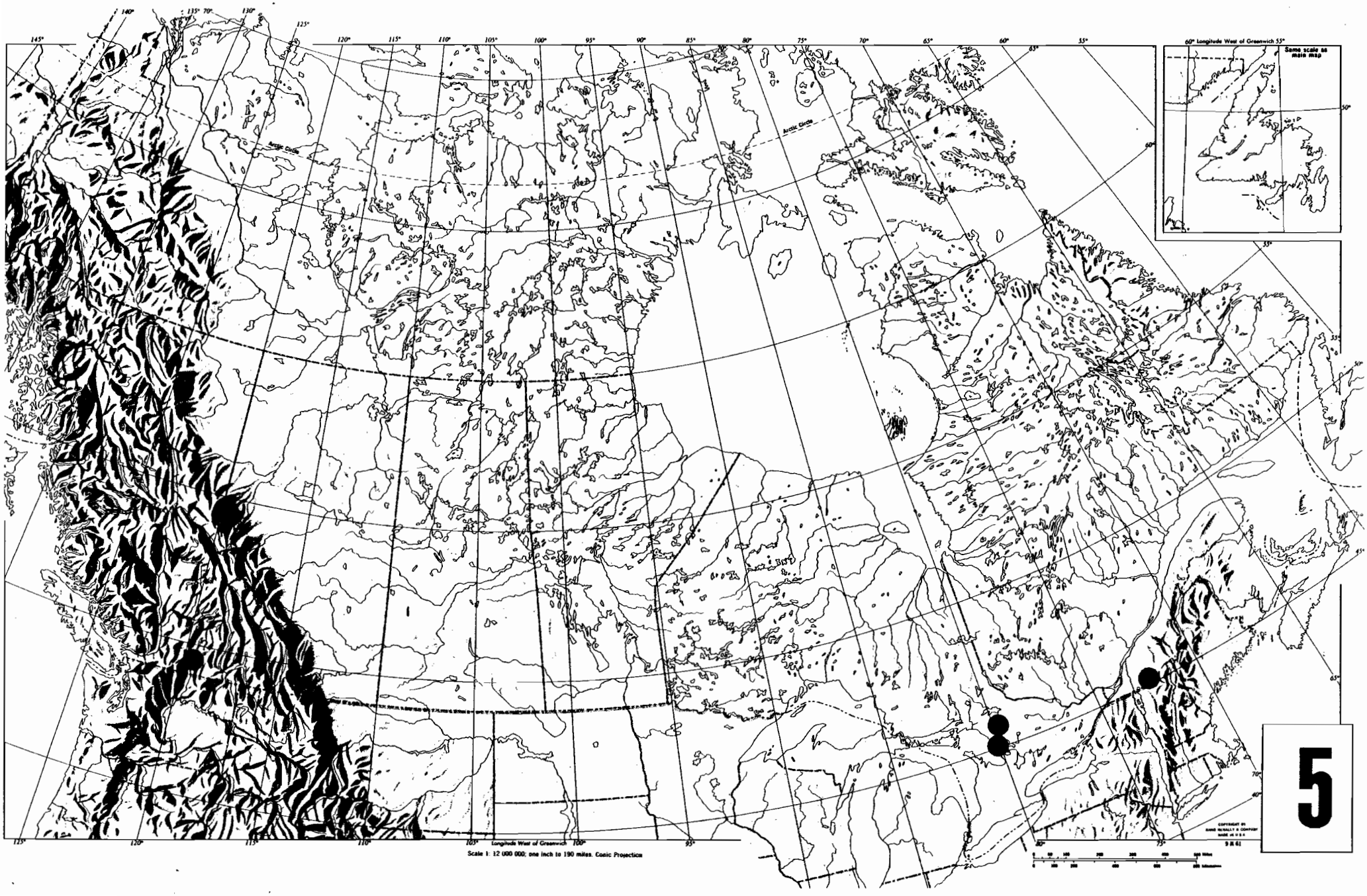
Same scale as main map
Arctic Circle
Arctic Circle
?
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
4

Map 5 Distribution in Canada of *Eremochrysa canadensis*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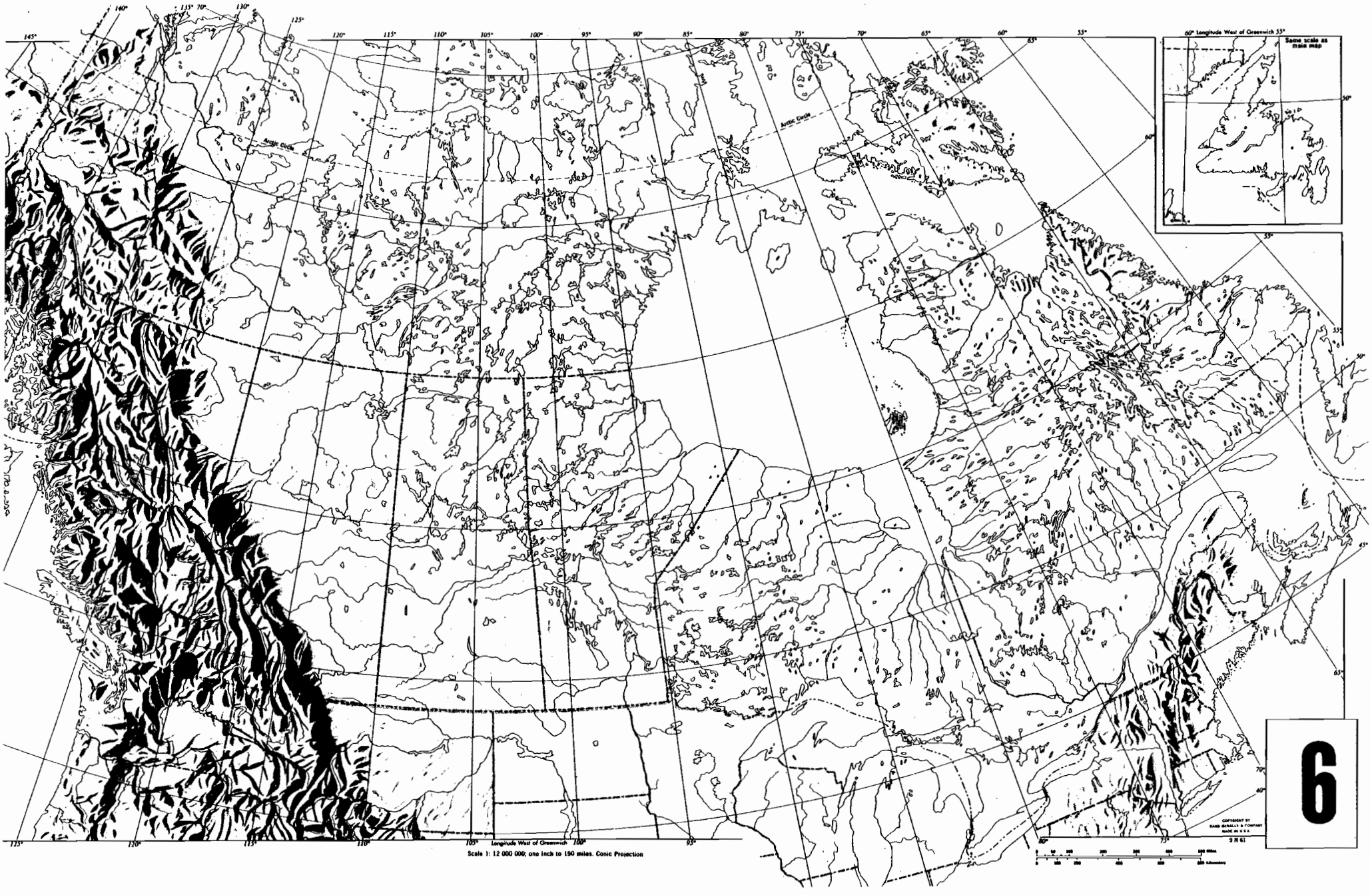
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
5

