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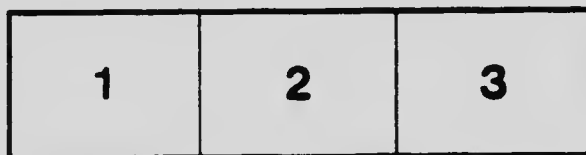
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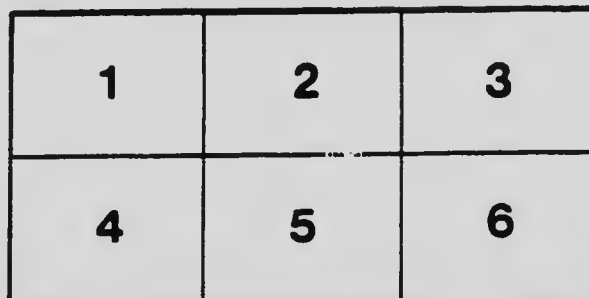
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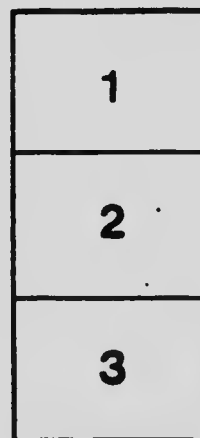
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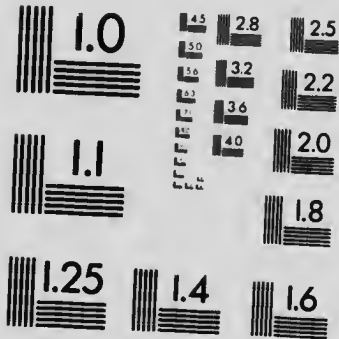
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REPORT
OF THE
CANADIAN ARCTIC EXPEDITION
1913-18

VOLUME III: INSECTS

PART G: HYMENOPTERA AND PLANT GALLS

Sawflies-Tenthredinoidea	- - - - -	Alex. D. MacGillivray,
Parasitic Hymenoptera	- - - - -	Chas. T. Brues,
Wasps and Bees	- - - - -	F. W. L. Sladen,
Plant Galls	- - - - -	E. P. Felt.

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OTTAWA
J. de LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1919

Issued November 3, 1919

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The Saw-flies (Tenthredinoidea) collected by the Canadian Arctic Expedition, 1913-18.

ALEX. D. MACGILLIVRAY¹.

The specimens of Tenthredinoidea collected by this Expedition were secured with one exception, by the entomologist of the expedition, Mr. F. Johansen. When the material obtained is compared with that described by Kineaid, the entomologist of the Harriman Alaska Expedition, a striking difference is noted. There was secured from southern Alaska by the Harriman Expedition representatives of eight groups, families and subfamilies. The collection of the Canadian Arctic Expedition contains representatives of three groups, two of which are represented by single species and specimens, which were collected at Nome, Alaska. One of these belongs to a group not represented in the collection of the Harriman Expedition, the Siricidae. All of the specimens from the northern part of the Northwest Territories belong to the subfamily Nematinae of the family Tenthredinidae. This restriction is further striking in that all the species belong to those genera with cleft claws. The larvæ of the species of certain of the genera feed only upon willow, while in others the majority of the species feed upon willow.

Some of the new species² described on the following pages may prove to be the same as some of the species described from the European fauna. There is less liability for confusion and danger from recording species from our fauna that do not belong to it by giving names to these species, and this method has been followed. If later studies prove any of the species to be identical with species described from Siberia or Europe, it will be a simple matter to record them as synonyms. The length given in the case of the larvæ is for individuals supposed to be mature. The statements enclosed by quotation marks are from the original notes prepared by Mr. Johansen, to whom I am indebted for reading the original manuscript of this paper, and for many corrections and suggestions.

The following suggestion of Mr. Johansen will be of great value to future investigators and travellers collecting and breeding saw-flies in the Arctic regions: "From my notes it is evident that no saw-fly imagines are found in the Arctic outside of the months of July and August (9-10 weeks), a fact that I think is worth mentioning in the report, so that one understands that the specimens collected outside this period are all larvae or pupæ."

Urocerus flavicornis Fab.

A single female collected at Nome, Alaska, specimen No. 83F. This specimen differs from the description of Bradley in that it has the first and sixth and part of the seventh segment of the abdomen and the corns yellow or brownish instead of the second, seventh, eighth, and sometimes the first more or less.

"A big woodwasp (*Teredo*) caught this summer 1916, in the town of Nome, Alaska, was given to me here. It probably had been imported (as larva or pupa) from the states with lumber, and then emerged in Nome later" Bradley reports this species from Alaska and Siberia.

¹Contributions from the Entomological Laboratories of the University of Illinois, No. 56.

²The types of all new species described in this report are deposited in the National Collection of Insects, Ottawa.

Rhogogastera reliqua, n. sp.

FEMALE. Head smooth and polished; the clypeus long, the emargination shallow, the bottom of the emargination straight, the sides oblique, the clypeal lobes slightly broader than long, their margins rounded; the labrum shield-shaped, pointed, fringed with setæ; the antennal plates large; the antennal furrows deep, extending from the pretentorium to the ridge bounding the caudal aspect of the head; each lateral ocellus placed on a swollen ocellar area; the ocellar areas separated by a prominent interocellar furrow, forming a small ocellar basin ventral of the median ocellus, bounded by the frontal ridges which are confluent on the meson and continuous with the supra-clypeal area, the dorsal end of each continuous with an ocellar area; the ocellar furrow distinct, the postocellar area quadrangular; antennæ with first and second segments subequal, the third longer than the fourth and shorter than the fourth and fifth together; the pronotum, mesonotum, metanotum, mesopleuræ, and the metapleuræ polished and setaceous; the claws cleft, the inner ray slightly shorter than the outer; the abdominal segments finely granular and sparsely setaceous; the saw-guides with the dorsal and ventral margins parallel, the caudal end obliquely rounded to a blunt point above; colour green or yellowish green with the following parts black: the dorsal surface of the antennæ, a band covering the antennal furrows, connected between the antennal plates, and extending across the caudal aspect as converging lines to the occipital foramen, the ocellar basin, the interocellar furrow, the transverse furrow of the pronotum, the median furrow of the median lobe of the mesonotum, the furrow separating the median and lateral lobes, the concave part of the mesoscutum, the infolded portion of the mesopostscutellum, the wing veins except the costa and stigma, a spot on the caudal surface of the trochanters, a band on the distal half of the caudal surface of the femora, a band on the caudal surface of the tibiae, the bottom of the infolding between the mesopostscutellum and the basal plates, and spots on the mesal part of each abdominal tergum, larger on the caudal segments, the lateral margins of the spots irregular, on the cephalic segments deeply squarely emarginate. Length, 10 mm.

Nome, Alaska, August 21-25, 1916. F. Johansen, collector. "On flowers of common, big umbellifer (*Heracleum*)?" Specimen No. 45.

This species is closely related to *eransii* Harr., from which it is readily separated by the difference in colour, the shape of the saw-guides, and the topography of the head.

Euura abortiva, n. sp.

FEMALE. Head, except the ventral half of the inner orbits, finely densely punctured; the clypeus roundly rather deeply emarginate, the clypeal lobes broad and broadly rounded; the labrum bluntly pointed and setaceous; the antennal furrows extending from the pretentorium to the frontal crest as broad shallow depressions and from the frontal crest to the ocellar furrow in which they terminate in rounded concavities as similar depressions; the ocellar furrow, broad and distinct, distant from the lateral ocelli; the macrocellar furrow a slight V-shaped depression extending halfway to the median ocellus; postocellar area continuous with the posterior orbits; ocellar basin represented by a rounded depression adjacent to the median ocellus; ocellar areas swollen with rounded sides and separated by slight depressions from the frontal areas, which are continuous with a poorly defined frontal crest; median fovea distinct, punctiform, continued dorsal as a linear depression slightly interrupting the frontal crest; antennæ short, segments three and four subequal, the segments roughened and densely setaceous with short setæ; pronotum and the median and lateral lobes of the mesonotum finely punctured like the head; mesoscutellum and mesopostscutellum polished; metascutellum more closely and coarsely

punctured than the mesoscutum; mesopleura finely densely punctured and setaceous; front wings fully formed, not reaching beyond the seventh abdominal segment, the petiolate cell abbreviated, veins and stigma brownish; hind wings normal in size and venation; claws deeply cleft, the rays subequal; the 1st lumen finely granular; saw-guides large and broad, the dorsal margin straight, the ventral margin oblique, the distal end obliquely and broadly rounded; cerci long and slender, extending beyond the end of the abdomen; color black with the tegulae and the legs with the knees, tibiae, and tarsi yellowish infuscated. Length 4 mm.

Herschel island, Yukon Territory. F. Johansen, collector. Larvae collected in galls on leaves of *Salix reticulata* L., August 13, 1911. Adults emerged July, 1915. Specimen No. 253.

This specimen was received as a part of Breeding Record 36. "Material (galls) only collected (in 1911) once and from the same host-plant (*Salix reticulata*). There is the further note on larvae from willows on Herschel island: "Host-plant *Salix reticulata* L. 2 (3) imagines reared. Galls." Mr. Johansen makes the further suggestion regarding this number: "Larvae collected as galls on bushy willow, probably *Salix Richardsiana* K., on Herschel island, Yukon Territory, end of July, 1916, were not reared (only in alcohol). Their host-plant is different from that of Breeding Record 36." The structure of the wings of the adult and the habits of the larvae of the species of *Euura*, which have always been considered as borers in the stem of willow, precludes its inclusion with the other specimen received under this breeding record number and described later as *Pantania delicatula*. I mistrust that the feeding habits of the larvae of the species of *Euura* do not vary but that in bred individuals, the wings are not always completely matured, with the result that there are specimens bred from galls which lack the free part of R_5 and described as species of *Euura*.

