

REPORT OF THE SCIENTIFIC RESULTS OF THE NORWEGIAN
EXPEDITION TO NOVAYA ZEMLYA 1921. No. 5.

CHARLES PAUL ALEXANDER

THE CRANE-FLIES

(SUPERFAMILY *TIPULOIDEA*, ORDER *DIPTERA*)

WITH 3 TEXT-FIGURES

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INTRODUCTION.

The purpose and itinerary of the Norwegian Expedition to Novaya Zemlya in 1921 have been ably discussed by the leader of the Expedition, Dr. OLAF HOLTEDAHL, in the first Report of this series of papers.¹ In the present article, the writer wishes to discuss the crane-fly fauna of Novaya Zemlya as demonstrated by the present collection, and to summarize our knowledge of these flies from the mainlands and islands north of the Arctic Circle. The writer's sincere thanks are extended to the leader of the Expedition, Dr. OLAF HOLTEDAHL, and the zoologist, Mr. FRIDTHJOF ØKLAND, for the privilege of studying these interesting collections of Arctic Tipuloidea. All holotypes and uniques have been deposited in the Zoological Museum in Kristiania, through the leader of the Expedition and the custodian of the collections, Mr. LEIF R. NATVIG.

TIPULOIDEA SECURED BY THE EXPEDITION.

Superfamily *Tipuloidea*.

Family *Rhyphidae*.

Genus *Trichocera* MEIGEN.

1800. *Petaurista* MEIGEN; Nouv. Class. Mouch., p. 15 (*nomen nudum*).

1803. *Trichocera* MEIGEN; Illiger's Mag., vol. 2, p. 262.

1911. *Paracladura* BRUNETTI; Rec. Indian Mus., vol. 6, p. 286.

The genus *Trichocera*, including the familiar so-called "winter crane-flies", contains about thirty described species, the great majority of which occur in the Holarctic Region. Species of this genus have been recorded in virtually all of the important collections of Arctic crane-flies. There has been considerable doubt as to the specific identity of the species of the Northern Hemisphere but the recent studies of EDWARDS, DE MEIJERE and others have done much to place the synonymy of the European species on a firm basis.

¹ HOLTEDAHL, OLAF: Brief Account of the Expedition. Report of the Scientific Results of the Norwegian Expedition to Novaya Zemlya 1921. No. 1; pp. 1-14, plates 3, maps 4; 1922.

Trichocera hiemalis (DE GEER).

1776. *Tipula hiemalis* DE GEER; Mém. pour serv. à l'hist. d. Ins., au Tom. VI, p. 360.

The collection includes seven specimens, representing both sexes, distributed as follows:

Matotchkin Strait, July 10, 1921 (F. ØKLAND).

Mashigin Fjord, July 29, 1921 (F. ØKLAND).

Arkhangel Bay, August 14, 1921 (F. ØKLAND).

Trichocera hiemalis had already been recorded from Novaya Zemlya by HOLMGREN in his report on the insects of the island collected by NORDENSKIÖLD in 1875. It is also known from Spitzbergen and Greenland and has a wide range throughout the cold and temperate regions of Europe.

Family *Tipulidae*.Tribe *Eriopterini*.Genus *Ormosia* RONDANI.

1856. *Ormosia* RONDANI; Dipterologiae Italicae Prodromus, vol. 1, pp. 180, 181.

1860. *Rhypholophus* KOLENATI; Wien. Ent. Monatschr., vol. 4, p. 393.

The genus *Ormosia*, as above restricted, includes some seventy species, occurring throughout the Holarctic Region. The writer can see no sufficient basis for maintaining *Rhypholophus* as distinct from *Ormosia*. A few species have been recorded from the Arctic lands and another is described at this time, the first to be recorded from Novaya Zemlya.

Ormosia holtedahli, sp. n.

General coloration brownish gray; halteres pale; wings tinged with brown, the stigma darker; R_{2+3} and basal deflection of Cu_1 subequal; basal deflection of Cu_1 beyond the fork of M ; 2nd Anal vein sinuous on its distal third.

Female. — Length 4.6—5 mm.; wing 7.2—7.8 mm.

Rostrum dark gray; palpi black. Antennae black throughout, the flagellar segments oval. Head dark gray.