Map 6 Distribution in Canada of *Eremochrysa fraterna*


Arctic Circle
Arctic Circle
60° Longitude West of Greenwich 55°
Same scale as main map
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
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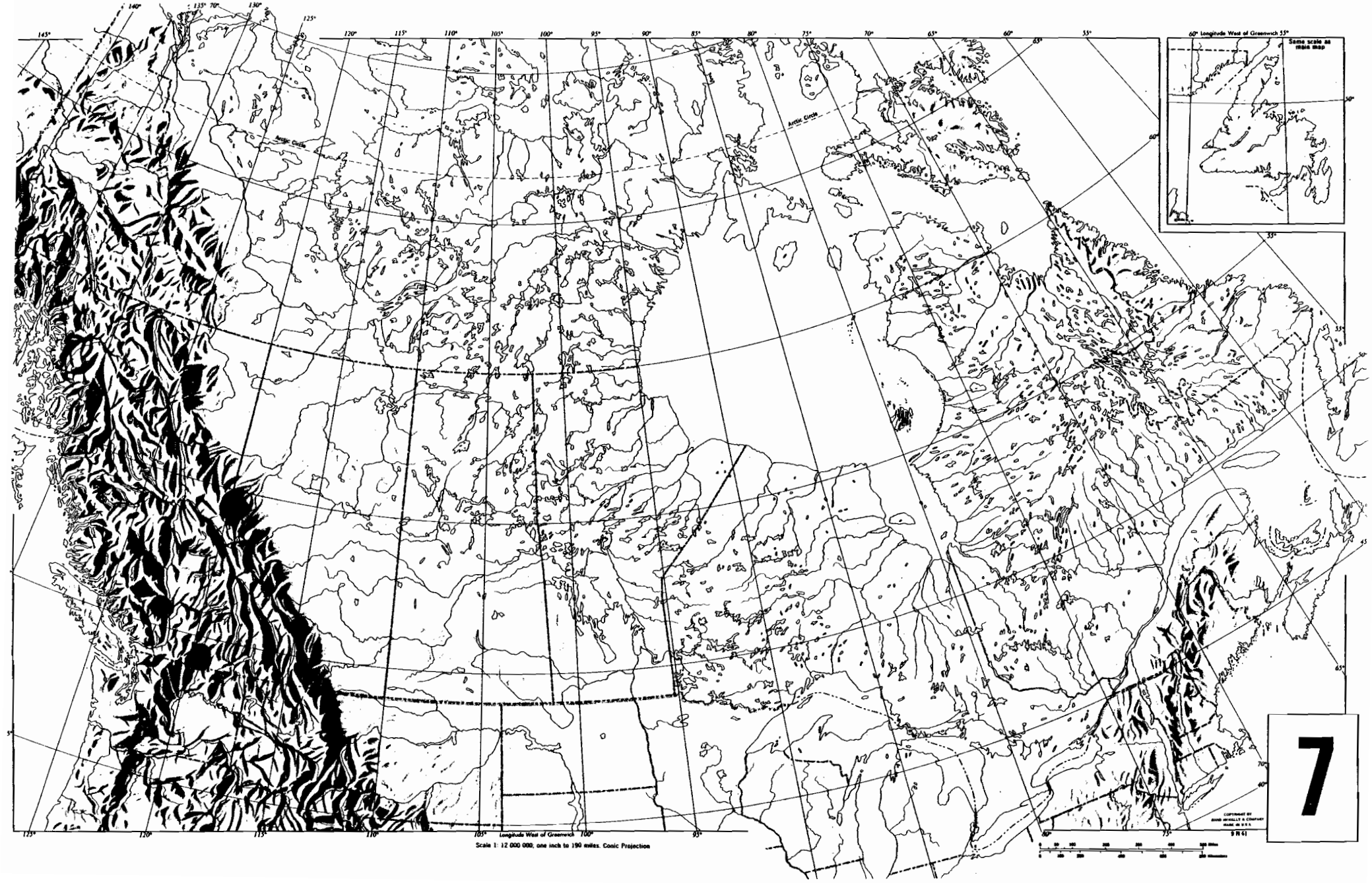
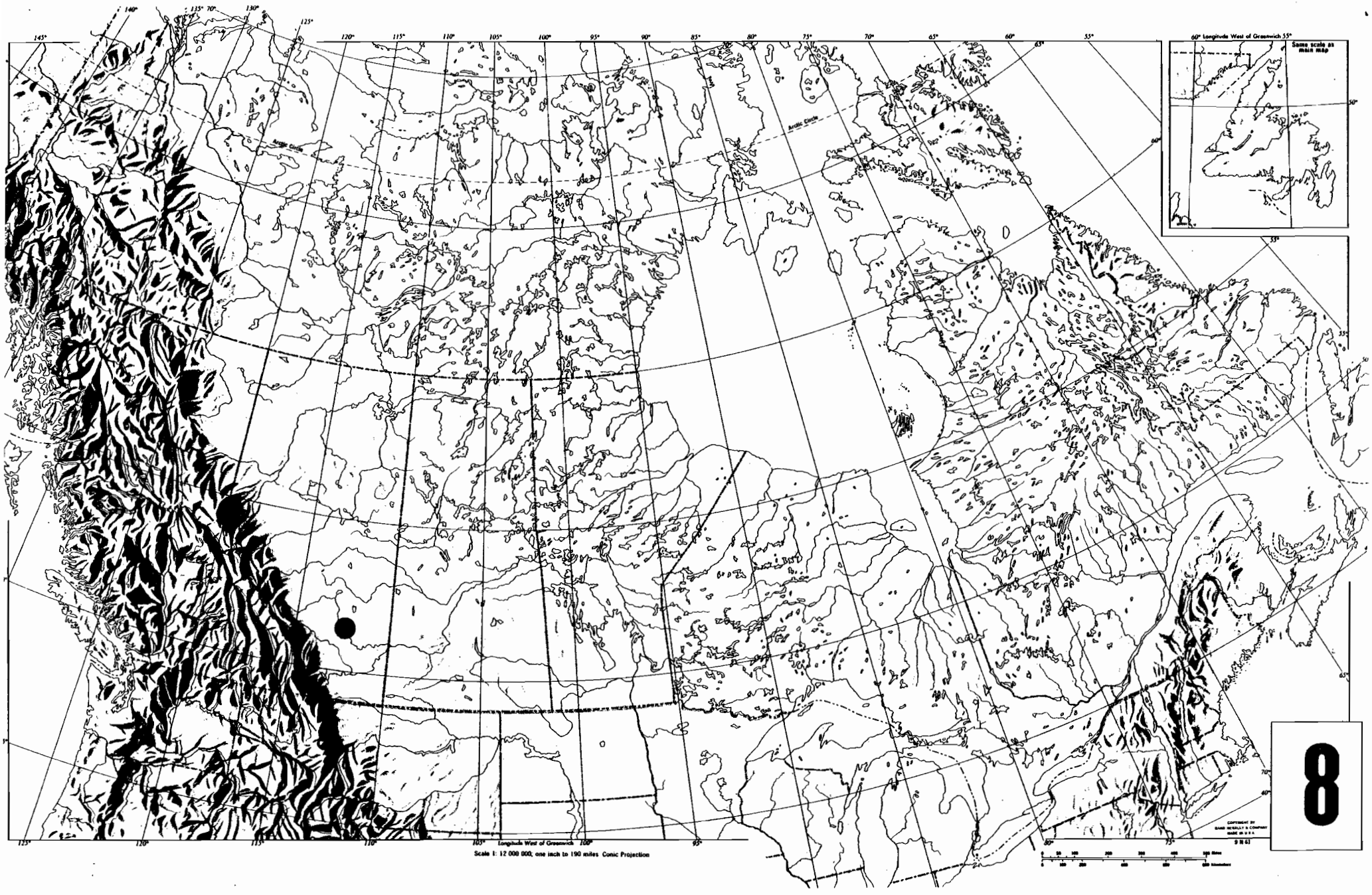
9 R 61
6

Map 7 Distribution in Canada of Eremochrysa punctinervis


60° Longitude West of Greenwich 55°
Same scale as main map
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000, one inch to 190 miles. Conic Projection
7

Map 8 Distribution in Canada of *Chrysopiella brevisetosa*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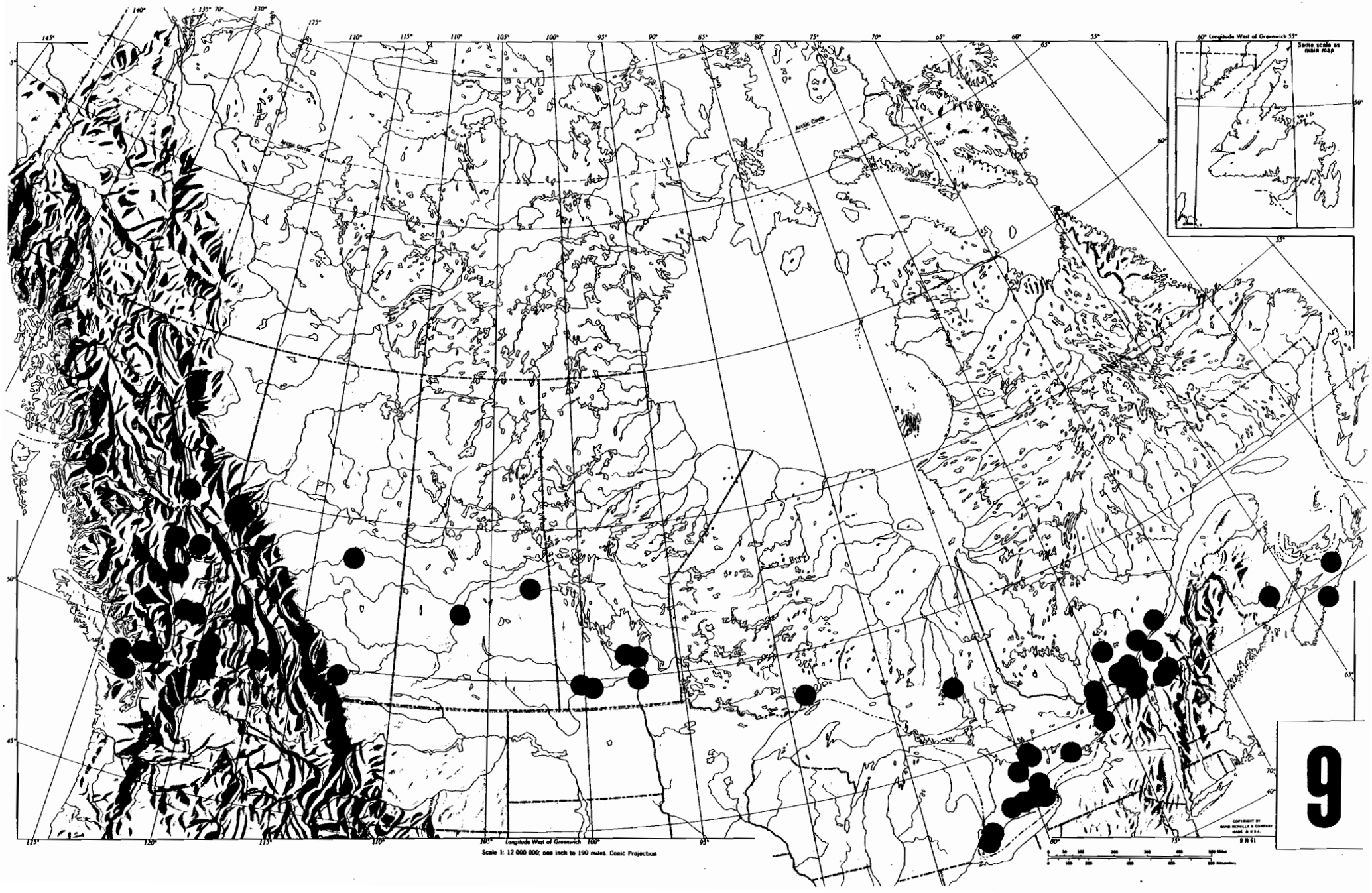
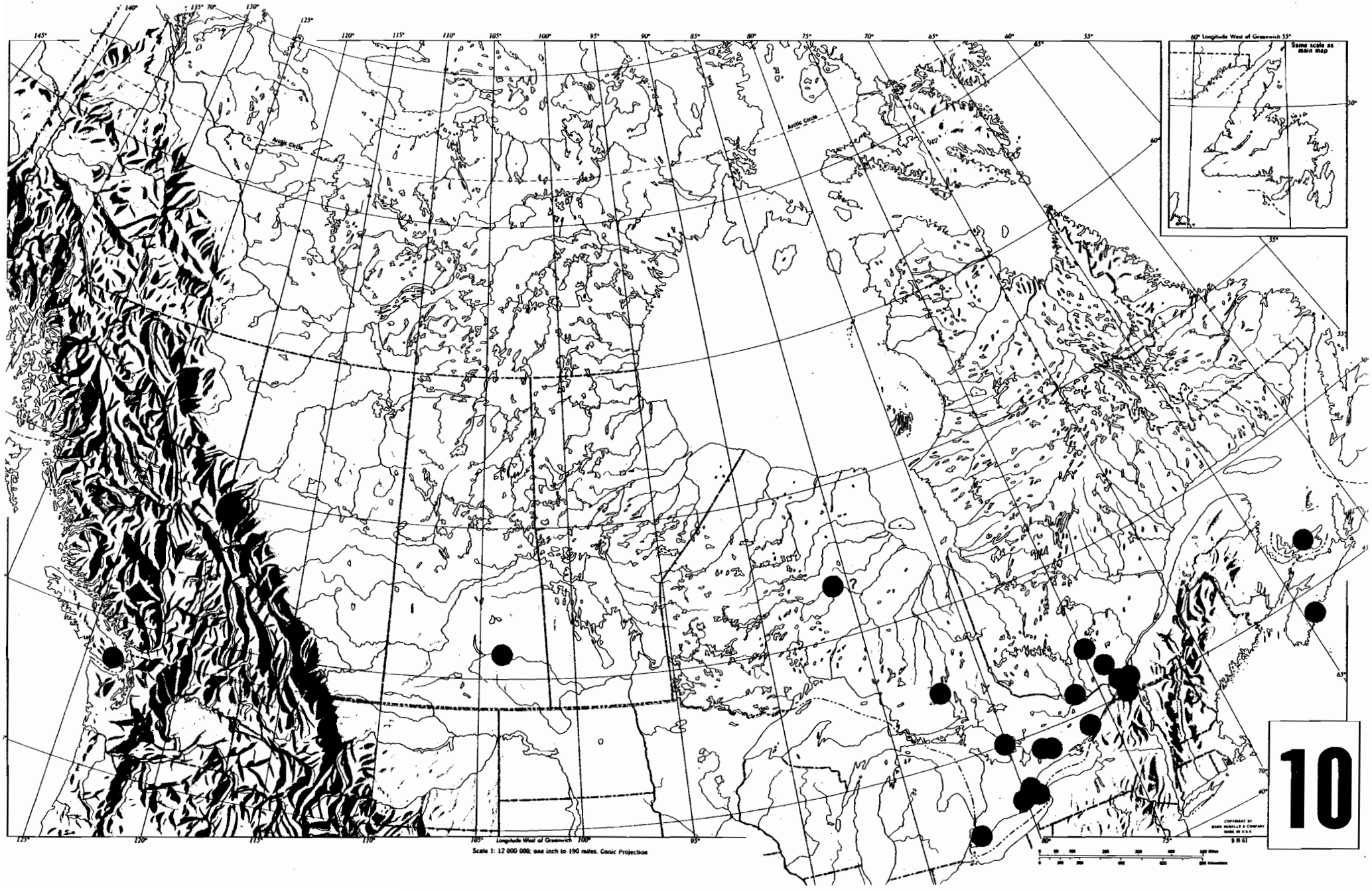
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles Conic Projection
8