This species is related to *niger* Prov. It is readily separated from this species by the short wings, the difference in the median fovea and frontal crest and in the darker-coloured legs.

Euura arctica, n. sp.

FEMALE. —Head coarsely granular throughout; the clypeus broadly, deeply, angularly emarginate, the clypeal lobes broad and rounded; the labrum broadly rounded and setaceous; the antennal furrows deep and broad from the pretentorial to the frontal crest, indefinite on the cephalic aspect, broad and deep adjacent to the lateral ocelli, terminating in a large punctiform depression, not reaching the caudal margin of the head; the interocellar furrow a linear depression extending from the median ocellus to a linear, low, V-shaped ocellar furrow, which is not connected with the antennal furrows; the antennal furrows widened opposite the median ocellus, extending almost to the compound eyes, limited on the ventral side by a distinct elevation; the ocellar area convex, not elevated above the broad flat ocellar basin; ocellar basin limited on the ventral side by strongly elevated frontal areas which are continuous with the frontal crest, separated by a broad concavity which is continuous with the long broad concave median fovea; median fovea limited by low antennal plates; supraclypeal area broadly convex; antennae long and slender, the third segment slightly longer than the fourth, the surface of the segments granular and finely setaceous; the pronotum coarsely granular like the head; the median and lateral lobes of the mesonotum uniformly finely granular, the latter sparsely setaceous; the median lobe with a broad longitudinal depression with a mesal carina; the mesoscutellum and mesopostscutellum polished; the metascutum concealed by the wings; the mesopleura with the dorsal portion finely granular and the ventral portion, the mesosternum, and the metapleura, polished; the front wings normal in size, the costa and stigma pale, and the other veins brownish; the claws deeply cleft, the inner ray much shorter than the outer; the abdomen

finely granular; the saw-guides with the dorsal and ventral margins rounded, the distal end bluntly rounded, the distal third and the ventral portion setaceous; the cerci long and pointed; colour black with the following parts infuscated yellowish: the mandibles in part, the tegulae, the knees, and the tibiae, and the tarsi. Length, 10 mm.

GALLS.—The galls, Breeding Record 90, considered as belonging to this species, are small reddish globular ones occurring on the leaves and are similar to those of *Pontania* and resemble in appearance and shape those of *Pontania atrata*. The adult has the wing venation typical of the genus *Euura*.

Material (larvæ) collected on *Salix reticulata* both by F. Johansen at Bernard harbour, Northwest Territories, August 16, 1915, in willow catkins; and by R. M. Anderson at Cape Barrow, Northwest Territories, August 14, 1915, in galls on willow leaves. Owing to shortness of jars the two collections were placed together when Dr. Anderson gave me his material in October, 1915, and nothing has come out of (dead?) my larvæ from August 16, at that time nor later. The material from Bernard harbour (if any) probably belongs to the same species as Breeding Record 85; while Breeding Record 90 properly only refers to the material collected by Dr. Anderson.

Bernard harbour and Cape Krusenstern, Northwest Territories. F. Johansen, collector. July 6, 1916. Specimen No. 295.

This species can be separated from *insularis* Kincaid by the form of the median fovea and the frontal crest and the colour of the labrum and legs.

The seven species of *Pontania* described on the following pages can be separated by means of the following table:—

- a Head, including orbits, and the collar black.
 - b Supraclypeal area with its dorsal extent limited by a distinct crestral furrow. *atrata*.
 - bb Supraclypeal area not limited by a distinct crestral furrow.
 - c Tegulae black.
 - d Ocellar basin flat *lorata*.
 - dd Ocellar basin deeply furrowed *delicatula*.
 - cc Tegulae pale *diminuta*.
- aa Head with orbits and pronotum with collar resinous or ferruginous.
 - b Mesonotum with the median and lateral lobes black *quadrifasciata*.
 - bb Mesonotum with a large V-shaped resinous or ferruginous mark.
 - c Head with postocellar area longitudinally furrowed; frontal crest large and broadly interrupted *subpallida*.
 - cc Head with postocellar area not longitudinally furrowed; frontal crest distinct but not large and narrowly interrupted *trifasciata*.

Pontania atrata, n. sp.

FEMALE.—Head with the surface in great part finely granular; the clypeus short, narrowly roundly emarginate, the clypeal lobes broad and rounded; the supraclypeal area strongly convex, separated from the frontal crest by a deep crestral furrow extending to the antennal furrows; the median fovea large and distinct; the frontal crest large, strongly swollen, interrupted by a broad shallow furrow extending to the crestral furrow; the antennal furrows deep, bounding a strongly elevated frontal area with a large flat or slightly concave ocellar basin extending from the lateral ocelli to the frontal crest; the frontal ridge wanting; vertical furrows punctiform; ocellar and interocellar furrows forming a T-shaped depression, the ocellar furrow not connected with the antennal furrows; the antennæ short and flattened, the third and fourth segments subequal in length, the fifth slightly shorter; the pronotum and median lobe of the mesonotum finely granular, the lateral lobes with the cephalic portion of each granular and the caudal portion smooth and polished; the mesoscutellum, mesopostscutellum, and metascutum smooth and polished; the mesopleura, the

mesosternum, and the metapleura smooth, the former setaceous and the two latter polished; the wings hyaline, the veins brownish, the stigma pale, the free part of R^5 and M^2 interstitial or nearly so; the claws long and slender, deeply cleft, the inner ray two-thirds the length of the outer; the saw-guides broad, the proximal part, of the ventral margin straight and the distal portion rounded to the concave dorsal margin, not tapering, distal end subtruncate, the surface sparsely setaceous; the cerci short and slender, extending to the middle of the saw-guides; colour black, the legs beyond the knees whitish. Length, 5 mm.

MALE.—The male differs from the female in that the median fovea is deeper and more distinctly punctiform, the furrow interrupting the frontal crest is deeper and broader, the ocellar basin is concave but the frontal ridges are wanting, the dorsal half of the head is more coarsely granular than the ventral portion, the vertical furrows are longer and broader and connected with a broad depression representing the ocellar basin, the antennae are longer but are stout and segments three and four are subequal; the procidentia are short bluntly rounded projections. Length, 5 mm.

LARVA.—Body white, head variable in colour, usually darker than the remainder of the body; ocellaria typical in form and size, the ocellus placed in the center; the antennae convex oval areas bounded by a brownish line, located ventro-mesad of the ocellaria, and its surface bearing about six minute chitinated areas; head usually darker in colour dorsad of a line drawn through the ocellaria, sometimes with a spot on the dorsal half of the front and a curved fuscous band connecting the ocellaria, the darker colour due in part to the number and intensity of the minute round or oval areas of which they are composed; mandibles distinctly dentate; spinneret large and prominent; microthorax linear, fuscous in colour; prothorax with three annulets, the second much larger than the others and interrupted on the meson and each lateral portion swollen, also each lateral portion of the first annulet; the spiracular area oval, swollen, and transverse, with five to eight setae; pedal area small with two or three setae; mesothorax and metathorax with four sparsely setaceous annulets, the first short and greatly swollen, the second and third subequal in length and swollen except the mesal portion of the second, the fourth small, the spiracular area large and swollen, the pedal areas similar to those of the prothorax; abdominal segments one to eight with four annulets, the first more swollen than the fourth, the second and third more swollen than the first, the second with a lighter coloured mesal portion usually bearing a single seta on each side of the meson, annulets with transverse rows of setae; the spiracular, postspiracular, and pedal areas large and swollen and setaceous; tergum of the tenth segment with small round black spots; prolegs long and blunt, cephalic and mesal portions setaceous; legs with strongly chitinated portions brownish. Length 10-12 mm.

GALLS.—Galls usually located near the midrib and projecting about equally onto both surfaces of the leaf, about the size of a large pea or slightly larger, the surface with depressions with irregular swellings between, in some specimens one-half of the gall bluntly pointed; colour probably brownish or reddish, a single gall on a leaf. Galls formed on leaves of creeping willow *Salix arctica*.

Breeding Record 35. "Host-plant *Salix arctica*. Galls. Several imagines reared. It was noted during the rearing that the emerging imagines were of different sizes (6 or 7 mm.); so that they may well have been of different species."

Herschel island, Yukon Territory. Larvae collected August 13, 1914. Imagines emerged July, 1915. F. Johansen, collector. Female No. 264; males Nos. 254, 257, 259, 261, 263, and 266.

This species is related to *kincaidi* Marlatt, from which it can be separated by the shape of the median fovea, the deep interruption of the frontal crest, the form of the claws, and the colour.

Pontania lorata, n. sp.