Pronotum dark gray, the rather elongate scutum with conspicuous yellow setae on the lateral portions. Mesonotal praescutum dark brownish gray, the median area indistinctly darker, the interspaces with conspicuous yellow setae; pseudosutural foveae elongate, black, shiny; remainder of mesonotum dark gray. Pleura clear gray. Halteres pale brownish yellow. Legs with the coxae concolorous with the pleura; trochanters dark brown; remainder of the legs dark brown. Wings tinged with brown, the stigma darker brown; veins dark brown. Venation: Sc_2 near midlength of Rs ; R_{2+3} subequal to the basal deflection of Cu_1 ;

r at or beyond the fork of R_{2+3} ; cell $2nd R_1$ at wing-margin a little wider than cell R_2 ; cell $1st M_2$ closed, rather small; basal deflection of Cu_1 beyond the fork of M ; vein $2nd A$ at about two thirds its length curved strongly toward vein $1st A$.

Abdomen dark brown, clothed with conspicuous yellow setae, more conspicuous laterally. Ovipositor with the valves reddish horn-colored.

Habitat. — Novaya Zemlya (endemic).

Holotype, ♀ Admiralty Peninsula, August 21, 1921 (F. ØKLAND) No. 242.

Paratypes, 1 ♀, Belushii Bay, July 16, 1921 (F. ØKLAND) No. 63; 1 ♀, Berkh, August 18, 1921 (F. ØKLAND) No. 235; Pomorskaya Bay, Matotchkin Strait, July 7, 1921 (F. ØKLAND) No. 11.

Ormosia holtedahli is related to *O. fascipennis* (ZETTERSTEDT), differing in the characters given above. The venational differences are shown in the accompanying figures of the two species.

This interesting Tipulid is named in honor of the Director of the Norwegian Expedition to Novaya Zemlya, 1921, Dr. OLAF HOLTEDAHL.

Genus *Psiloconopa* ZETTERSTEDT.

1838. *Psiloconopa* ZETTERSTEDT, Ins. Lapponica, Dipt., p. 847.

The genus *Psiloconopa* includes six species from Europe, together with an additional species from Japan. The reference of the present species to this genus is not entirely satisfactory but there is no other genus that can receive it and it is decidedly inadvisable to propose new groups in this complex of genera without ample justification for the move.

Psiloconopa novae-zemblaе, sp. n.

General coloration gray; dorso-pleural region and the lateral margin of the praescutum yellow; wings tinged with gray, variegated with brown; a supernumerary crossvein in cell R_2 ; basal deflection of Cu_1 before the fork of M ; vein $2nd A$ straight to convex, the anal veins being strongly divergent.

Male. — Length 3,3—3,5 mm.; wing 4,5 mm.

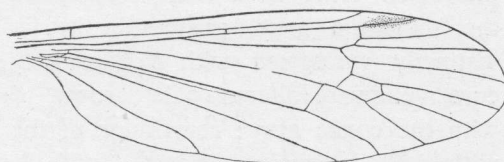


Fig. 1. Wing of *Ormosia fascipennis* (ZETT.).

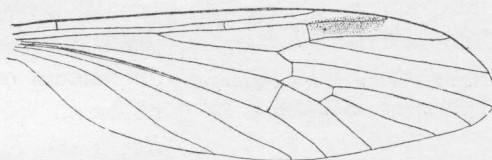


Fig. 2. Wing of *Ormosia holtedahli*, sp. n.

Rostrum and palpi dark brown. Antennae short, brownish black throughout. Head pale grayish white, the center of the vertex darker.

Pronotum brown, the sides obscure yellow. Mesonotal praescutum with the disk light grayish brown, the extreme lateral margins anteriorly more grayish; lateral margin immediately cephalad of the wing-root conspicuously light sulphur-yellow; pseudosutural foveae and tuberculate pits black, lying on a transverse level; median area of the scutum and the scutellum gray, postnotum brownish gray. Pleura light gray, indistinctly variegated with darker gray; dorsopleural membrane obscure yellow. Halteres pale brown, the knobs a little darker. Legs with the coxae gray; remainder of the legs dark brown. Wings tinged with gray, sparsely variegated with brown, the markings being distributed as follows: A conspicuous area at origin

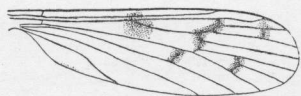


Fig. 3. Wing of *Psiloconopa novae zemblae*.