Map 9 Distribution in Canada of *Chrysopa nigricornis*


60° Longitude West of Greenwich 55°
Same scale as main map
Arctic Circle
Arctic Circle
Longitude West of Greenwich 100°
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
9

Map 10 Distribution in Canada of Chrysopa quadripunctata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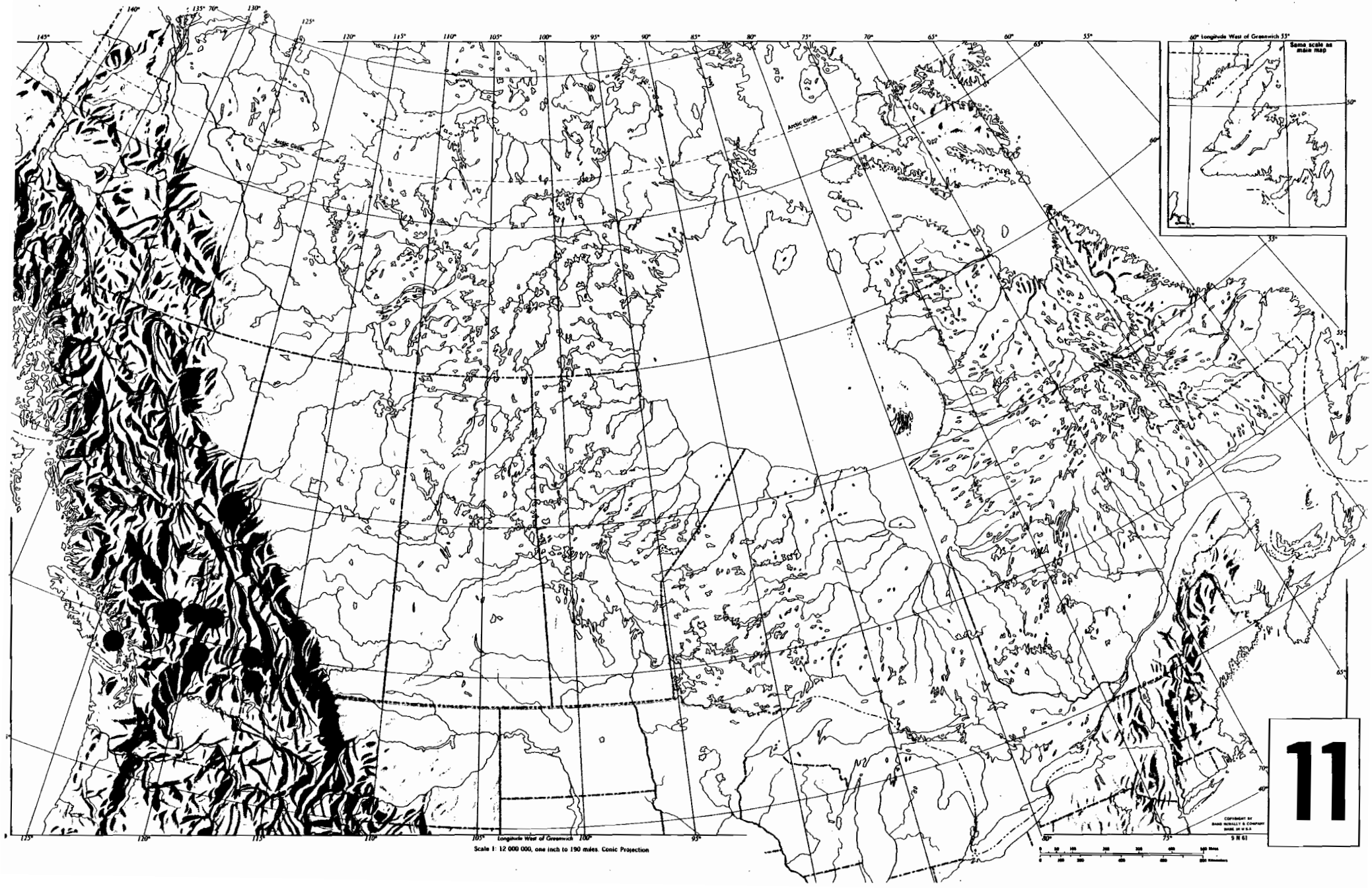
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
10