FEMALE.—Head with the dorsal portion finely granular and the ventral portion polished; the clypeus short, broadly roundly emarginate, the clypeal lobes distinct, broadly rounded; the supraclypeal area strongly convex, the crestral furrow wanting; the frontal crest swollen, continuous with the frontal area; median fovea a deep oval pit continuous on the dorsal side with a short shallow linear impression interrupting the ventral portion of the frontal crest; the antennal furrows distinct, broad and bounding a strongly elevated frontal area with a slightly concave ocellar basin; the frontal ridges wanting; the vertical furrows punctiform; the ocellar and interocellar furrows wanting; antennæ wanting beyond the sixth segment, the third and fourth and fifth segments subequal in length; the collar granular and setaceous; the median and lateral lobes of the mesonotum, the mesoscutellum, the mesopostscutellum, and the metascutum polished and setaceous; the mesopleura, mesosternum, and metapleura polished, the former sparsely setaceous; wings hyaline, veins brownish, the stigma pale, the free part of R^5 and M^2 interstitial in one wing and not in the other; claws unevenly cleft, the outer ray long and slender, the inner short and not over one-third the length of the outer; the abdomen finely granular and sparsely setaceous; the saw-guides broad and bluntly rounded on the ventral margin and distal end, not tapering, the dorsal margin convex, the distal portion with a distinct scopa; the cerci long and setaceous, reaching beyond the middle of the saw-guides; colour black, the legs beyond the femora whitish, the distal segments of the mesotarsi and metatarsi infuscated. Length, 4.5 mm.

MALE.—The male differs from the female in having the frontal crest completely interrupted, the ocellar and interocellar furrows faintly indicated, the antennæ longer and more slender but with segments three and four subequal; the procidentia short, broad, and bluntly rounded. Length, 4 mm.

Herschel island, Yukon Territory. Larvæ collected in galls of creeping willow *Salix arctica*. August 13, 1914. Imagines emerged July, 1915. F. Johansen, collector. Female No. 265; males Nos. 255, 258, 260.

The smaller size and the lack of a crestral furrow readily separates this species from *atrata* to which it is quite similar in general appearance. The specimens described under this name were received as a part of Breeding Record No. 35. The difference in head structures and the shape of the saw-guides makes their inclusion with the preceding species impossible.

Pontania delicatula, n. sp.

MALE.—Head with the posterior orbits and postocellar area finely granular, the inner orbits polished for the most part, and the frontal area slightly roughened; the clypeus narrowly, shallowly, semicircularly emarginate, the clypeal lobes broad and truncate; the labrum transverse and truncate; antennal furrows deep between the pretentorinæ and the frontal crest, broad and shallow and almost wanting on the cephalic aspect, terminating in a punctiform depression caudad of the lateral ocelli; the ocellar furrow wanting and the interocellar furrow a short linear depression; the postocellar area short and broad, not elevated; the ocellar area only slightly elevated, continuous with the frontal crest, the frontal crest strongly convex and interrupted on the meson by a deep furrow continuous with a deep concave ocellar basin which extends to the median ocellus; the median fovea a distinct punctiform depression, distinctly separated from the furrow interrupting the frontal crest; the supraclypeal area strongly convex and roughened; the antennæ short, segments three and four subequal, the segments roughened and densely finely setaceous; the pronotum roughened like the head; the median and lateral lobes of the mesonotum finely

granular, the median lobe longitudinally furrowed but without a mesal carina, the parapsidal grooves almost wanting; the mesoscutellum polished, the mesopostscutellum roughened on each side and polished at middle; the metaseutum roughened at middle and smooth on each side; the mesopleura smooth and sparsely setaceous, the mesosternum and metapleura polished; the wings normal in size, the stigma pale, the veins brownish; the claws deeply cleft, the inner ray much shorter than the outer; the abdomen with the surface finely densely granular, the last sternum with the caudal margin bluntly pointed; colour black with the following parts yellowish infuscated: the knees, the tibiae, the tarsi, and the greater part of the last sternum of the abdomen. Length, 4 mm.

LARVA.—Body white with portions of the head darker; ocellaria black, the caudal margin not sharply defined, the ocellus located nearer the mesal than the caudal margin; antennae short oval areas bounded by a faint brownish line, more than their own length distant from the ocellaria, its surface bearing two groups of closely adjacent minute brownish areas; head white with a brownish area of varying extent formed of minute round brownish spots, sometimes covering the dorsal half of the front and the vertex adjacent to the epicranial stem and extending indistinctly to the ocellaria; mandibles distinctly dentate; spinneret large, its distal end blunt; microthorax linear, brownish; prothorax with three annulets, the first and third very inconspicuous, the second swollen and scarcely emarginate on the meson, bearing three setae on each side, the spiracular areas small and swollen and each bearing five or six setae, the pedal area not sharply defined, bearing about three setae; mesothorax and metathorax with four annulets, the first short and in the mesothorax bearing about six setae and four in the metathorax, the second and third annulets subequal in length, not strongly swollen and bearing only a few setae, the fourth annulet inconspicuous; the spiracular areas large and not strongly swollen and setaceous; the pedal areas small and with about three setae; a brownish chitinated spot near the ventral margin of each spiracular area; abdominal segments one to eight with four annulets, not prominent on any of the segments and inconspicuous on the caudal segments, the first small and bearing three setae on each side of the meson, the second and third large, each with a row of setae, the second with the mesal part modified into a more elevated lighter coloured creeping ridge, the fourth small; the spiracular and postspiracular areas subequal in size and bearing setae; the pedal areas inconspicuous and bearing two or three setae; annulets indistinguishable on the ninth segment, with three bands of setae; the tenth tergum without annulets or setae, usually with transverse rows of minute spots, the caudal end emarginate; prolegs typical in form; spiracles distinct, brownish, not with a fuscous spot on each side. Length, 6.5 to 8 mm.

Herschel island, Arctic coast of Yukon Territory. Larvae collected in galls on leaves of *Salix reticulata*, August 13, 1914. Imagines emerged July, 1915. Breeding Record 36. F. Johansen, collector. Specimen No. 152.

This species can be separated from *californica* Marlatt, to which it is related by the broad shallow emargination of the clypeus, the broad interruption of the frontal crest and the ventral end of the deep ocellar basin.

***Pontania deminuta*, n. sp.**

FEMALE.—Head finely densely granular, ocellar basin indefinitely rugose; the clypeus narrowly, shallowly, roundly emarginate, the clypeal lobes broad and bluntly angular; the labrum long and rounded; the antennal furrows deep from the pretentorinae to the frontal crest, broad and shallow from the frontal crest to the lateral ocelli and almost wanting and linear on the dorsal aspect of the head, not interrupting its caudal margin; the ocellar furrow broad and

shallow, connecting with the antennal furrows and a broad shallow interocellar furrow; postocellar area broad and short; the ocellar areas prominent, sharp ridges continuous with a prominent uninterrupted frontal crest, the three bounding a deep ocellar basin extending to the median ocellus; antennal plates thin and prominent with an interrupted crestal furrow dorsad of them; median fovea deep, elongate, punctiform, connecting with a larger round punctiform depression in the ventral part of the frontal crest; the supraclypeal area convex; the antennae are wanting beyond the second segment; the pronotum finely punctate and setaceous; the median and lateral lobes of the mesonotum finely granular and sparsely setaceous, the median lobe with a mesal carinate depression; the mesoscutum polished; the mesopostscutellum with the mesal portion polished and each lateral portion finely roughened; the metascutum roughened; the wings more or less infuscated, the stigma and the veins including the costa brownish; the claws cleft, the inner ray shorter and stouter than the outer; the abdomen densely finely granular, sparsely setaceous; the saw-guides stout, the dorsal and ventral margins strongly converging, the distal end bluntly pointed; colour black with the tegulae yellowish and the legs beyond and including the knees strongly infuscated yellowish. Length, 4 mm.

Chantry island, Northwest Territories. August 16, 1915. Specimen No. 132F. The labels of the specimen read as given. Mr. Johansen informs me it should be labelled Bernard harbour and not Chantry island.

This species runs to *atriventris* Marlatt by Marlatt's table. The prominent uninterrupted frontal crest will differentiate it.

Pontania quadrifasciata, n. sp.

FEMALE.—Head sparsely coarsely granular, the granules elongated to fine ridges in certain parts; the clypeus broadly, shallowly, roundly emarginate, the clypeal lobes broad and angular, margin rounded; the antennal furrows deep on the ventral and dorsal portions, not interrupting the caudal margin of the head, the furrows broad and rounded opposite the median ocellus; the ocellar and interocellar furrows forming a distinct Y-shaped depression connected with the antennal furrows; the ocellar areas rounded elevations not connected with the frontal crest; the frontal crest not interrupted, almost wanting except between the antennal foveae where it forms an elevation continuous with the subconvex supraclypeal area; the median fovea an elongate punctiform depression, twice as long as wide; the ocellar basin distinct, concave, extending from the frontal crest to the median ocellus; antennae wanting beyond the second segment; the pronotum, the median and lateral lobes of the mesonotum, the mesoscutellum, the mesopleura, the mesosternum, and the metapleura polished and setaceous; the mesopostscutellum and metascutum polished and not setaceous; the wings hyaline, the stigma and part of the costa pale, the veins brownish; the abdomen polished and sparsely setaceous; the saw-guides broad, the dorsal margin straight, the ventral margin convex and curving dorsad to the dorsal margin, forming a long oblique distal end, the dorsal part of which is bluntly pointed and densely setaceous; the cerci long and slender, reaching to the end of the saw-guides; colour black with the following parts yellowish: the clypeus and labrum, the mandibles, the malar space, extending for a short distance on the inner orbits, the outer orbits, an elongate spot caudad of each compound eye, the pronotum broadly, the tegulae, two spots on the cephalic part of the mesoscutellum, a spot on each mesaxilla, a large triangular spot on the mesopleura, the legs except the proximal part of the coxae and the trochanters in part, the proximal half of the femora and the tarsi more or less infuscated, the ventral aspect of the abdomen and the last tergum; the saw-guides dark brownish. Length, 6 mm.

Sandstone rapids, Coppermine river, Northwest Territories, Arctic Canada. "Collected as larvae in cocoons in old cerambycid burrows in bark of white spruce, February 18, 1915. Imago emerged July, 1915. Breeding Record 46". F. Johansen, collector. Specimen No. 1370.