of R_s ; seams along the cord, outer end of cell 1st M_2 and the supernumerary crossvein in cell R_2 ; veins dark brown. Venation: Sc long, Sc_1 ending opposite r ; Sc_2 retreated to near midlength of Sc , lying opposite the origin of R_s ; r on R_2 a little more than its length beyond the fork of R_{2+3} ; a supernumerary crossvein in cell R_2 opposite the termination of vein R_1 ; cell 1st M_2 elongate, gently widened distally; m about two-thirds the outer deflection of M_3 ; basal deflection of Cu_1 before the fork of M , the distance a little longer than $r-m$; vein 2nd A straight or even convex, diverging very strongly from vein 1st A . Longitudinal veins beyond the cord with macrotrichiae; a series of about 15 on the distal third of vein 1st A , and about 3 near the distal end of vein 2nd A .

Abdomen dark brownish gray, the caudal margins of the tergites very narrowly, the lateral margins, more broadly, ochreous yellow; hypopygium large, dark brown. Male hypopygium with two pleural appendages, the outer appendage deeply bifid at apex, the lateral spine smaller; inner pleural appendage subequal in length, the apex feebly dilated and obtusely rounded. Gonapophyses flattened, the apex of each with a chitinized black spine that is directed strongly laterad.

Habitat. — Novaya Zemlya (endemic).

Holotype, ♂, Pomorskaya Bay, Matotchkin Strait, July 7, 1921 (F. ØKLAND) No. 11.

Paratopotypes, 3 ♂'s.

Psiloconopa novae-zemblae bears a strong superficial resemblance to *Helobia hybrida*, this similarity being heightened by the presence of a supernumerary crossvein in cell R_2 , a primary character of the genus *Helobia*. However, the divergent anal veins and the structure of the hypopygium remove it from *Helobia*. and, as remarked above, it seems to fit best in *Psiloconopa*, from all of the known species of which it

is readily told by the presence of a supernumerary crossvein in cell R_3 . As has been remarked earlier by Dr. BERGROTH and other students, the group of genera centering about *Erioptera* constitutes a very complex aggregation whose strict generic limits are still very unsatisfactorily understood.

Tribe *Tipulini*.

Genus *Tipula* LINNAEUS.

1758. *Tipula* LINNAEUS; Syst. Natur., Ed. 10, p. 585.

1864. *Anomaloptera* LIOY; Atti dell' Institut Veneto, ser. 3, vol. 9, p. 218.

1887. *Oreomyza* POKORNY; Wien. Ent. Zeitung, vol. 6, p. 50.

Tipula is the largest genus of crane-flies in the World. It is one of the characteristic genera in high Arctic regions as can be seen from an examination of the data presented in the Bibliography at the end of this paper. HOLMGREN recorded nine species of the genus from Novaya Zemlya, but a subsequent study of his types by RIEDEL and WAHLGREN has reduced this number to seven. Two of HOLMGREN's species are in the present material, in addition to a third undescribed species.

Tipula arctica CURTIS.

1831. *Tipula arctica* CURTIS; Ross's Voyage to the Arctic Regions, p. LXXVII.

A female, Belushii Bay, Matotchkin Strait, July 19, 1921 (F. ØKLAND) No. 94.

A female, Mashigin Fjord, August 8, 1921 (F. ØKLAND) No. 187 b.

The writer is not entirely convinced that these specimens are congeneric with specimens from Arctic America but in the absence of male individuals they must be referred to *T. arctica*. This is unquestionably the species determined by HOLMGREN as *arctica*. The species, as determined, has a wide range in the Arctic Regions of America, recurring in Novaya Zemlya.

Tipula carinifrons HOLMGREN.

1883. *Tipula carinifrons* HOLMGREN; Ent. Tidsskrift, vol. 4, p. 184.

This remarkably distinct *Tipula* was represented in the present collection by the following specimens:

2 males, one female, Matotchkin Strait, July 13, 1921 (F. ØKLAND) No. 54.

A male, Belushii Bay, Matotchkin Strait, July 19, 1921 (F. ØKLAND) No. 63.

Tipula øklandi sp. n.

General coloration gray, the praescutum with four darker gray stripes; wings tinged with gray, the stigma very conspicuous, dark brown; abdomen dark gray, the tergites with a median brown line.

Male. — Length 13 mm.; wing 15.8 mm.

Female. — Length 15 mm.; wing 17,5 mm.