Map 11 Distribution in Canada of *Chrysopa coloradensis*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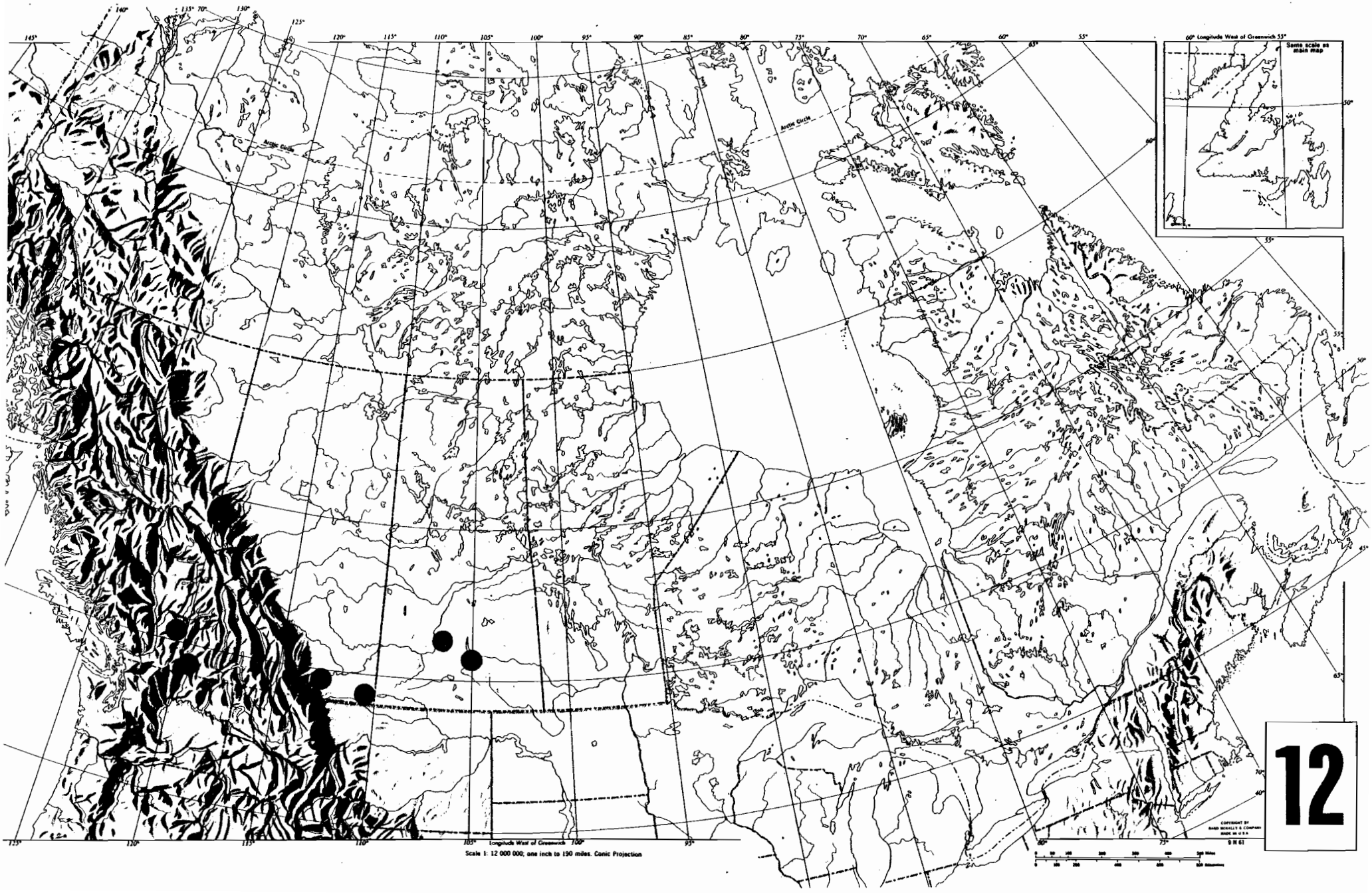
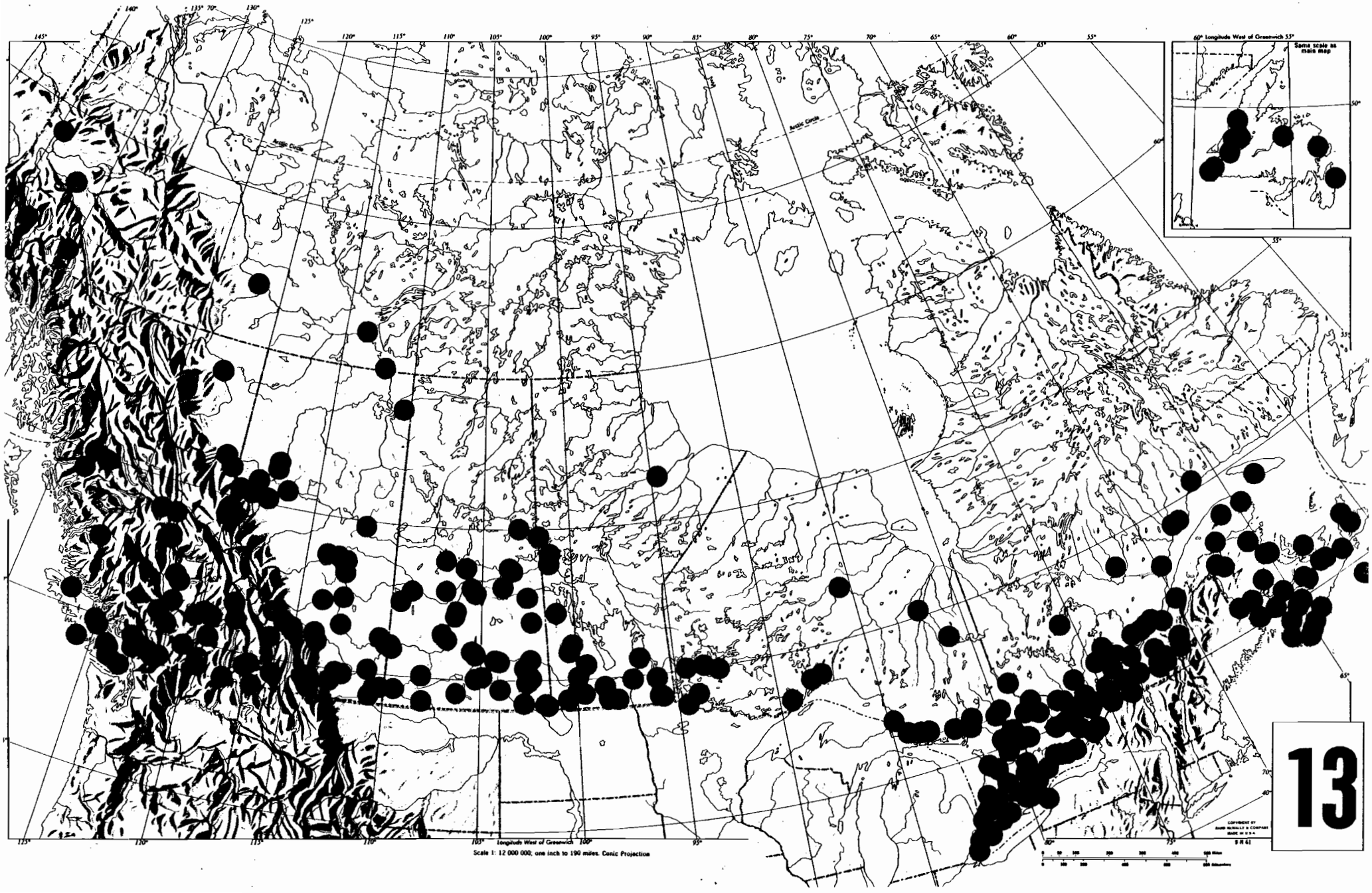
Arctic Circle
Longitude West of Greenwich 100°
Scale 1: 12 000 000, one inch to 190 miles. Conic Projection
11

Map 12 Distribution in Canada of Chrysopa excepta


60° Longitude West of Greenwich 55°
Same scale as main map
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
12
9 N 61

Map 13 Distribution in Canada of Chrysopa oculata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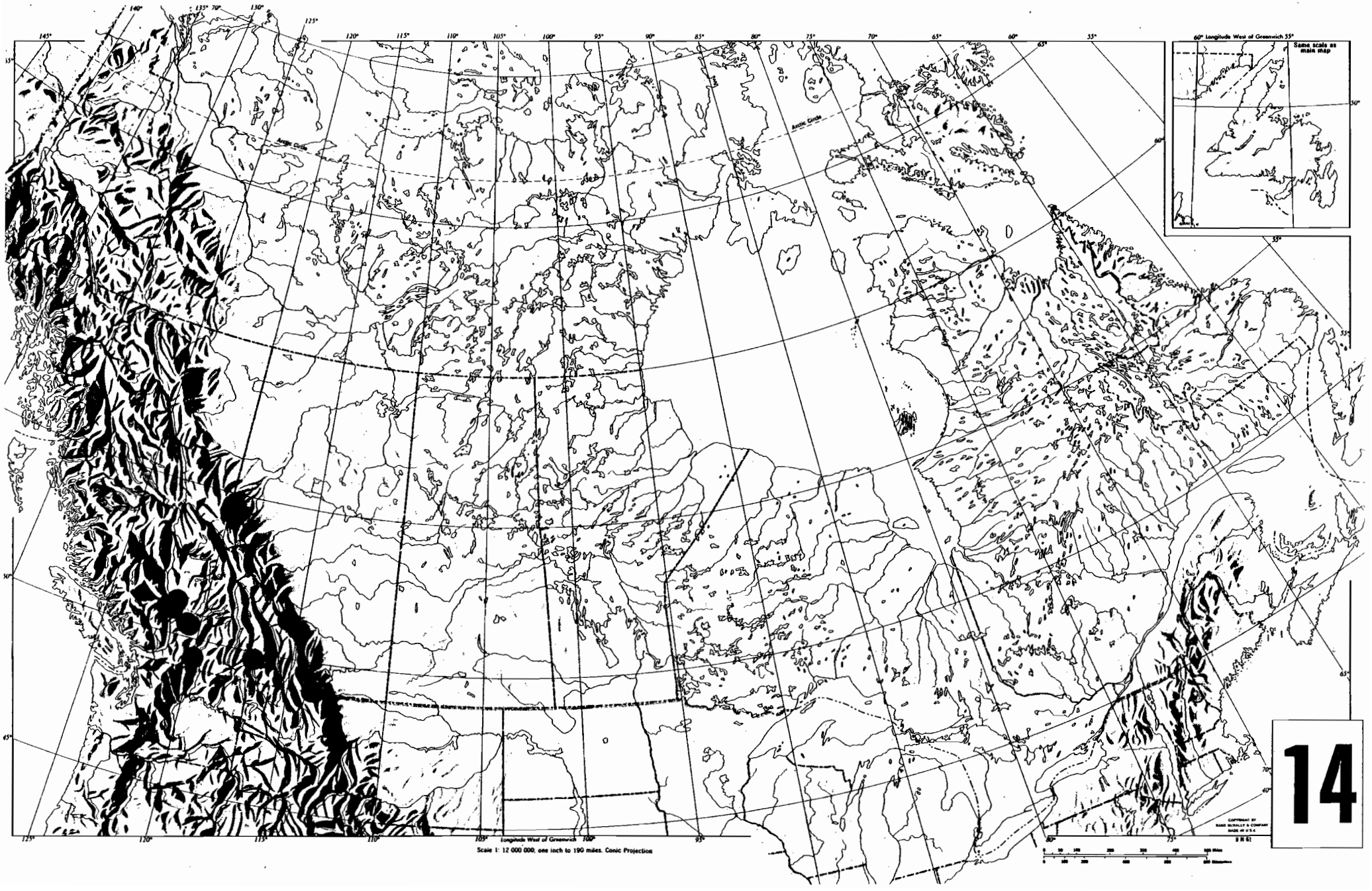
Arctic Circle
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
13