The yellow coxae and the large yellow spot on each mesopleuron will separate this species from its nearest relative, *truncata* Marlatt.

***Pontania subpallida*, n. sp.**

FEMALE.—Head polished, the orbits setaceous; the clypeus broadly slightly emarginate, almost truncate; the antennal furrows deep and distinct from the pretentorial to the caudal margin of the head which they interrupt, broadest between the frontal crest and the lateral ocelli; the ocellar furrow distinct and connecting with the antennal furrows and a short broad interocellar furrow; the postocellar area short and broad with a deep, linear, mesal furrow interrupting the caudal margin of the head; the ocellar areas strongly elevated and more or less separated from the frontal crest, forming a distinct pentagonal area; the frontal crest strongly elevated, its dorsal margin squarely emarginate on the meson, interrupted by a broad furrow extending to the elongate deep punctiform median fovea; ocellar basin deep, bounded by sharp walls, extending from the frontal crest to the ocellar furrow; the supraclypeal area not strongly elevated; antennae long, the third and fourth segments subequal, the fifth segment shorter, the surface of the segments setaceous; the pronotum setaceous; the median and lateral lobes of the mesonotum, the mesoscutellum, and the mesopostscutellum polished, sparsely setaceous; the metasentum finely transversely striate; the mesopleura, the mesosternum, and the metapleura polished and sparsely setaceous; the wings hyaline, the costa and stigma pale, the veins brownish; the claws deeply cleft, the inner ray shorter than the outer; the abdomen finely granular, very sparsely setaceous; the saw-guides stout, the dorsal margin straight and oblique, the ventral margin curved, the distal end bluntly pointed, the distal and ventral portions with short fine setae; the cerci long and clavate; body black with the following parts pale or yellowish: the distal half of the antennae, the mandibles, the labrum the clypeus, the supraclypeal area, the frontal crest in part, the inner and posterior orbits, the cephalic portion of the postocellar area, the pronotum, the tegulae, a broad band on the parapsidal furrows, the mesoscutellum except the caudal margin, the legs except irregularly infuscated areas, the ventral aspect of the abdomen, the saw-guides, and the three caudal terga. Length, 5.5 mm.

Bernard harbour, Northwest Territories, July 12, 1915. F. Johansen, collector. Specimen No. 797.

The strongly elevated ocellar areas, the large uninterrupted frontal crest, the deep ocellar basin, and the shallow emargination of the clypeus will serve to separate this species from *desmodioides* Walsh, with which it is similar.

***Pontania trifasciata*, n. sp.**

FEMALE.—Head finely closely punctured; the clypeus narrowly roundly emarginate, the clypeal lobes broadly rounded; the labrum rounded; the antennal furrows deep from the pretentorial to the dorsal margin of the frontal crest, broad and shallow on the middle of their length, and narrow, deep, converging, linear depressions caudad of the lateral ocelli, not interrupting the caudal margin of the head; the ocellar furrow distinct but broad and shallow; the interocellar furrow deep and expanding toward the median ocellus; the ocellar areas not prominent, with a slightly convex surface; the frontal crest distinct, deeply interrupted at middle by a linear long deep furrow continuous with the median fovea; supraclypeal area convex, not prominent; the

antennae slender, the third segment shorter than either the fourth or fifth, the fifth shorter than the fourth, the surface finely punctured and setaceous; the pronotum and the median and lateral lobes of the mesonotum finely densely granular; the mesoscutellum and mesopostscutellum polished; the mesopleura finely densely granular, the mesosternum and metapleura polished; the wings hyaline, the veins and stigma pale; the claws deeply cleft, the inner ray nearly as long as the outer; the abdomen faintly granular, polished; the saw-guides broad and stout, the dorsal margin straight, the ventral margin broadly convex, the convexity continued to the dorsal margin, forming an oblique bluntly pointed distal end, the distal end and the ventral margin setaceous; color black with the following parts yellowish: the posterior and outer orbits, the collar broadly, the tegulae, a broad V-shaped band covering the parapsidal furrows, the cephalic half of the mesopostscutellum and continuous with a similar spot on each axilla, a large triangular spot on the mesopleura, the legs except the trochanters in part and the proximal portion of the caudal surface of the femora more or less and the tarsi, the ventral aspect of the abdomen, the saw-guides, and the two caudal terga. Length, 6 mm.

Bernard harbour, Northwest Territories, July 15, 1915. Specimen No. 1253.

This species resembles *pomum* Walsh. The punctured head, the shallow emargination of the clypeus, and the general topography of the head will serve to differentiate it.

The collection contained specimens of the galls of the following from which no adults were secured: -

Breeding Record: The larvae described below were collected on bushy willow (*Salix Richardsonii*) on Herschel island, end of July, 1916. The portions of the plant enclosed with the larvae in alcohol were the ends of the branches bearing the seed pods and in each case had been mined by a larva. This was considered at first as an indication that it was a species of *Euura*. It may be this or it may be the larva of a species of *Pontania* that has completed its feeding and has left its gall and is boring into the seed pod to make a place for pupation.

LARVA. Body white, shading to brownish, with a portion of the head and the articulations of the segments of the legs brownish; ocellarium round and black, the ocellus situated in its center; antennae convex oval area near the ventral margin of the ocellaria, limited by a brownish line and its surface bearing eight minute brownish areas; head white with minute, round, inconspicuous spots on the dorsal half, forming a fuscous spot on the dorsal half of the front; mandibles distinctly dentate; spinneret prominent, the distal end bluntly rounded; microthorax linear, white; thorax and abdomen with some of the annulets swollen and the summit of the swollen area slightly fuscous and with minute uncoloured spots bearing setae; prothorax with three annulets, the first and third inconspicuous, the second bearing three setae on each side of the meson, the spiracular area large and swollen and bearing two setae, the pedal area swollen and indistinctly separated from the spiracular area; mesothorax and metathorax with four annulets, the first short and swollen, the second and third subequal in length, the mesal portion of the second slightly depressed, the mesal portion of the third swollen and separated from each lateral portion, the lateral portions of the second annulet bearing two setae and of the third three setae, the spiracular areas large and each bearing about three inconspicuous setae, the pedal areas distinctly marked and swollen, setae inconspicuous; abdominal segments one to eight with four annulets, the first small, the second and third large and swollen and with distinctly elevated lighter coloured mesal creeping ridges, the lateral portions of each bearing about two setae; spiracular areas swollen and bearing about two setae and distinctly separated from the swollen pedal areas bearing two or three setae; annulets indistinct on the ninth and tenth segments; setae of the tenth segment fairly numerous and without definite arrangement; prolegs long, cylindrical, and typical in form; spiracles

prominent and conspicuous, due to the semioval brownish mark on each side of each spiracle, the metathoracic spiracles distinct, but not functional and without brownish spots. Length, 8 mm.

Breeding Record 131: Galls of a species of *Pontania* collected on *Salix reticulata* at Herschel island, Yukon Territory, end of July, 1916. The galls included under this number appear to represent two species, one similar to that of *Pontania atrata* and a very differently shaped gall which consists of two or three closely placed irregular swellings, more prominent on the under than on the upper surface of the leaf. The upper surface is infolded, forming a pocket partially concealing the swollen parts of the gall. Three adults were bred in the same summer but were lost in transit.

Breeding Record 74: Galls of *Pontania* on Creeping willow, *Salix arctica*, Bernard harbour, Northwest Territories, July 19, 1915. Under this number is included two types of galls, one evidently adult, spherical and similar in size to those of *Pontania atrata*, the others are small swellings confined in great part to the ventral surface of the leaf and are probably immature.

Galls of a species of *Pontania* collected (alcohol) at Cape Bathurst, Northwest Territories, July 26, 1916, on *Salix arctica*. The galls are large, oval in outline, greatly swollen on the underside of the leaf, and project only slightly on the upper side. Apparently of a different species from any of those described.

Specimens of two minute galls occurring near the center of the leaves of *Salix Richardsonii*. Collected end of July, 1916, on Herschel island, Yukon Territory (alcohol). The galls are small kidney-shaped swellings which are more prominent on the dorsal than on the lower surface, and are evidently immature.

The species of *Amauronematus* described on the following pages can be separated by means of the following table:—

- a Head with the frontal crest not interrupted.
 - b Head, mesonotum, and mesopleura wholly or for the most part black.
 - c Antennae with the third segment distinctly shorter than the fourth; clypeus roundly emarginate. *completus*.
 - cc Antennae with the third and fourth segments subequal; clypeus angularly emarginate. *indicatus*.
 - bb Head, mesonotum, and mesopleura distinctly marked with ferruginous.
 - c Clypeus broadly shallowly emarginate; supraclypeal area pale. *aligestus*.
 - cc Clypeus narrowly deeply emarginate; supraclypeal area black. *coquilatus*.
- aa Head with the frontal crest distinctly interrupted.
 - b Mesonotum, including the mesoscutellum, black. *varianus*.
 - bb Mesonotum, including the mesoscutellum, entirely or for the most part pale.
 - c Ocellar basin concave and broadly continuous with the median fovea. *aulatus*.
 - cc Ocellar basin shallow and narrowly continuous with the median fovea. *magnus*.

Amauronematus completus, n. sp.