Frontal prolongation of the head short, dark gray, hairy; palpi black. Antennae short in both sexes, black; in the male, the flagellar segments are slightly incrassated basally, the swelling subequal to the remainder of the segment. Head dark gray, the orbits and sides of the vertical tubercle whitish gray; vertex with black setae, the center naked.

Mesonotum dark blue-gray, the praescutum with four darker gray or bluish gray stripes, the intermediate pair separated only by a capillary line of the ground-color; scutal lobes with similar darker centers; scutellum and postnotum covered with abundant short erect black setae. Pleura dark blue-gray, the dorso-pleural region obscure ochraceous. Halteres pale brown, the knobs darker brown. Legs with the coxae light gray; trochanters dark gray; femora reddish brown, the tips rather narrowly but conspicuously blackened; remainder of the legs brownish black. Wings tinged with gray; stigma very conspicuous, dark brown; very conspicuous whitish oblitative areas before and beyond the stigma; veins dark brown. Venation: Petiole of cell M_1 shorter than the cell; veins Cu_1 and Cu_2 parallel or slightly convergent.

Abdomen dark gray, the tergites with a narrow but conspicuous brown median stripe. In some males, the caudal margins of tergites three and four are narrowly pale and the median brown line is less distinct. Male hypopygium small. Ninth tergite rather massive, depressed, the caudal margin very deeply split by a narrow median incision, the mesal margins being contiguous or nearly so; apex of each lobe obliquely truncated, a little produced at the mesal apical angle; margin of tergite very narrowly obscure reddish brown; ninth pleurite small, the suture indicated dorsally; pleural appendages pale reddish brown, flattened, dilated apically, more or less foot-shaped. Ninth sternite deeply incised medially, the mesal margins contiguous. Eighth sternite unarmed. Ovipositor with the tergal valves elongate, divaricate, the margins smooth.

Habitat. — Novaya Zemlya (endemic).

Holotype, ♂, Mashigin Fjord, July 30, 1921 (F. ØKLAND) No. 155.

Allotype, ♀, Belushii Bay, Matotchkin Fjord, July 17, 1921 (F. ØKLAND) No. 82.

Paratopotypes, 1 ♂, 3 ♀'s, *paratypes*, 1 ♂, North side of Matotchkin Strait, July 13, 1921 (F. ØKLAND) No. 54; 1 ♂, with the allotype, July 16, 1921 (F. ØKLAND) No. 63.

This interesting species of *Tipula* is named in honor of the Zoologist of the Expedition, Mr. FRIDTHJOF ØKLAND. It suggests in its general appearance *Tipula besselsi* OSTEN SACKEN, of Arctic America, but is a very distinct fly.

In addition to the adult flies discussed in the preceding pages, the collection made by Mr. ØKLAND included a few larvae belonging to crane-flies of the genus *Tipula*. There is no way in which they can be correctly associated with the adults. Since these larvae evidence no peculiarities of coloration or structure, they are not discussed further in the present report.

A BIBLIOGRAPHY OF THE ARCTIC CRANE-FLIES.

In order to present succinctly the problem of distribution of Tipuloidea in the Arctic Regions, the writer has given below a summary of the most important literature on the subject, restricting these observations to the lands north of the Arctic Circle. Most writers on Arctic insects have included in this category Iceland and even the Faroe Islands, both of which are eliminated by the above restrictions. The selection of this artificial boundary has also eliminated from discussion the numerous Tipulidae taken on the Harriman Alaskan Expedition, the various reports of the Pribilof or Fur-seal Islands and the species reported from Labrador. On the other hand, it allows us to include the numerous species recorded from Lapland, although this region, with a climate greatly mollified by the warm westerly winds from off the Gulf Stream, has a Tipuloidean fauna that is comparable with that of Southern Alaska or Northern Ontario or Quebec. It seems advisable, however, to discuss this fauna of Lapland in some detail as a direct comparison with the fauna of Novaya Zemlya which lies only a few degrees further north, but considerably to the east so as to be outside the effects of the westerly winds from off the Atlantic and thus to show true arctic conditions.

I. General Discussion of the Arctic Tipulidae.

DE MEIJERE, J. C. H. Die Dipteren der arktischen Inseln. Fauna Arctica, vol. 5, pp. 13—72; 1910 (Tipulidae, pp. 41—46).