Map 14 Distribution in Canada of *Chrysopa pleuralis*


60° Longitude West of Greenwich 55°
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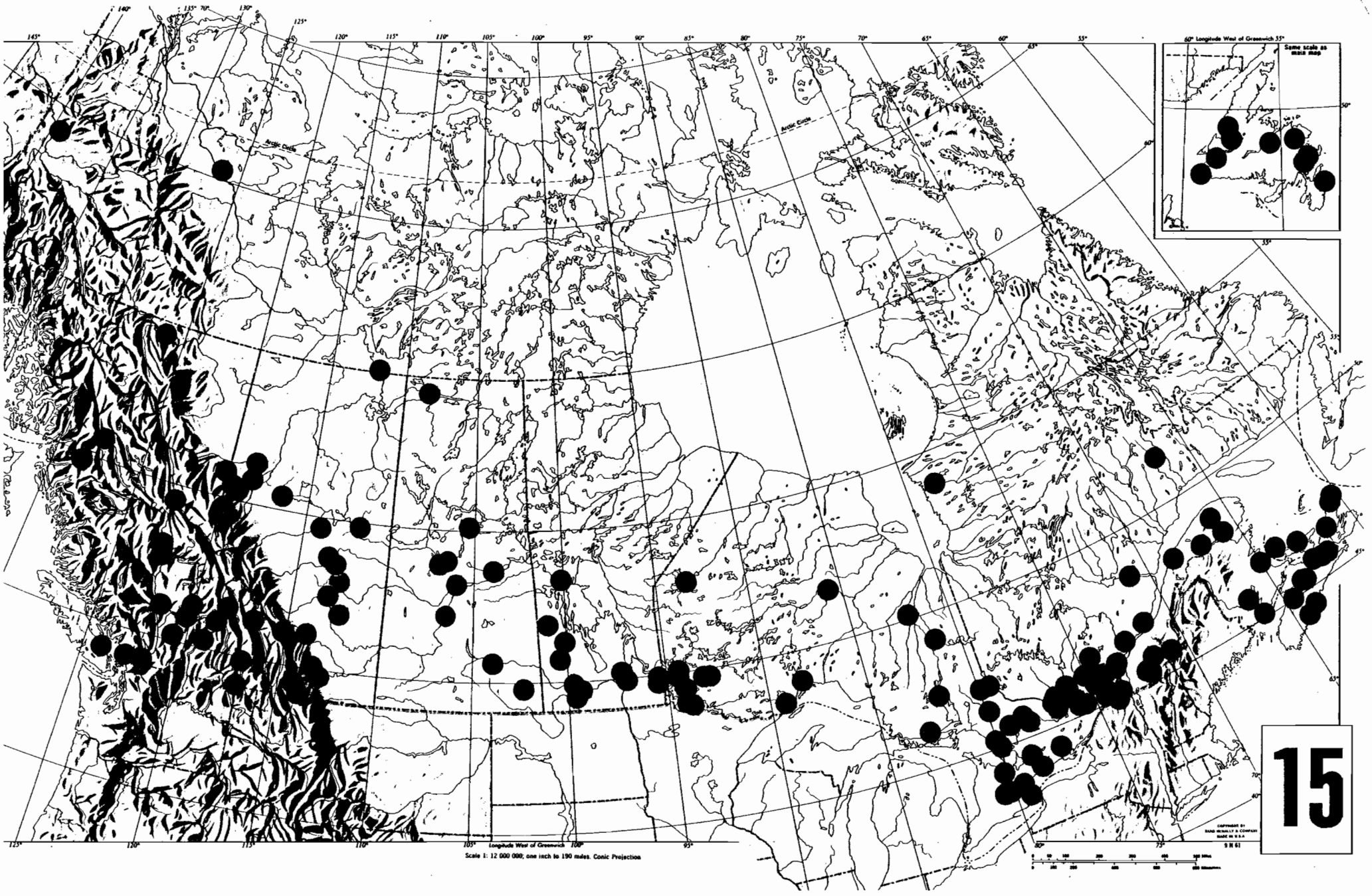
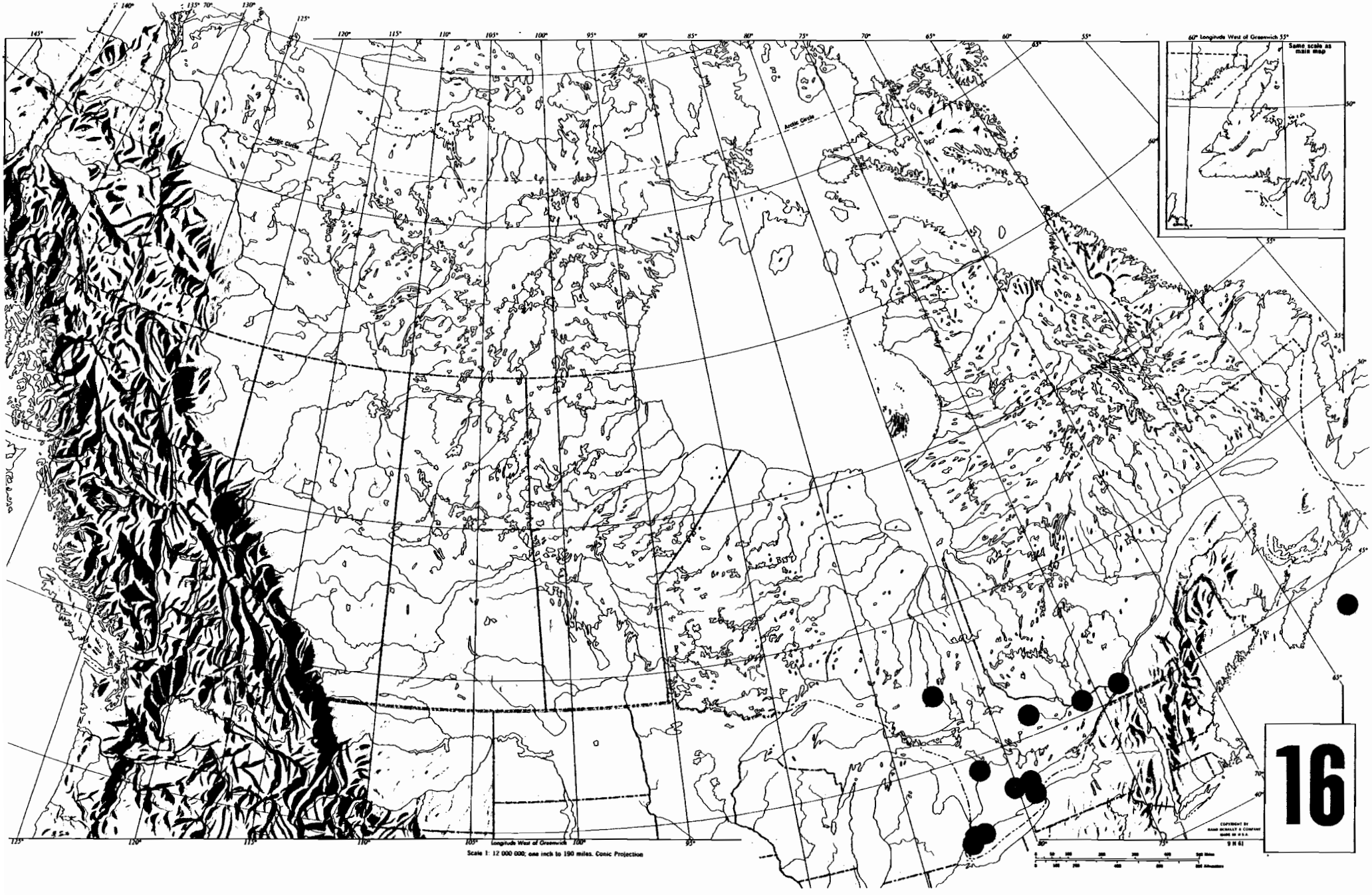
Arctic Circle
Longitude West of Greenwich 100°
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
14

Map 15 Distribution in Canada of Chrysopa chi


60° Longitude West of Greenwich 35°
Same scale as main map
Arctic Circle
Arctic Circle
Longitude West of Greenwich 100°
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
15