MALE.—Head finely densely punctured and setaceous, clypeus and labrum polished; the clypeus narrowly, moderately deeply emarginate, the clypeal lobes large, angularly rounded at apex; the labrum broadly rounded and setaceous; antennal furrows deep depressions adjacent to the pretentorialae, distinct on the cephalic aspect, and linear adjacent to the lateral ocelli, not reaching the caudal margin of the head; the ocellar and interocellar furrows not well defined; the postocellar area broad, not strongly convex; the portion of the ocellar areas bearing the lateral ocelli small and elevated, flat ventrad of the lateral ocelli and not forming a ridge continuous with the frontal crest; the ocellar basin short, deepest adjacent to the median ocellus; the median fovea a deep pit, three times as long as wide; the frontal crest wanting dorsad of the antennal fossae and not interrupted on the meson; the supraclypeal area

strongly convex; the antennae roughened by closely placed fine pits, setaceous, the third segment distinctly shorter than the fourth and slightly shorter than the fifth; the prothorax, the median and lateral lobes of the mesonotum, the mesopostscutellum, and the mesopleura for the most part finely densely punctured; the mesoscutellum, mesosternum, and metapleura polished with sparse punctures; the wings hyaline, the stigma and the costa pale, the veins brownish; the stigma triangular in outline, the caudal margin almost straight; the claws deeply cleft, the inner ray subequal in length to the outer; the abdomen finely granular and setaceous; the procidentia long and truncated at the caudal end, and constricted at the cephalic end; the colour black with the following parts brownish: the labrum, the distal portion of the femora, the tibiae, the tarsi except the distal segments of the metatarsi more or less above, and the caudal abdominal sternum. Length, 7 mm.

Collinson point, Alaska, June 20, 1914. F. Johansen, collector. Specimen No. 1166.

This species is related to *borealis* Marlatt from which it can be separated by the difference in the form of the median fovea and ocellar basin.

Amauronematus indicatus, n. sp.

MALE.—Head, the clypeus and labrum, finely densely punctured, the punctures tending to form rugosities; the clypeus deeply roundly emarginate, the clypeal lobes large, angular, rounded at apex; the labrum broadly rounded and polished; the antennal furrows deep broad depressions adjacent to the pretentorinae and the dorsal part of the antennal fossae, broad rather shallow but distinct furrows between these depressions and the lateral ocelli and the uninterrupted caudal margin of the head; the ocellar and interocellar furrows broad, deep, rounding furrows, the former connecting with the antennal furrows; the postocellar area strongly convex, its cephalic margin rounded; the portion of the ocellar areas bearing the lateral ocelli slightly elevated and continuous with the strongly elevated uninterrupted frontal crest; the ocellar basin distinct but shallow, extending from the frontal crest to the median ocellus; the median fovea a large subquadrangular depression; the supraclypeal area strongly convex; the antennae roughened by closely placed fine pits, setaceous, the third segment shorter than the fourth; the prothorax, the median lobe of the mesonotum, the mesopostscutellum, and the metapleura in part finely densely pitted; the lateral lobes of the mesonotum, the mesoscutellum, the metascutum, and the mesosternum polished, sparsely pitted; the wings hyaline, the stigma pale, the veins, including the costa, brownish; the claws deeply cleft, the inner ray distinctly shorter than the outer; the abdomen polished and setaceous; the procidentia concealed; the colour black with the following parts brownish: the labrum, the distal portion of the femora, the tibiae, the tarsi, and the caudal end of the abdomen. Length, 6.5 mm.

West of Konganevik, Camden bay, Alaska, July 4, 1914. F. Johansen, collector. Specimen No. 521.

This species is very similar to *completus*. The difference in the antennal segments and the clypeal emargination will distinguish them.

Amauronematus digestus, n. sp.

FEMALE.—Head finely roughened, sparsely setaceous; the clypeus polished, narrow and shallowly emarginate, the clypeal lobes minute and rounded; the labrum polished, long and broadly rounded, and setaceous; the antennal furrows deep from the pretentorinae to the middle of the cephalic margin, broad distinct furrows from this to the lateral ocelli, and deep linear furrows interrupting the caudal margin of the head; the interocellar furrow a broad

concave depression, the ocellar furrow deeper and linear; the postocellar area sharply defined and convex with a mesal furrow; the ocellar areas not strongly elevated and only slightly elevated ventrad of the lateral ocelli, enlarged adjacent to the frontal crest; the frontal crest narrow, strongly elevated, and not interrupted; the ocellar basin distinct but short and surrounding the median ocellus; the median fovea a deep pit twice as long as wide; the supraclypeal area convex and setaceous; antennae roughened, the third segment shorter than the fourth, the fourth and fifth subequal; the pronotum and the cephalic part of the mesonotum roughened, the remainder of the median lobe and of the lateral lobes polished, with sparse punctures; the mesopleura finely densely roughened; the mesosternum and metapleura polished and setaceous; the wings hyaline, the costa and stigma pale, the veins brownish, and the stigma long with the caudal margin nearly straight; the claws not deeply cleft, the outer ray distinctly longer than the inner; the abdomen indistinctly granular and sparsely setaceous; the saw-guides with the dorsal margin straight, the ventral margin gradually rounded, and the distal end broadly, obliquely, truncate rounded; the colour black with the following parts brownish: the head except the antennal furrows and the median fovea and a spot about the ocelli and the occiput, the pronotum in great part, the tegulae in part, a V-shaped mark on the parapsidal grooves, the axillae, the cephalic half of the mesoscutellum, a large mark on each pleuron, the distal third of the femora, the tibiae, and the saw-guides; the distal segments of the mesotarsi and metatarsi more or less infuscated. Length, 5.5 mm.

West of Konganevik, Camden bay, Alaska, July 4, 1914. Specimen No. 520.

The elongate median fovea, the form of the clypeus, and the colouration will separate this species from *fulripes* Norton, to which it is related.

***Amauronematus cogitatus*, n. sp.**

FEMALE.—Head, except the clypeus and labrum, roughened throughout, more distinctly on the mesal portion, and setaceous; clypeus polished, narrowly, deeply, roundly emarginate, clypeal lobes large, triangular, blunt projections; the labrum polished, broadly rounded, densely setaceous near the margin; antennal furrows almost completely interrupted ventrad of the lateral ocelli, deep and broad ventrad of the interruption, the vertical furrows linear and distinct, not interrupting the caudal margin of the head; the ocellar furrow a broad round depression, almost wanting; the interocellar furrow obsolete, probably represented by a distinct mesal pit in the ocellar furrow; the ocellar areas flat, only slightly elevated for the lateral ocelli, continuous with the frontal crest; the frontal crest not elevated above the ocellar areas, lateral walls precipitous which is due to the deep antennal furrows, interrupted by a deep linear mesal furrow, this furrow not interrupting the ocellar areas and not connected with the minute ocellar basin located ventrad of the median ocellus; the median fovea round, deep, pit-like, and continuous with the furrow interrupting the frontal crest; the supraclypeal area elevated, the mesal portion flat, continuous with the interrupted longitudinal portions of the frontal crest; antennae wanting beyond the second segment; the pronotum, mesopleura, and metapostscutellum densely finely punctured; the median and lateral lobes of the mesonotum, the mesoscutellum, the metascutum, the ventral half of the metapleura, and the mesosternum with sparsely placed round pits bearing setae, more abundant on the median lobe of the mesonotum; the wings with the stigma and costa pale, the veins only slightly darkened; the claws deeply cleft, the inner rays shorter than the outer, obliquely truncate; the abdomen polished, sparsely setaceous; the saw-guides stout, convex, the dorsal and ventral margins strongly convergent, the distal end short and bluntly rounded; the colour black with the following parts rufous: the ventral ends of the ocellar areas, the inner

and posterior orbits more or less, the pronotum broadly, the parapsidal furrow more or less, an indefinite spot on the mesoscutellum, each axilla, and the lateral parts of the mesopostscutellum, a large spot on the mesopleura, the knees, the tibiae, the tarsi variable, and the caudal portion of the abdomen more or less the labrum and clypeus yellow. Length, 6 mm.

Demarcation point, Alaska. Collected as pupa in cocoon in moss on tundra May 11, 1911. Imago emerged June 23, 1914. Breeding Record 12a. F. Johansen, collector. Specimen No. 118.

This species is related to *orbitalis* Marlatt. The black tegulae, the large median fovea, and the form of the frontal crest will separate it from this species.

Amauronema us varianus, n. sp.

FEMALE.—Head with the inner orbits slightly roughened, otherwise polished and setaceous; the clypeus narrowly, deeply, roundly emarginate, the clypeal lobes narrow, angular, and rounded; the antennal furrows broad and deep, from the pretentorium to the caudal margin of the head, which they interrupt linear at bottom caudad of the lateral ocelli, not so deep on the middle of the length; the ocellar furrow broad and deep, V-shaped, connected with the antennal furrows; interocellar furrow deep, extending from the median ocellus to the ocellar furrow; the ocellar areas broadly convex; the frontal crest elevated above the ocellar areas, its dorsal surface abrupt, deeply interrupted on the meson by a deep linear furrow, the furrow continuous with the median fovea; the supraclypeal area strongly convex; the ocellar basin shallow, extending from the interrupting furrow of the frontal crest to and around the median ocellus to the interocellar furrow; the postocellar area strongly convex, shallow and broad; antennae roughened, finely setaceous, the fourth segment slightly longer than the third; the thorax polished throughout and setaceous; the wings hyaline, the stigma and costa pale, the veins brownish; the claws deeply elongate; the inner ray about one-half the length of the outer; the abdomen polished and setaceous; the saw-guides broad, the ventral margin convex, the distal end bluntly pointed at middle; colour black with the following parts infusate brownish: the distal one-third of the femora, the tibiae for the most part, the proximal portion of the tarsi, and the proximal part of the saw-guides. Length, 6.5 mm.