DE MEIJERE records 36 species of Tipulidae from the Arctic Islands (including Greenland) but of these 8 are from Iceland and other regions south of the Arctic Circle, that are not considered in this paper.

II. Novaya Zemlya.

HOLMGREN, AUG. E. *Insecta a viris doctissimis NORDENSKIÖLD illum ducem Sequentibus in Insulis Waigatsch et Novaja Semlia anno 1875 collecta.* Entomologisk Tidsskrift, vol. 4, Diptera, pp. 162—190; 1883. Tipulidae, pp. 184—188).

This is the basic list for Novaya Zemlya. The following Tipulidae are included:

<i>Tipula arctica</i> CURTIS	<i>Tipula instabilis</i> , nov.
<i>T. carinifrons</i> , nov.	<i>T. divaricata</i> , nov.
<i>T. senex</i> , nov.	<i>T. serricornis</i> ZETT. (a <i>Prionocera</i>)
<i>T. stagnicola</i> , nov.	<i>T. lionota</i> , nov.
<i>T. convexifrons</i> , nov.	<i>Trichocera hiemalis</i> MEIG.
<i>T. serotina</i> , nov.	<i>T. parva</i> MEIG.

JACOBSON, G. [Russian Title]. *Insecta Novaja-Zemljensia.* In: *Compte rendu de l'expédition, envoyée par l'académie impériale des sciences à Novaïa Zemlia en été 1896.* Mémoires de l'académie des sciences de St. Pétersbourg. Classe Phys.-Math., ser. VIII, vol. VIII, no. 1, pp. 1—244; 1898 (reference on pp. 171—244). The reprint is paged separately and is so cited by Kertész.

This report adds no new records to the known fauna of Novaya Zemlya.

MARKHAM, A. H. A polar reconnaissance, being the voyage of the "Isbjørn" to Novaya Zemlya in 1879: London, 1881, octavo. *Insecta*, pp. 350—352; Diptera by Meade (p. 352).

No authentic species are added to the list, doubtful records of *Tipula oleracea* and *T. variipennis* being given.

RIEDEL, M. P. Die palaäarktischen Arten der Dipteren — (*Nematocera polyneura* —) Gattung *Tipula* L. *Abhandlungen des Lehrervereins für Naturkunde in Crefeld*, 1913; pp. 1—123, pl. 3.

No species are added to the known fauna of Novaya Zemlya but additional notes on HOLMGREN's co-types are given, of the greatest value in determining the synonymy of these species. In this paper, RIEDEL places *Tipula stagnicola* as a synonym of *T. senex* and *T. instabilis* as a synonym of *T. serotina*, the latter on the authority of WAHLGREN.

The number of species of Tipuloidea thus known from Novaya Zemlya is 13, including ten species recorded by HOLMGREN and three others in the present report. Of these species nine are endemic to the Island, one [*Prionocera serricornis* (ZETT.)] occurring elsewhere in northern Europe, and the other three [*Tipula arctica* CURT., *Trichocera hiemalis* MEIG. and *T. parva* MEIG.] with a wide range in Arctic regions. The reference of the last species may be considered as being somewhat doubtful.

III. Arctic Siberia and North-eastern Europe.

ERICHSON, W. F. In MIDDENDORFF'S „Reise in den äussersten Norden und Osten Sibierens“. Tome II, Bd. 1, Zoologie, 1851. Describes as new *Nephrotoma aquilonia* (p. 68); as indicated by BERGROTH (Wien. Ent. Zeitung, vol. 8, p. 120; 1889) this is a species of *Tipula*, described from Boganida, Taimyrland, Northern Siberia, 75° N. Latitude.

LUNDSTRÖM, CARL. Résultats scientifiques de l'expédition polaire Russe en 1900–1903, sous la direction du Baron E. TOLL. Mémoires de l'académie impériale des sciences de St. Petersburg. Classe Phys.-Math.

According to Dr. FREY, this paper had not appeared in press in 1916 and has presumably not been published since that time owing to the chaotic conditions obtaining in Russia. LUNDSTRÖM'S paper bears the title „Diptera nematocera aus den arktischen Küstengegenden Nord Sibierens“. The region involved is the vicinity of the Kara Sea, east of the mouth of the Yenesei, from the Island of Vilitzki to the Gulf of Taimyr.