Map 16 Distribution in Canada of *Chrysoperla rufilabris*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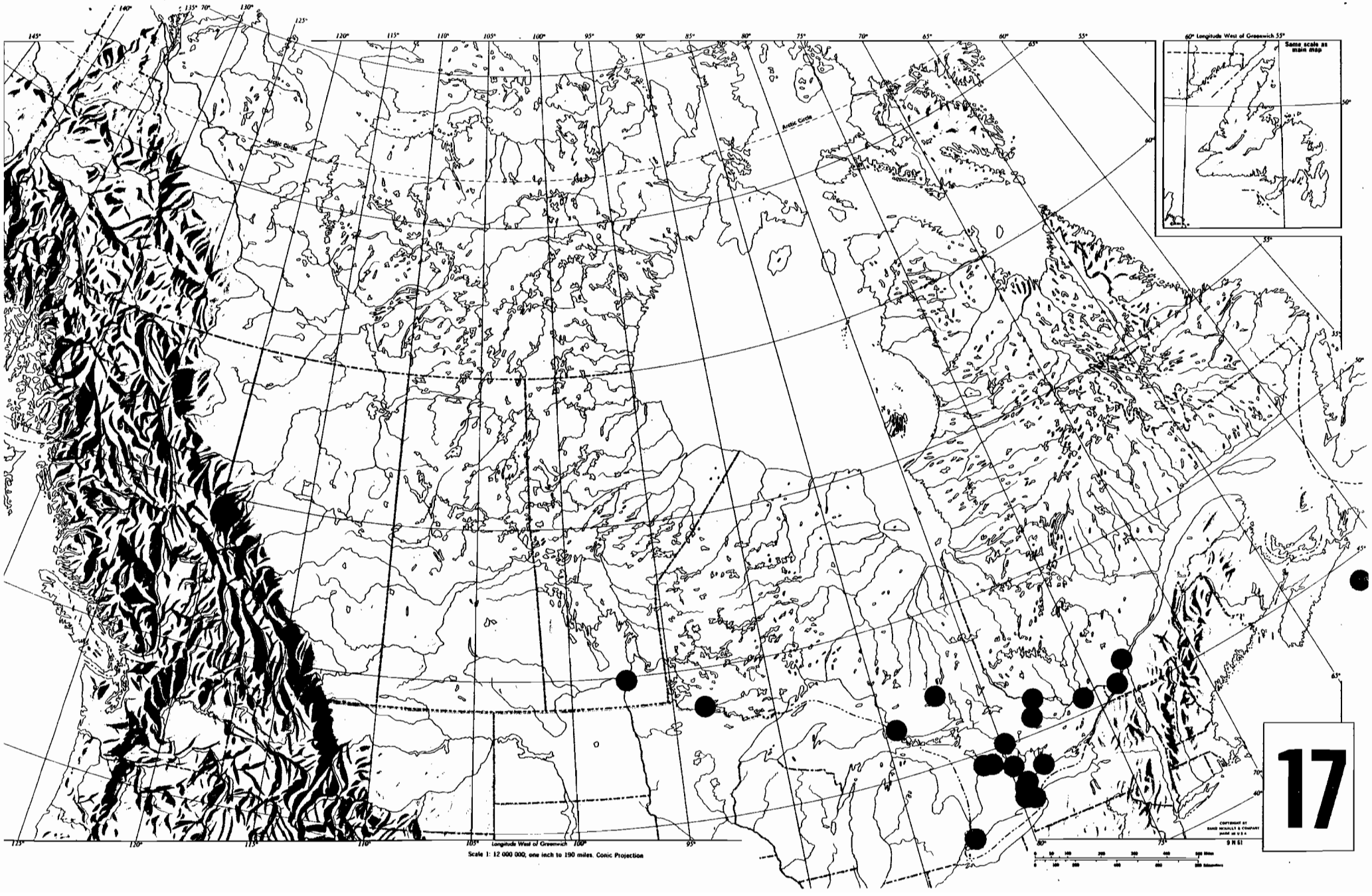
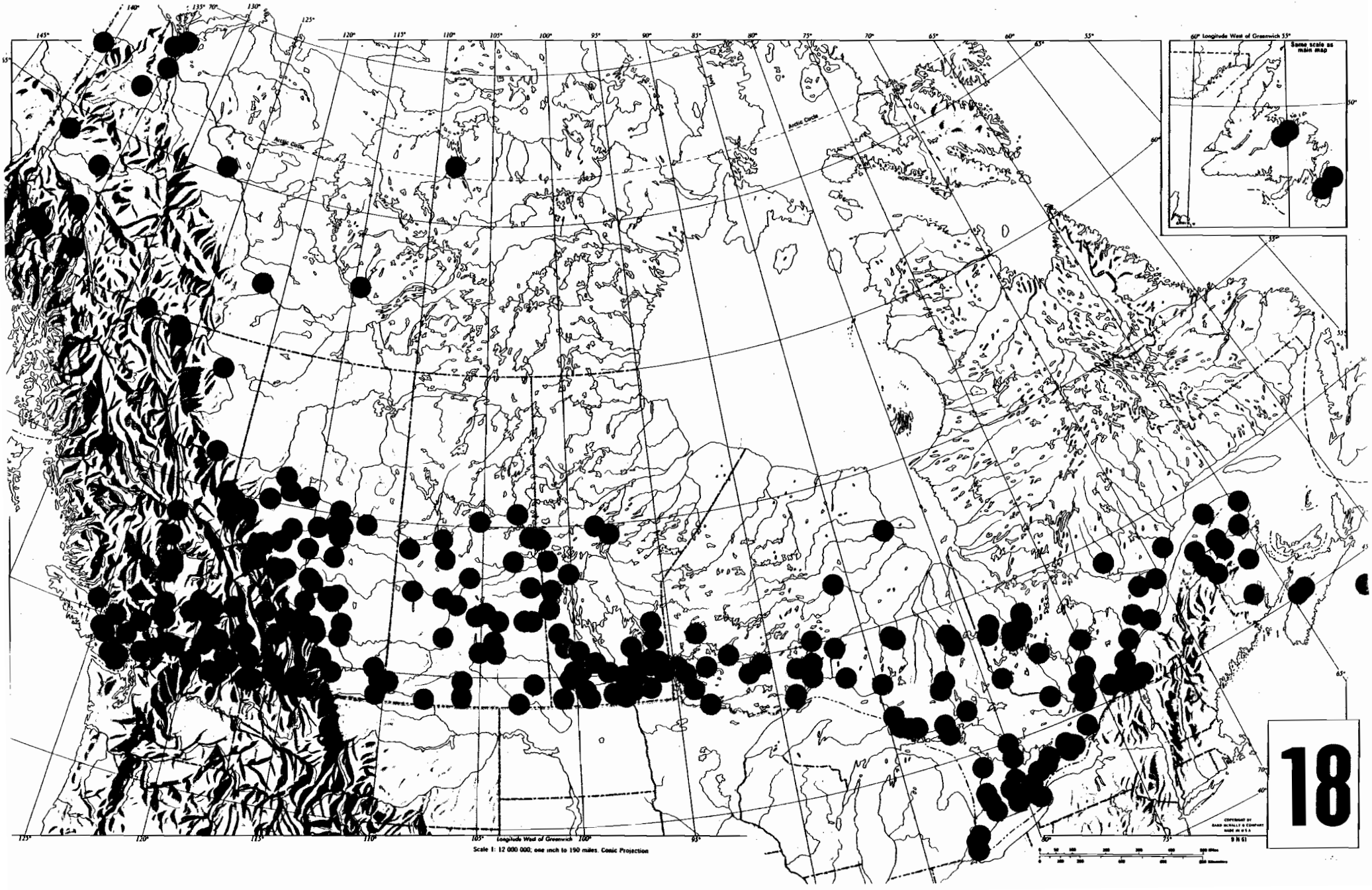
Same scale as main map
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
16

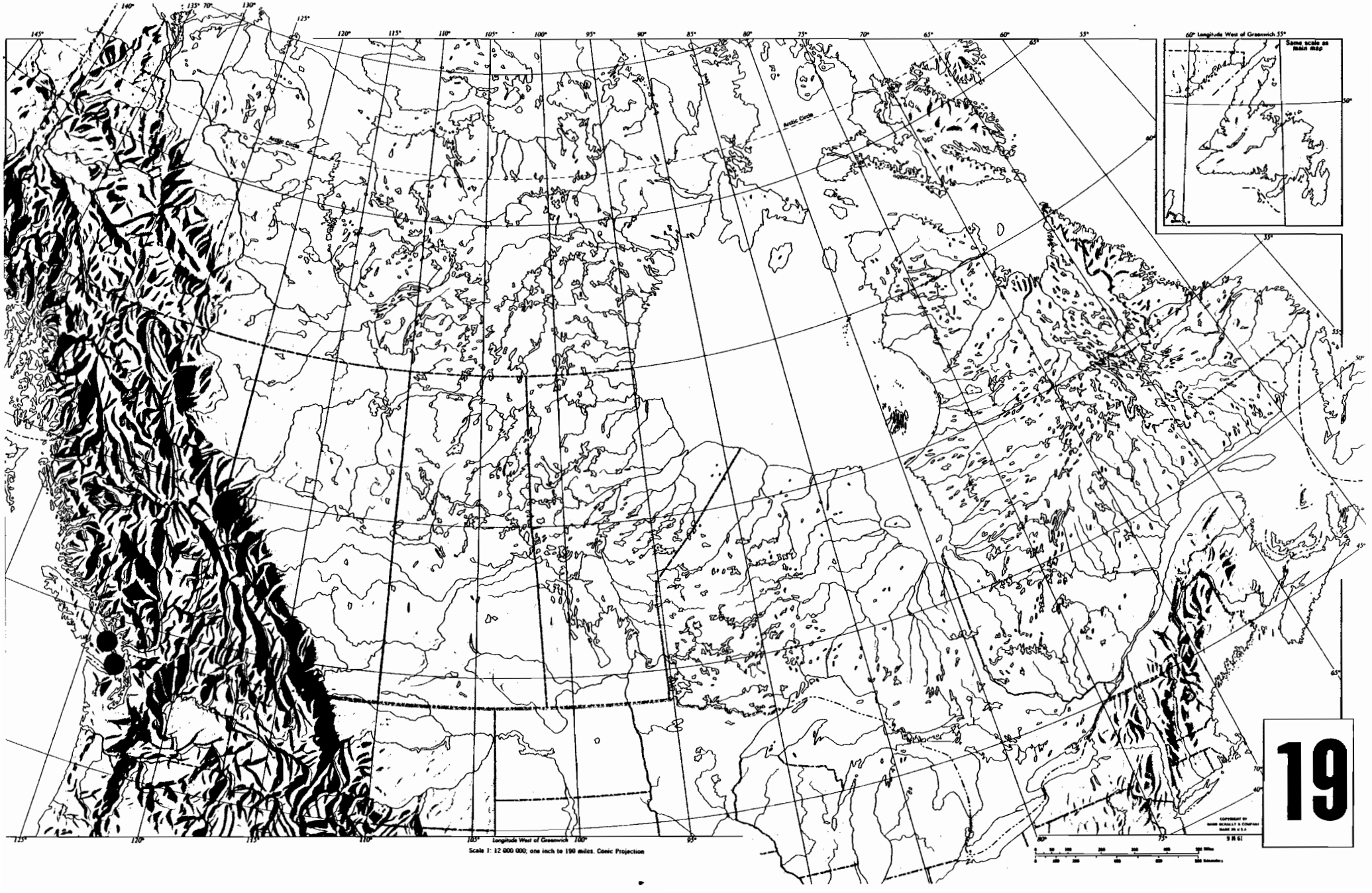
Map 17 Distribution in Canada of *Chrysoperla harrisii*


60° Longitude West of Greenwich 55°
Same scale as main map
Arctic Circle
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
9 N 61
17