MALE. The male differs from the female in having the head more coarsely punctured, the emargination of the clypeus broader, the clypeal lobes angular and pointed, the ocellar basin less distinct, the prothorax and mesopleura densely pitted, the dorsal aspect of the mesothorax not so densely pitted as the prothorax; the fourth segment of the antennae distinctly longer than the third; the procidentia long and broad, the sides nearly straight, and the caudal truncate; the legs with paler parts much lighter, the dorsal and ventral portions of the caudal segments of the abdomen pale. Length, 6 mm.

West of Kongak, Camden bay, Alaska, June 27, 1914, the date by the specimens. F. Johansen, collector. Specimens No. 524, 525.

This specimen compares to *rapax* Cresson by Marlatt's table. The shallow defined ocellar basin will distinguish it.

Amauronema aulatus, n. sp.

FEMALE. Head not punctured but irregularly, obscurely roughened, finely granular; the clypeus polished, roundly and rather shallowly emarginate; the clypeal lobes broad, angular, and rounded; the labrum polished and rounded; the antennal furrows deep depressions from the pretentorium to near the middle of the cephalic aspect, where they are interrupted for a short distance, then broadly depressed to the lateral ocelli, linear and divergent caudad of the lateral

ocelli; the ocellar furrow broad and shallow, connected with the antennal furrows; interocellar furrow represented by a triangular punctiform depression connected with the antennal furrows, but distinctly separated from the median ocellus; the ocellar areas convex, continued as slightly elevated ridges to the frontal crest; the frontal crest deeply and broadly interrupted, forming a curved strongly elevated ridge on each side continuous with the broad slightly convex supraclypeal area; median fovea continuous with the broad furrow interrupting the frontal crest, this furrow continuous with the well marked ocellar basin, which extends to and around the median ocellus; the antennae with the third and fourth segments subequal; the pronotum, the median lobe and the cephalic part of the lateral lobes of the mesonotum, the mesoscutellum the mesopostscutellum, the metascutum, and the metapleura finely densely roughened; the lateral lobes of the mesonotum in great part finely granular or polished with a few puncture; the mesosternum and metapleura finely granular and polished; wings greatly abbreviated, not extending beyond the caudal end of the abdomen, the stigma and costa pale, the veins much darker; the claws deeply cleft, the inner rays shorter and blunter than the outer; the abdomen polished with sparsely distributed punctures in which setae are attached; the saw-guides broad and stout, the dorsal and ventral margins converging, the distal end long, straight, and oblique on the ventral portion and the much shorter dorsal portion bluntly truncated; the ventral and distal margins setaceous; the cerci long, slender, and pointed; colour black with the following parts brownish: a spot on the frontal crest and ventral part of the ocellar basin, the inner, posterior, and outer orbits, the postocellar area, the collar narrowly, the tegulae, the median lobe and the caudal half of each lateral lobe of the mesonotum, the cephalic half of the mesoscutellum, a large triangular spot on the mesopleura, and the caudal end of the abdomen more or less; the knees and the tibiae of the prothoracic and mesothoracic legs infuscated whitish. Length, 6 mm.

Barter island, Alaskan Arctic coast, June 16, 1914. D. Jenness, collector. Specimen No. 866.

This species is related to *digestus* from which it can be separated by the characters given in the table.

***Amauronematus magnus*, n. sp.**

FEMALE. Head densely finely punctured throughout, probably densely setaceous, though the setae are in great part wanting on the specimen; clypeus deeply, broadly, angularly emarginate, the clypeal lobes large and bluntly angular; labrum large and truncate; the antennal furrows deep between the pretentorium and the frontal crest and lateral ocelli, deep linear furrows caudad of the lateral ocelli, not interrupting the caudal margin of the head; the ocellar furrow broad and indefinite; the interocellar furrow distinct, a rounded depression where it joins the ocellar furrow; the portion of the ocellar areas bearing the lateral ocelli sharply raised, in great part elevated; the frontal crest a sharp V-shaped elevation, deeply interrupted on the meson by a broad, deep, linear furrow continuous with the median fovea; the median fovea a large, deep, punctiform depression; the ocellar basin convex with a distinct linear furrow extending from the median ocellus to the frontal crest, not connected with the furrow interrupting it; the supraclypeal area prominent and convex; the antennae wanting beyond the second segment; the pronotum, the median lobe of the mesonotum, the greater part of its lateral lobes, the mesopleura, the mesosternum, and the metapleura densely punctured and setaceous; the caudal portion of the lateral lobes of the mesonotum, the mesoscutellum, the mesopostscutellum, and the metascutum sparsely punctured and setaceous; tl.

wings hyaline, the veins and stigma brownish; the claws deeply cleft, the inner ray distinctly shorter than the outer; the abdomen sparsely granular and setaceous; the saw-guides large, the dorsal margin oblique, the ventral margin convex, the distal portion rounded and forming a sharp point with the dorsal margin; the cerci long and stout, extending to the caudal end of the saw-guides; colour black with the following parts brownish: the margin of the labrum, the clypeal lobes, the mandibles, the superior and outer orbits, the postocellar area in great part, the pronotum broadly, the median lobe of the mesonotum except a triangular mesal black spot, the lateral lobes except a line on each axilla, the mesoscutellum, the mesopleura, the legs beyond the coxae, the dorsum of the abdomen in great part, and the venter in part at the caudal end. Length, 11.5 mm.

Bernard harbour, Northwest Territories, July 15, 1915. F. Johansen, collector. Specimen No. 1254.

This species is closely related in color and size to *insularis* Kincaid. It differs in the form of the median fovea and the ocellar areas.

Breeding Records, Undetermined Species.

Breeding Record 7a: "Green coloured" nematid larva (formalin) collected under moss in tundra bluffs at bay coast near winter house at Collinson point, Alaskan Arctic coast, November 29, 1913." F. Johansen, collector. Adult unknown.

Breeding Record 7b: "Sawfly (*Nematus* sp.) pupa in cocoon among dead willow leaves on tundra behind winter house at Collinson point, Alaska. November 21, 1913." F. Johansen, collector. Adult unknown.

Breeding Record 46: "Two cocoons of an unknown species of sawfly larva (green) collected February 18, 1915, in the burrows of a cerambycid larva made under White Spruce bark, Sandstone rapids, Coppermine river, Northwest Territory." F. Johansen, collector. Mr. Johansen states that "these two larvae had the same appearance (and were taken in the same bark) as the larva from which *Pontania quadrifasciata* was bred."

Breeding Record 84: "Dark green saw-fly larva (20 mm.) On bushy willow, *Salix pulchra*. Collected at Bernard harbour, Northwest Territories, August 4, 1915. Male pupating cocoon in October." F. Johansen, collector. Adult not bred.

Breeding Record 85: "Saw-fly larvae (black and dark green) 7-11 mm. On female catkins of bushy willow, *Salix pulchra*. Bernard harbour, Northwest Territories, July 16, 1915." F. Johansen, collector. Larva distinctive in colour, marked like many species of *Amauronematus*. The head black except the ventral portion, also the legs except the joints, and the ultimate tergum. The thoracic and abdominal segments with two transverse rows of round or oval blackish spots, larger on the thoracic segments, forming bands on the penultimate tergum. "Saw-fly larvae in female catkins of bushy willow, *Salix pulchra*. Collected as larvae at Bernard harbour, Northwest Territories, August 10, 1915." Two cocoons. Adult unknown.

Breeding Record 89: "A saw-fly larva 20 mm. long (pink with dark pigmentation) on leaf of *Salix reticulata*, collected at Bernard harbour, Northwest Territories, August 16, 1915. Pupated after having first assumed a uniformly red-orange colour with black eyes and only a little dark pigment on head and thoracic legs. In December it still had this colour and had begun its pupating cocoon." F. Johansen, collector. Cocoon and dried up larva received, probably a nematid. "A similar larva was collected the same day and place on leaf of bushy willow. Breeding Record 88."

Breeding Record 138: "Saw-fly larvae (green), Ketchikan, Alaska, September 10, 1916. Made cocoon September 13, 1916." Cocoon contained the dead shrivelled larva of a species of *Trichiosoma*. F. Johansen, collector.

Breeding Records 139 and 140: "Saw-fly larvae (green) on *Rubus* and *Sambucus*, Ketchikan, Alaska, September 10, 1916. A fortnight later these larvae, by moulting, acquired a system of black segmental markings connected by a middle-stripe dorsally. Larva of No. 140 dorsal blackish brown, ventral pale. A week later the larva got an orange (also head) colour with black eyes and the same black dorsal markings as the larva from Breeding Record 139." "Record 139. Many larvae collected, which all, except two, quickly died. May be they are younger stages of larva from Breeding Record 140." Specimen (alcohol) badly shrivelled, host plants would suggest that it might be an emphytid larva, the general habitus is also something the same. F. Johansen, collector.

Breeding Record 150: "Green saw-fly larva, Jasper park, Alberta, September 15, 1916." F. Johansen, collector. A single discoloured badly shrivelled specimen. Head coloured like larvae of *Euphytina*.

The Parasitic Hymenoptera collected by the Canadian Arctic Expedition, 1913-18

By CHARLES T. BRUES

Bossey Institution, Harvard University.

The following report is based on the material collected or reared by Mr. F. Jobansen. Most of the material was obtained near the headquarters of the Southern Party of the Expedition at Bernard harbour, Dolphin and Union strait. Three new species¹ are described. It was felt undesirable to give specific names to a number of the specimens.

ICHNEUMONIDÆ.

Amblyteles russatus Cress.