RIEDEL, M. P. Résultats scientifiques de l'expédition des frères Kuznecov a l'Oural Artique en 1909, sous la direction de H. BACKLUND. Mémoires de l'académie impériale des sciences de St. Petersburg. Classe Phys.-Math., ser. VIII, vol. XXVIII, livr. 8, Diptera Nematocera.

The region involved lies between 66° 40' and 69° 20' N. Latitude and 64° and 78° E. Longitude. Of this report, RIEDEL has never seen a copy and none has reached America so far as known to the writer. That it has been published is affirmed in a communication sent to RIEDEL by BERGROTH who had seen a copy. The paper describes *Rhincoptila polaris*, nov., (a Pediciine form with degenerate wings, probably more correctly referrable to *Tricyphona* though possibly one of the Dicranotae; co-types are in the writers collection through the kindness of RIEDEL); *Tipula postposita*, nov., *T. invenusta*, nov., *T. moesta*, nov., and *Pachyrhina orbitalis*, nov., the latter later recorded by FREY from Lapland.

IV. Arctic Northern Europe.

Including Lapland (Swedish, Finnish and Russian) and Tromsø Stift, Norway (Finmarkens fylke, Tromsø fylke and the northern part of Nordlands fylke).

BERGROTH, E. Ueber einige palaearktische Tipulidae. Wien. Ent. Zeitung, vol. 8, pp. 113–120; 1889.

- FREY, R. Beitrag zur Kenntnis der Arthropoden-Fauna im Winter. Medd. Fauna Flora Fenn., vol. 39, pp. 106—121; 1913.
- LUNDSTRÖM, CARL. Beiträge zur Kenntnis der Dipteren Finlands II, Tipulidae. Acta Soc. Fauna Flora Fenn., vol. 29, pp. 27, 3 pl., 1907.
The same, III, Cylindrotomidae and Limnobiidae. L. c., vol. 29, pp. 32, 2 pl.; 1907.
The same, VIII, supplement 2, Mycetophilidae, Tipulidae, Cylindrotomidae and Limnobiidae. L. c., vol. 36, pp. 70, 8 pl.; 1912.
The same IX, supplement 4, Bibionidae, Chironomidae, and Tipulidae. (Posthumous, edited by FREY). L. c., vol. 44, pp. 26, 2 pl.; 1916.
- Dipteren aus dem Sarek-Gebiete. Diptera nematocera. Naturwissenschaftl. Untersuchungen des Sarekgebirges in Schwedisch-Lappland, Bd. IV, Lief. 6, pp. 666—680, 10 figs.; 1916.
- SIEBKE, H. Enumeratio Insectorum Norvegorum. Fasc. IV, Catalogum Dipteriorum continentum, pp. 255, map, Christiania, 1877.
- WAHLGREN, EINAR. Über einige ZETTERSTEDT'sche Nemocerentypen. Arkiv för Zoologi, Band 2, No. 7, pp. 1—19; 1904. (Tipulidae on pp. 1—13).
- WALLENBOM, H. D. J. Revision af Skandnaviens Tipulidae. Ent. Tidskrift, vol. 2, pp. 177—208, 1881; vol. 3, pp. 13—30, 1882.
- WALKER, FRANCIS. List of the Dipterous Insects in the British Museum, part I, pp. 1—229; 1848 (Tipulidae on pp. 34—84). (The synonymy of the Finmarken species is established by Edwards in Bergroth, Acta Soc. Fauna Flora Fenn., vol. 37, no. 6, p. 9; 1913).
- ZETTERSTEDT, JOHANN W. Insecta Lapponica descripta, columns 1140; 1838—1840 (Diptera in 1838).
Diptera Scandinaviae disposita et descripta. Vols. I—XIV, 1842—1860.
- From Finnish and Russian Lapland, LUNDSTRÖM records 102 species of Tipuloidea, very few of which can be considered as being true arctic forms. These species represent the following genera, the number of included species being given after each genus in parenthesis: *Trichocera* (3), *Dicranomyia* (11), *Rhipidia* (1), *Limnobia* (3), *Discobola* (1), *Orimarga* (1), *Rhamphidia* (1), *Ormosia* (4), *Molophilus* (3), *Erioptera*, s. l. (7), *Chionea* (2), *Psiloconopa* (2), *Helobia* (1), *Rhabdomastix* (1), *Idioptera* (3), *Limnophila*, s. l. (8), *Phyllolabis* (1), *Ula* (1), *Hexatoma* (1), *Tricyphona* (1), *Pedicia* (1; FREY has in press an additional species), *Dicranota* (4), *Rhaphidolabis* (1), *Cylindrotoma* (1), *Phalacrocer* (1), *Dolichozepe* (1), *Tanyptera* (2), *Dictenidia* (1), *Prionocera* (4), *Tipula* (29) and *Nephrotoma* (1).