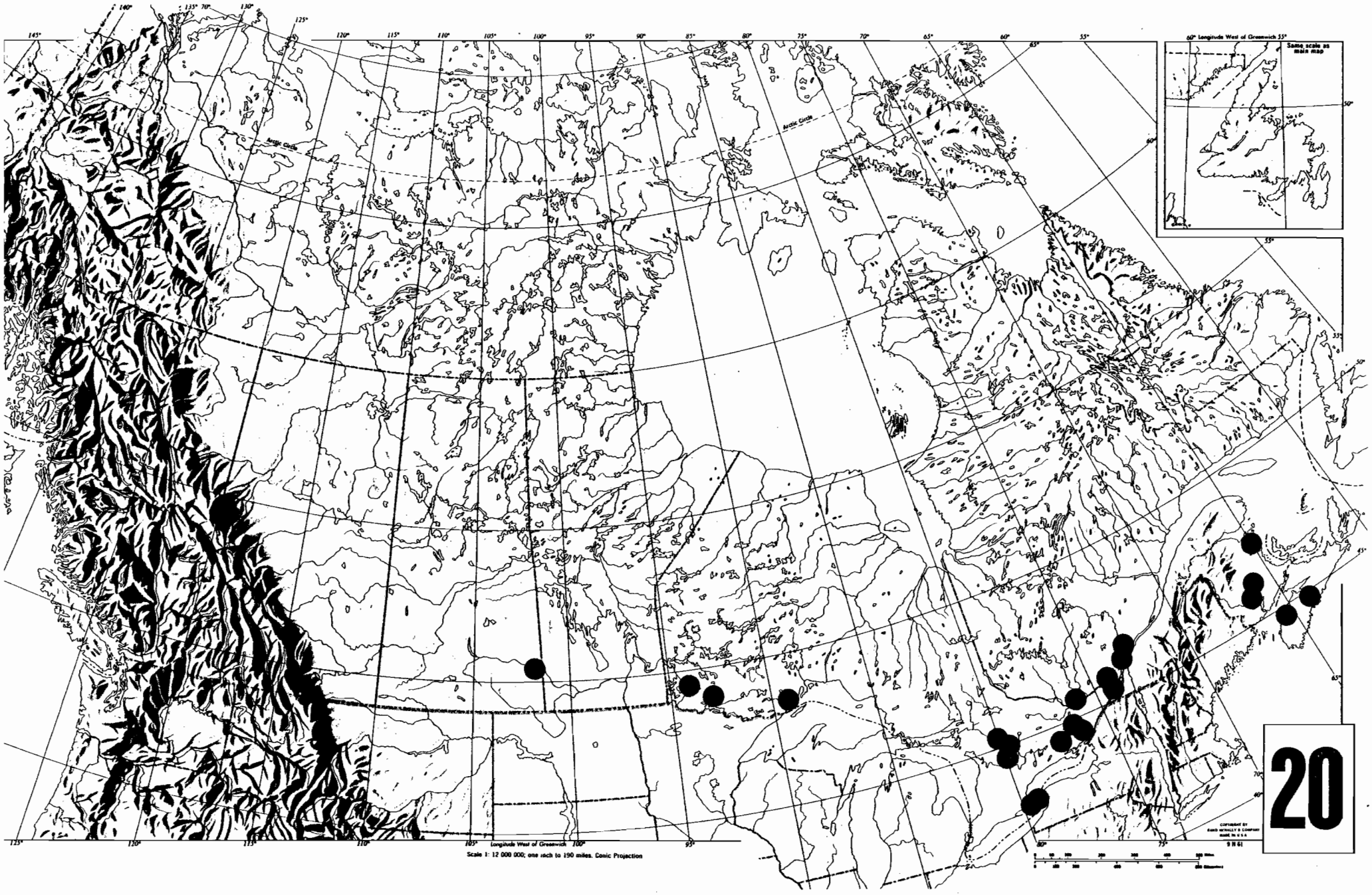
Map 18 Distribution in Canada of *Chrysoperla carnea*


60° Longitude West of Greenwich 55°
Same scale as main map
Arctic Circle
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
18

Map 19 Distribution in Canada of *Nineta gravida*


Arctic Circle
Arctic Circle
60° Longitude West of Greenwich 55°
Same scale as main map
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
19

Map 20 Distribution in Canada of
Glenochrysa lineaticornis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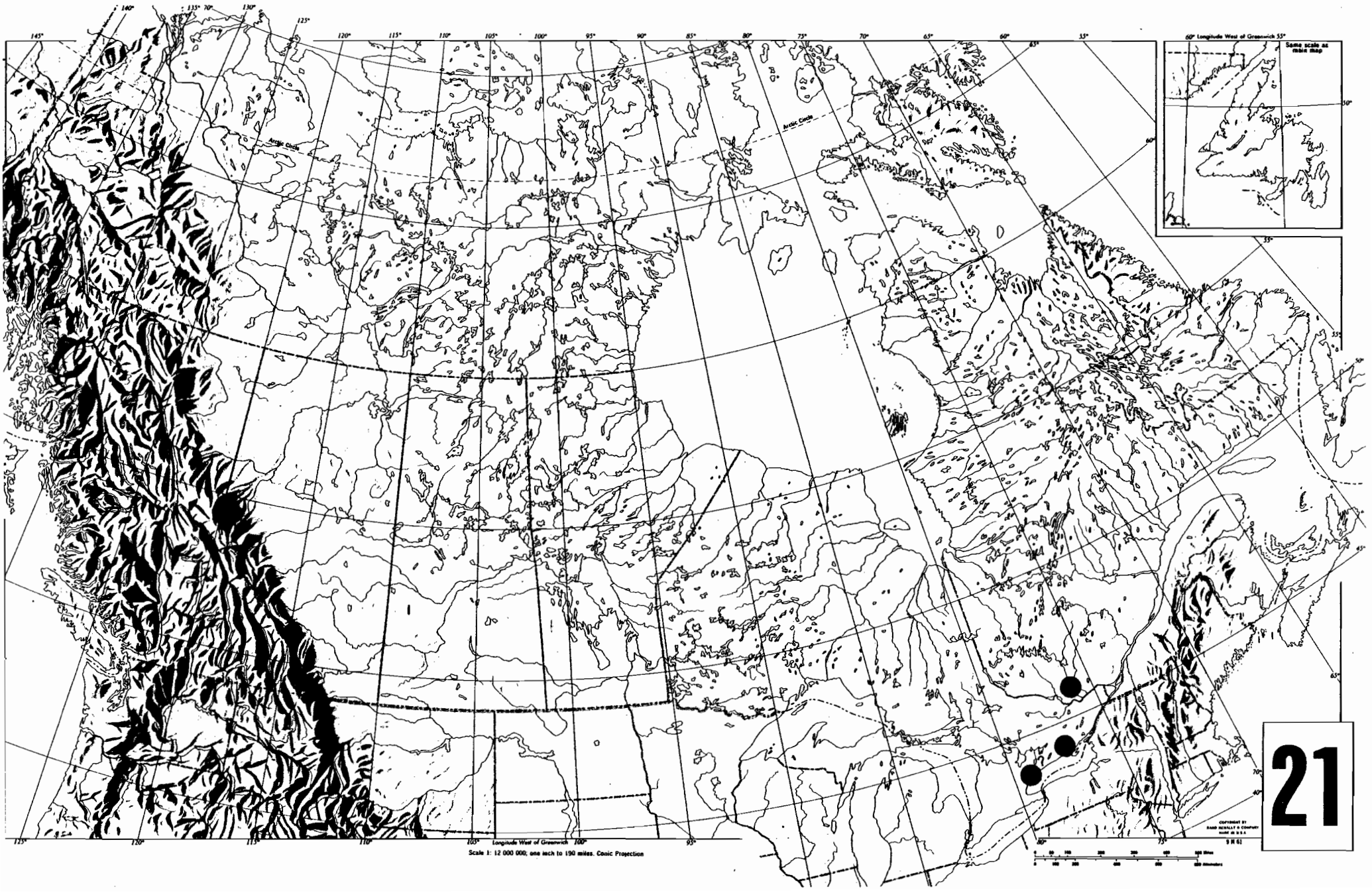
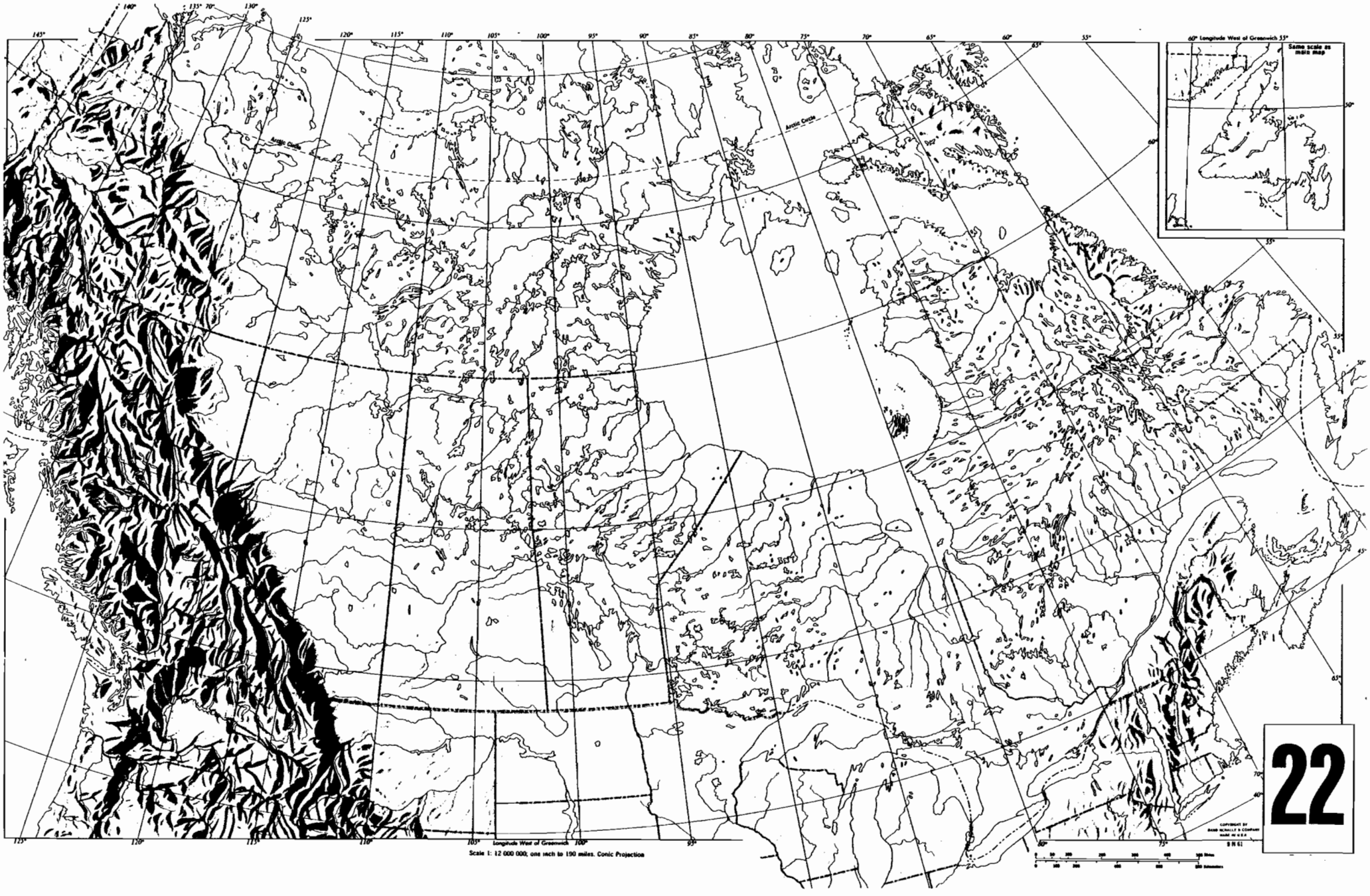
Same scale as main map
Arctic Circle
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
20