Ichneumon russatus Cresson, Proc. Acad. Nat. Sci., Philadelphia, 1878, p. 353.

One specimen from Bernard harbour, Dolphin and Union strait, Northwest Territories; collected on flowers in a sheltered place, July 18, 1915.

Described originally from Vancouver, B.C.

Amblyteles suturalis Say.

Ichneumon suturalis Say, Boston Journ. Nat. Hist., vol. 1, p. 227 (1836); complete writings, vol. 2, p. 685.

Two specimens from Bernard harbour, Northwest Territories, May 18 and July 12, 1915.

A widely distributed North American species.

Amblyteles spp.

There are four other species in the collection not referable to any palaearctic or nearctic species so far as I can ascertain. It seems hardly worth while, however, to add isolated descriptions to those of an already large number of North American species which have not been studied in a comparative way.

Mesoleptus insularis Ashm.

Eroltus insularis Ashmead, Proc. Ent. Soc. Washington, vol. 4, p. 168 (1902).

Three specimens, Bernard harbour, Northwest Territories, August 14, 1915, collected on flowers on southern slope of ridge. Originally described from Popof island, Alaska.

Aptesis nivarius, n. sp.

FEMALE. —Length, 5 mm. Dull ferruginous, varied with black as follows: cheeks near base of mandibles, propleura anteriorly, margins of mesopleura, and propodeum; antennae blackish at tips; abdomen piceous along the sides; legs

¹The types of all new species described in this report are deposited in the National Collection of Insects, Ottawa.

honey yellow. Wings reaching slightly beyond apex of propodeum, hyaline, with pale brown neurulation. Head almost twice as wide as thick, full behind the eyes which occupy half of the side in top view; paired ocelli equidistant from one another and the eye-margin. Head shagreened above; face rugulose, clypeus strongly protuberant, its lower half smooth, malar space as long as the first flagellar joint. Eyes bare. Antennae 23-jointed; scape large, oval; first three joints of flagellum subequal, about two and one-half times as long as thick at apex; following growing shorter and thicker; those near the middle quadrate. Mesonotum and scutellum shagreened, flat, separated by a shallow impressed line. Propodeum short, convex above, obliquely truncate behind; shagreened above, very finely rugose behind and on the sides; without distinct areas, although the transverse carina and a small median area are faintly indicated by very delicate lines; posterior angles rounded, without trace of tubercle or tooth. Pleurae opaque except for a shining area below the base of the hind wing. Petiole of abdomen shagreened or minutely rugose, shining; broad behind, the width at apex four times as great as at base and equal to three-fourths the length. Following segments minutely roughened, more nearly smooth and shining after the third. Ovipositor exerted the length of the abdomen, although its sheaths are only half that length. Legs slender; fourth tarsal joint entire; claws simple. Wings with complete venation in miniature as far as the stigma, and beyond this with a very small rounded radial cell.

One female from Collinson point, Alaska, June 20, 1914. F. Johansen, collector.

Quite distinct in colour of body and antennae from other nearctic and from European species. The nearly complete neurulation of the wings is evidently similar to that described by Davis (Entomological News, vol. 1, p. 32, (1893)) for *Aptesis major*.

***Polyblastus arcticus*, n. sp.**

FEMALE.—Length, 8.5 mm. Black, varied with fulvous, the fulvous markings as follows: face except median band, antennae, clypeus except extreme base and sides, mandibles except tips, palpi, tegulae, second to fourth segments of abdomen, except spot on tip of fourth, front and middle legs, except coxae, hind trochanters, basal two-thirds of tibiae, spurs and entire tarsi. Wings—strongly tinged with fulvous basally, veins and stigma fuscous. Face very closely punctate, much more finely so at the sides; clypeus convex, smooth and shining, except at the edges, labrum projecting beyond the closed mandibles; antennae 31-jointed, the first flagellar joint slightly longer than the second, vertex punctulate; head behind shining and almost smooth; mesonotum shining, closely punctate; scutellum strongly sloping and elevated at the apex. Propodeum shining, basal and superomedian areas confluent; petiolar area large, as broad as long, its sides curved. Propleurae very closely punctate, confluent so below, epomia sharp, but not prominent; mesopleura closely punctate; metapleura rugulose-punctate below. Abdomen as long as the head and thorax; petiole slender, slightly over twice as long as broad at apex which is twice as wide as the base, shining and almost smooth above; spiracles slightly before the middle; discal carinae present only on basal fifth of segment; second segment as long as broad, third and fourth broader than long; ovipositor stout, exerted over half the length of the petiole; without attached eggs; tarsal claws with four or five long pectinations on basal half. Areolet small, indistinctly pentangular, with the outer vein oblique, partly hyaline; submedian cell slightly longer than median; discoidal vein in hind wing but slightly oblique, broken just below the middle.

One female. Ketchikan, southern Alaska, September 10, 1914. F. Johansen, collector.

This species is coloured much like *P. glacialis* Ashm. described from St. Paul island, Alaska, but the carinae of the abdominal petiole are much shorter and the

trochanters pale. It is quite distinct from other North American and from all the European species included by Schmiedeknecht in his *Opuscula Ichthyomologica*.

***Stenomacrus borealis* Ashm?**

Fur Seals and Fur Sea Islands, vol. 1, p. 358 (1899).

One specimen from Herschel island, Yukon Territory, July 29, 1916, is probably this species.

***Ophion bilineatum* Say.**

Ophion bilineatus Say, Contrib. Macruran Lye. Arts & Sci., vol. 1, p. 75. (1828); Complete writings, vol. 1, p. 378.

One specimen from Cockburn point, Dolphin and Union strait, Northwest Territories, September 5, 1911. This was collected at a lighted lantern in the evening.

A very abundant and widely distributed North American species.

***Diocetes iodes* n. sp.**

FEMALE.—Length 4–4.5 mm.; ovipositor as long as the hind femur. Black, clothed with sparse short, white hair; the middle of mandibles, tips of front femora, all tibiae and base of tarsi brownish yellow; wings hyaline, stigma and veins pale fuscous. Head broad, twice as wide as thick, strongly excavated medially behind, the temples as deep as the eyes; seen from the front, the face is not narrowed below; malar space as long as the width of mandibles at base. Ocelli large, paired ones closer to the eye margin than to one another. Front and face opaque, minutely roughened, clypeus almost smooth, sub-shining, its lower edge straight. Head behind opaque and finely roughened below, nearly shining above. Eyes bare, twice as high as broad, not emarginate. Antennae 23-jointed; first joint of flagellum one-half longer than the second; four following subequal; those beyond shortening, but all of them longer than thick. Mesonotum subopaque, finely roughened. Scutellum slightly shining; with a deep, smooth, transverse furrow at the base; strongly convex. Propodeum declivous from base, but more strongly so beyond middle, finely rugose, nearly smooth anteriorly on the sides; supermedian and petiolar areas confluent, the latter the broadest, the former reaching almost to the base of the propodeum; lateral and subspiracular carinae present. Pleurae finely roughened, the mesopleura with a smooth space near the root of the hind wing and a trace of fine oblique striae below the root of the fore wing. Abdominal petiole with the spiracles placed before the posterior third, distinctly projecting; widened from just before the middle; more than twice as wide at apex as at base and one-third wider than at spiracles; its surface roughened, except at extreme apex. Second and third segments roughened, especially at base; following nearly smooth, the apical segments not very strongly compressed. Ovipositor issuing at the apex of the fourth ventral segment, strongly curved upward. Submedian cell slightly longer than the median; discocubital vein angularly broken, with a stump of a vein; areolet open, small and petiolate in position; transverse median vein in hind wing not broken. Tarsal claws pectinate.

MALE.—Length, 4.1–2.5 mm. Essentially like the female; antennae 21-jointed; abdominal petiole more slender, as wide at spiracles as at apex; tibiae darker, pale fuscous.

Four females and two males from Bernard harbour, Northwest Territories, August 7 and 12, 1915, the female type taken on the latter date. F. Johansen, collector.

Quite distinct from any of the palaearctic forms listed by Schmiedeknecht, and so far as I can ascertain not identical with any North American species referred to, either *Diodes*, *Angitia*, or *Limnarium*. The species was reared from a lot of galls from *Salix*, probably produced by a saw-fly. (Breeding Record 37.)

Bathyplectes sp.

A single male from Bernard harbour, Northwest Territories, apparently represents an undescribed species, but the specimen is poor and, in the absence of the female, it seems unwise to give it a name.

BRACONIDÆ.

Meteorus sp.

One specimen from Ketchikan, Alaska, reared October 1 from a cocoon collected September 10, 1916. The cocoon was attached to a pine leaf suspended by a slender thread as is customary with the members of this genus. (Breeding Record 136.)

Apanteles sp.

Twenty-five specimens from Bernard harbour, Northwest Territories, taken during July, 1915.

Apanteles sp.

Eleven specimens from Bernard harbour, Northwest Territories, reared during July and August, 1915, from an unknown caterpillar. (Breeding Record 40a.)

Protapanteles sp.

One specimen from Bernard harbour, Northwest Territories, July 20, 1915.

The Wasps and Bees collected by the Canadian Arctic Expedition, 1913-18.

By F. W. L. SLADEN.