V. Spitzbergen and Jan Mayen.

BOHEMAN, C. H. Spetsbergens Insekt-Fauna. Öfv. Vet. Akad. Förhandl., vol. 22, pp. 563—577; 1865.

Records *Trichocera hiemalis* and *T. parva* from Spitzbergen, both species having also been reported from Novaya Zemlya. Mr. EDWARDS informs me that the Oxford Expedition to this island secured only *T. lutea* BECHER and the first two records are possibly mis-determinations.

BECHER, E. Insekten von Jan Mayen, gesammelt von Dr. F. FISCHER.

Beobachtungsergebnisse Internationale Polarforschung, vol. 3, pp. 59—66, Pl. V; 1886 (K. Akad. Wissenschaft. Wien).

Trichocera lutea is described, known only from the two islands included in this category.

VI. Greenland, Baffinland, Melville Island, Ellesmereland, etc.

ALEXANDER, CHARLES P. New or little-known Crane-flies from the United States and Canada. Tipulidae, Diptera. Proc. Acad. Nat. Sci. Philadelphia, pp. 579—606; 1914.

Records *Rhabdomastix (Sacandaga) caudata* (LUNDBECK) from Baffinland.

BURGESS, E. In LUDWIG KUMLIEN'S "Contributions to the Natural History of Arctic America". Bull. U. S. National Museum, No. 15, pp. 1—179; 1879. (Insects on pp. 159—161; the only Tipulid (p. 160) is *Tipula arctica* CURTIS, from the Gulf of Cumberland on the Arctic Circle.

CURTIS, JOHN. Description of the insects brought home by Commander J. CLARK ROSS. Appendix to Ross's Voyage to the Arctic Regions; 1831. Original description of *Tipula arctica*.

FABRICIUS, OTTO. Fauna Groenlandica, pp. 452; 1780. (Insecta on pp. 184—221).

HENRIKSEN, KAI L. and LUNDBECK, WILL. Conspectus Faunae Groenlandicae. Pars secunda. II Landarthropoder (Insecta et Arachnida). Meddelelser om Grønland, vol. 22, pp. 481—823; 1917. Tipulidae on pp. 598—606).

In this list, LUNDBECK records 13 species of Tipulidae from Greenland, the identical number known from Novaya Zemlya. These species are distributed in the following genera: *Dicranomyia* (1), *Ormosia* (2), *Helobia* (1), *Rhabdomastix* (1), *Nephrotoma* (2), *Prionocera* (1), *Tipula* (2) and *Trichocera* (3). Of these, *Trichocera hiemalis* and *Tipula arctica* are the only ones likewise found in Novaya Zemlya. In this list, a comparison is made between the Tipulidae of the two coasts of Greenland.

JOHANSEN, FRITZ and NIELSEN, I. C. The Insects of the "Danmark" Expedition. Meddelelser om Grønland, vol. 43, pp. 35—68, Pl. 7, 8; 1910.

I General remarks on the life of insects and arachnids in north-east Greenland, pp. 35—54, by JOHANSEN.

II A catalogue of the insects of north-east Greenland with description of some larvae, pp. 55—68, by NIELSEN. Observations made at Latitude 76° 46' North; the life history of *Tipula arctica* described.

KIRBY, WM. Supplement to the Appendix of Capt. PARRY's Voyage for the discovery of a North-West passage in the years 1819—1820, pp. CCXIV—CCXIX; London 1824 (Melville Island).

LUNDBECK, W. Diptera groenlandica. I. Vid. Meddel. naturhist. Foren. Kjöbenhavn, pp. 236—314; 1898.

LUNDBECK, W., and DEICHMANN, I. H. Østgrønlandske Insekter. Meddelelser om Grønland, vol. 19, pp. 95—120; 1896.

I. Korte Bemærkninger over Insektlivet, pp. 95—104, by DEICHMANN.

II. Fortegnelse over de indsamlede Insekter, pp. 105—120, by LUNDBECK.

NIELSEN, I. C. The Insects of East-Greenland. Meddelelser om Grønland, vol. 29, pp. 363—409; 1907. (Tipulidae on pp. 372 (list), 389—391).