Map 21 Distribution in Canada of Oviedus placitus


Arctic Circle
Arctic Circle
60° Longitude West of Greenwich 55°
Same scale as main map
Longitude West of Greenwich 100°
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
21

Map 22 Distribution in Canada of *Mallada perfectus*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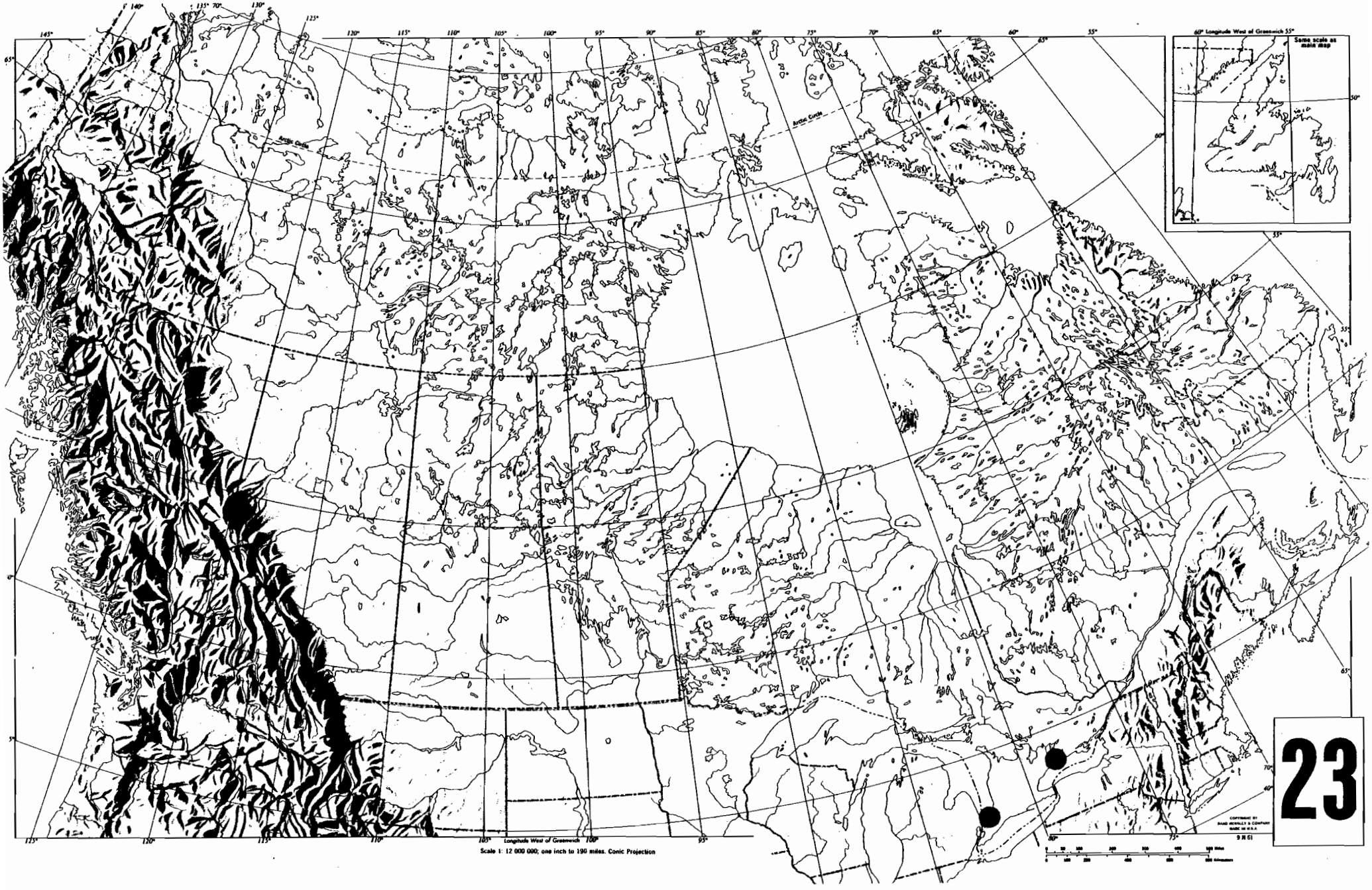
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
22

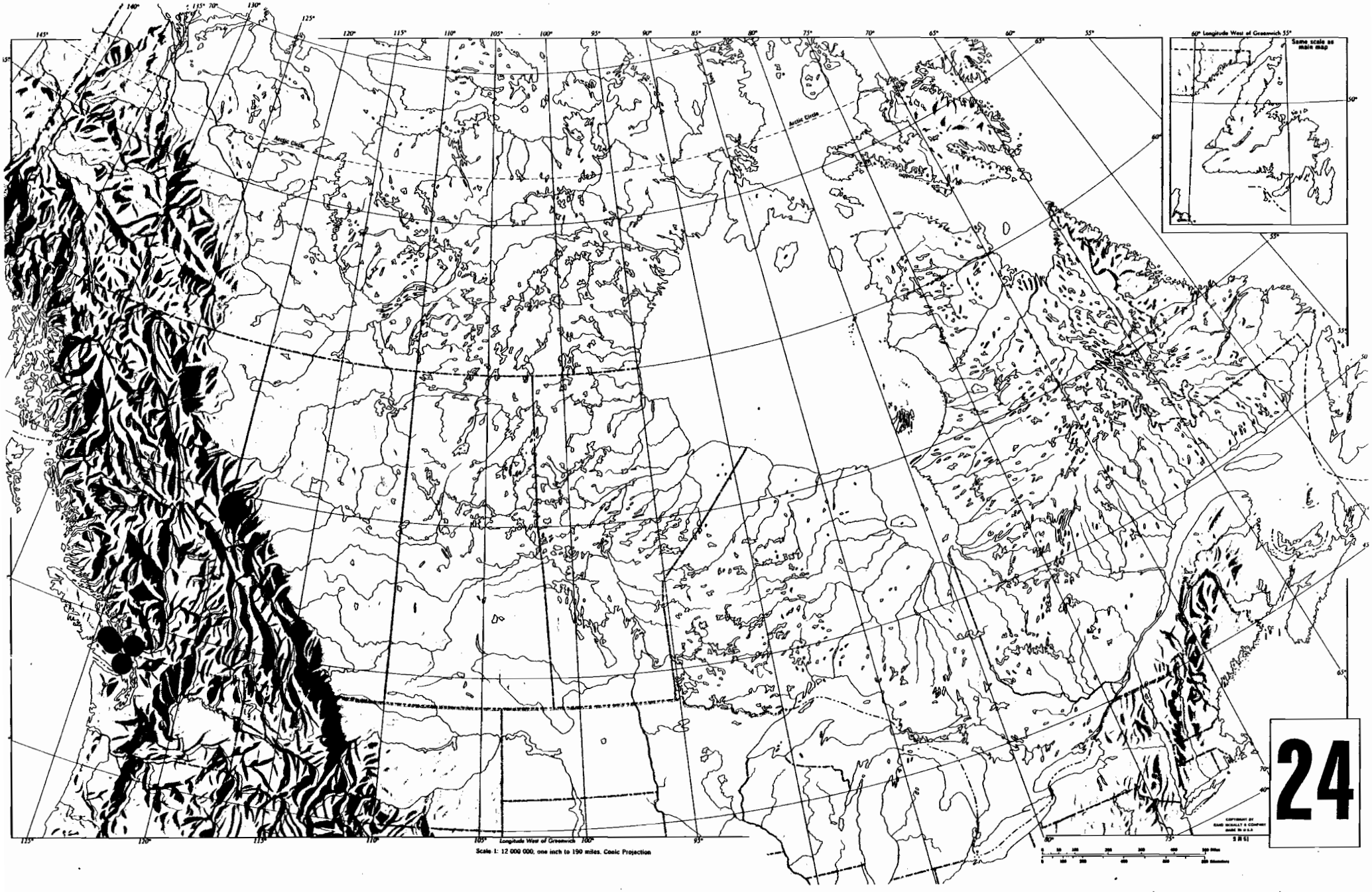
Map 23 Distribution in Canada of *Mallada slossonae*


60° Longitude West of Greenwich 55°
Same scale as main map
Arctic Circle
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000; one inch to 190 miles. Conic Projection
9 M 61

23

Map 24 Distribution in Canada of

Nothochrysa californica


60° Longitude West of Greenwich 55°
Same scale as main map
Arctic Circle
Arctic Circle
Longitude West of Greenwich
Scale 1: 12 000 000, one inch to 190 miles. Conic Projection
24

Take up your cross, the Saviour said,
if you would my disciple be,
deny yourself, the world forsake,
and humbly follow after me.

C.W. Everest

AUTHOR'S LIST OF REVIEWED PUBLICATIONS ON NEUROPTERA

Adams, P.A., & J.A. Garland. 1981. A new species of *Chrysopiella* Banks from western North America (Neuroptera: Chrysopidae). *Can. Ent. 113*: 1-4.

Garland, J.A. 1979. *Meleoma schwarzi*: an addition to the Canadian fauna (Neuropteroida Planipennia: Chrysopidae). *Can. Ent. 111*: 745-746.

Garland, J.A. 1981. Effects of low-temperature storage on oviposition in *Hemerobius stigma* Steph. (Neuroptera: Hemerobiidae). *Entomologist's mon. Mag. 116* [1980]: 149-150.

Garland, J.A. 1981. Reinterpretation of information on exotic brown lacewings (Neuroptera: Hemerobiidae) used in a biocontrol programme in Canada. *Manitoba Ent. 12* [1978]: 25-28.

Garland, J.A. 1981. Observations on survival of eggs of *Hemerobius stigma* (Neuroptera: Hemerobiidae) following exposure to frost. *Manitoba Ent. 12* [1978]: 61-62.

Garland, J.A., & B.D. Marshall. 1980. Confirmation of *Ululodes quadrimaculata* in Canada (Neuroptera: Ascalaphidae). *Can. Ent. 112*: 637-638.