Twelve species are here recorded, all being included in the more comprehensive list by HENRIKSEN and LUNDBECK cited before.

OSTEN-SACKEN, C. R. Report on the Diptera brought home by Dr. BESSELS from the Arctic Voyage of the "Polaris" in 1872. Proc. Bost. Soc. Nat. Hist., vol. 19, pp. 41—43; 1876.

These are the most northerly Tipulidae yet recorded (Polaris Bay, 82° N. Lat.), including a *Trichocera*, possibly *regelationis*; *Tipula besselsi*, nov., and *T. nodulicornis* ZETT. which is now considered a synonym of *T. arctica*.

STAEGER, C. Beskrivelse af Grønlands Antliater. KROYER's Naturhist. Tidsskrift., (2), vol. 1, pp. 346—369; 1845.

Records *Ormosia fascipennis* (ZETT.), *Tipula nodulicornis* ZETT. and *Trichocera maculipennis* MEIG.

VII. The Canadian Arctic North-west and Alaska.

ALEXANDER, CHARLES P. New Nearctic Crane-flies (Tipulidae, Diptera) Part IV. Canadian Entomologist, vol. 50, pp. 60—71; 1918.

Describes *Tipula coracina* from Point Barrow, Alaska, and *T. bergrothiana* from the Koyukuk River, Alaska (Lat. 67°—69° N.).

New Nearctic Crane-flies (Tipulidae, Diptera) Part V. Canadian Entomologist, vol. 50, pp. 242—246; 1918.

Describes *Tipulae kirbyana* from Point Barrow, Alaska.

The Crane-flies collected by the Canadian Arctic Expedition, 1913—1918. Report of the Canadian Arctic Expedition, 1913—18, vol. III, Insects; Part C, Diptera; pp. 3c—30c; 1919.

Records from the Canadian North-west, the following number of species, almost all new to science: *Erioptera* (1), *Dactylolabis* (1), *Tricyphona* (1), *Prionocera* (2), *Nephrotoma* (1), *Tipula* (7) and *Trichocera* (1). The immature stages of *Tipula arctica* and the supposed immature stages of *Prionocera parrii* are described.

The Crane-flies of New York. Part I. Distribution and Taxonomy of the Adult Flies. Cornell University Memoir 25, pp. 765—993; 1919.

Systematic account of *Rhabdomastix caudata*, *Tipula arctica*, *T. besselsi* and other Arctic American Tipulidae.

The Crane-flies of New York. Part II. Biology and Phylogeny. Cornell University Memoir 38, pp. 691—1133; 1921.

References to the biology of *Tipula arctica*, *Prionocera parrii* and other Arctic American Tipulidae.

From Arctic Northwestern North America, about 17 species of Tipuloidea have been recorded, of which 15 are endemic. All of these species have been recorded subsequently to the appearance of the general list of Arctic Diptera by DE MEIJERE.

SUMMARY.

From the islands of Novaya Zemlya, a total of 13 species of Tipulidae and Rhyphidae have now been recorded. 9 of these species are endemic, 3 having been discovered by the Norwegian Expedition of 1921. Of the species that are not confined to the islands, 3 are widely distributed in the Arctic regions. One other is found elsewhere in Northern Europe.

Excluding from consideration the fauna of continental Europe lying north of the Arctic Circle, the crane-flies of the Arctic Region may be summarized as follows:

The fauna as listed by DE MEIJERE (1910), excluding Iceland and other points south of the Arctic Circle, included 28 species of Tipuloidea, the list being further reduced to 26 by the discovery of the synonymy of certain of the Novaya Zemlya species of *Tipula*. To this list may be added 6 species from Arctic Europe and Asia, and 15 from Arctic North America, making a total of 46 species of truly Arctic Tipuloidea.

Of these species, 9 are endemic to Novaya Zemlya, 5 to Arctic Europe and Asia, 1 to the islands of Spitzbergen and Jan Mayen, and 20 to Arctic North America, including Greenland, a total of 35. The remaining 11 species are widely distributed in the Arctics (*Tipula arctica*) or occur elsewhere in Northern Europe. 7 of the 13 known Tipuloidea of Greenland occur also in Northern Europe.