The wasps and bees brought back by the Canadian Arctic Expedition consist of one species of *Vespa*, of which twenty-eight specimens were taken in Alaska, and eight species of bumble-bees (*Bombus*), of which one hundred and fifty specimens have been taken in Canada and Alaska. The purely Canadian material consists of one hundred and eleven specimens of five species of bumble-bees.¹

It is worthy of note that *Vespa* is the only genus of wasps distributed through the temperate region that lives in colonies containing a number of small virgin females or workers which raise the males and the perfect females or queens; and likewise, among the bees, *Bombus* is the only genus enjoying the same manner of life, if we except *Apis*, in which the colony survives the winter. In both *Vespa* and *Bombus* the colony breaks up at the end of the summer, and the sole survivors, the young queens, after impregnation, pass the winter solitarily in a state of complete torpidity, and establish new colonies in the spring.

VESPOIDEA.

Represented by twenty-eight specimens from Alaska of one species of *Vespa*.

Vespa marginata Kirby.

Vespa marginata Kirby, Fauna Boreali-Americana, Insecta, 1837.

Vespa albida Sladen, Ottawa Naturalist, xxxii, p. 71.

This species belongs to the *Norvegica* group which is distinguished from the other groups of the genus *Vespa* by the fact that the eyes do not nearly reach to the mandibles, and the sagitæ in the male genitalia are not fused together at the tip. This species may be distinguished in the male and worker by the pale yellow, almost white, markings, combined with two red spots on the second dorsal segment of the abdomen. The red spots are absent in the queen.

MALE.—Black; mandibles; clypeus, except a median longitudinal line, broad in the middle; bilobate spot between antennæ; scape in front; a narrow line on cheek above, behind eyes, another on inner margin of eye; a line on pronotum bordering mesonotum; a small lateral spot on the scutellum, a narrow uninterrupted slightly wavy line on apical margins of dorsal abdominal segments 1 to 5; a narrow line interrupted in the middle on segment 6; two large comma-shaped spots on segment 7 and the margins of ventral segments 2 to 4, pale yellow, almost white. A large red spot on each side of segment 2. Second and base of third antennal joint testaceous beneath. Inner margin of stipes not sharply angled, clothed with dense short red hairs; legs testaceous; coxæ, trochanters and bases of femora black; a black spot on fore tibiae, apex of femora and of tibiae, and basal tarsi flavous. Body hairs long, pale, mixed with black, including those on the first segment of abdomen. Length, 13 mm.

¹The types of all new species described in this paper are deposited in the Canadian National Collection, Ottawa.

QUEEN.—Head, thorax and abdomen coloured like the male, but the abdominal segments 1 to 5 have complete pale bands, emarginate in front on each side and narrowly so in the middle; the sixth segment has two spots; the ventral segments 2 to 4 have marginal bands interrupted in the middle; ventral segment 5 has two large spots. No red on second dorsal segment. Length, about 11 mm.

WORKER.—Black, the following parts creamy-white; mandibles except tips, clypeus except a broad longitudinal line, broadest in the middle, scape in front, a bilobate spot above antennae, a narrow line on lower side of emargination of eye, an elongate spot on cheek behind eye, a parallel sided line on margin of pronotum next mesonotum, a small spot on each side of scutellum near wing, complete bands on the apices of dorsal segments 1 to 5, that on segment 5 deeply emarginate on either side anteriorly, narrowly emarginate in middle; that on segment 1 less and on segment 3 still less deeply so; segment 6 with a large spot on either side containing a small black spot; apical margin of ventral segments 2 to 5, greater part of ventral segment 6, apex of femora, line on tibia and part of basal tarsi. The following parts red: irregular spot, often absent, on side of dorsal segment 1; a large, in some specimens a small, spot on side of dorsal segment 2; apex of segment 5; middle of femora, tibiae and tarsi. Hairs on vertex, dorsum of thorax and abdomen mostly black. Hairs on sides and underside of head, thorax and abdomen and on first dorsal segment of abdomen mostly pale. Length, 10 to 11 mm.

One male, Nome, Alaska, August 24-25, 1916 (F. Johansen). One queen and twenty-six workers from a nest taken at Teller, Alaska, by Mr. Johansen on July 26, 1913. The queen is in alcohol, the other specimens dried. Most of the workers are in perfect condition. The nest contained larvae and was in a hole under an old willow shrub at the brink of the lake. The nest was half hidden in the hole, half protruding from it, and attached to the thick root of the willow, while heather twigs supported the outer layers of the nest.

I have here followed Du Buysson in considering this form to be the *marginata* of Kirby. Kirby's description, however, makes no reference to the red spots on the abdomen or the long malar space.

An old and smaller wasp's nest was found at Teller on August 3, 1913, by Mr. Johansen in an old rusty tin-can lying free on the tundra. Neither this nest nor any of the wasps in it were brought home. Dr. Anderson saw a wasp's nest the size of a man's head on a willow branch on the Hula-Hula river, Alaska, in November, 1908. There is no information to show to which species either of these nests belonged.

SPIHECOIDEA.

The collection contains no representatives of this super-family.

APOIDEA

Represented by 150 specimens of bumble-bees. These consist of eight species, belonging to three groups, of the genus *Bombus* Lat. Five of the species were found in Canada.

Bombus Lat.

Kirbyellus Group.

Kirbyellus Group, Franklin. Trans. Amer. Ent. Soc. XXXVIII, p. 289.

Size large. Pile long and fine. Malar space very long, one-third to one-half as long as the eye. Red-haired areas on the abdomen if present, are at the tip only. In the males the genitalia are very different to those of the other groups, and the posterior tibiae are more like those of the female.

Bombus kirbyellus (Curtis) Franklin.

Bombus kirbyellus, Franklin, Trans. Amer. Ent. Soc. XXXVIII, p. 291.

MALE.—Eighth ventral segment of abdomen (inner spatha) tridentate (see figure). Hair colour pale yellow; black between the antennae, on the inner margins of the eyes, on the outer margins of the eyes and on the third segment of the abdomen; there is an indistinct black band on the thorax between the wings but this is partly bleached, and the fourth to the seventh segments of the abdomen are pale red; on the underside the hairs are long, and almost white. Length, about 15 mm.

WORKER.—Hair on head black, on thorax black with a yellow band before and behind, pleura pale yellow. Abdomen; segments 1 and 2 yellow, segment 3 black, segments 4 to 6 dull red; underside with white hairs; legs with long largely pale hairs.

Two males, Nome, Alaska, August 21 to 25, 1916 (F. Johansen); one worker, Nome, Alaska, August 21-25, 1916 (F. Johansen); one worker, Collinson point, Alaska, July 10, 1914 (F. Johansen); one worker, Young point, Northwest Territories, July 21, 1916 (this specimen has the hairs on the legs and underside black).

Specimens of *B. kirbyellus* in the Canadian National Collection include a queen from Bartlett bay, Alaska (lat. 58°26', long. 135°53'), 1907 (D. H. Nelles), two from Fullerton, Northwest Territories, July, 1901 (A. Halkett), one from Nottingham island, Hudson strait, 1886 (J. McKenzie), and one from cape Chudleigh, Hudson strait; a worker from Laggan, Alta. (J. Fletcher), and males from Banff, Alta. (N. Sanson).

Bombus polaris (Curtis) Franklin.

Bombus polaris Franklin, Trans. Amer. Ent. Soc. XXXVIII, p. 299.

MALE.—Eighth ventral segment tapering to a blunt point, its side margins deeply incurved (see figure). Hairs on head black with more or less pale yellow on clypeus and vertex. Thorax pale yellow with indistinct interalar black band. Abdomen; basal portion pale yellow, apical portion pale red, with more or less black on the middle portion. Hairs on underside and legs pale with more or less black. Length, 11 to 15 mm.

QUEEN AND WORKER.—Head hairs black. Thorax black, with a broad yellow band in front and a narrower one behind, pleura yellow, lower part black. Abdomen with segments 1, 2 and 3 yellow; segment 4 black; segments 5 and 6 red. Length, queen 16 to 19 mm., workers 11 to 13 mm.

Two males from Nome, Alaska, August 24-25, 1916 (F. Johansen); one queen from west of Collinson point, Alaska, June 11, 1914 (E. deK. Leflingwell); one worker from Kamarkok, west of Herschel island, Yukon Territory, August 3, 1916, and one from Herschel island, near end of July, 1916 (F. Johansen) one queen from Bernard harbour, Northwest Territories, July 2, 1915; two males from Bernard harbour, July 10, 1916 (F. Johansen). The males from Bernard harbour have the coat bleached to a considerable extent, one of them has no black hairs on the abdomen. The queen from Collinson point differs from the description in having segment 3 partly black and segment 4 red.

***Bombus neoboreus*, n. sp.**

This species is distinguished from the other species of the *Kirbyellus* group by the structure of the eighth ventral segment in the male and by the strongly marked melanism in both sexes.

MALE. Eighth ventral segment truncate (see figure); inner margin of claspers of genitalia nearly straight. Hair black; but a faint tinge of yellow on centre of face and a few yellow hairs on vertex (occiput); thorax with the anterior yellow band well developed, remainder of thorax black with a faint tinge of yellow on the posterior part, and in the type (the lighter example) yellow on the upper part of the pleura. Abdomen black, segment 1 yellow but black in the middle and at the extreme sides; segment 2 yellow, but in the darker example partly black in the middle apically and at the extreme sides basally; segment 3 entirely black but in the lighter example yellow at the sides apically; segments 4 and 5 black and segments 5 and 6 pale red. Hairs on legs and underside black. Length, 16 mm.

QUEEN. Hair black; that on the head entirely black; on thorax, anterior yellow band more or less encroached upon from behind in the middle by black, posterior yellow band absent or rudimentary, absent in type; pleura black, faintly tinged with yellow over a considerable area in some examples including the type; abdomen, segment 1 yellow only at the sides, black on extreme sides; segment 2 yellow, but black on extreme sides; segment 3 with a little yellow on either side of middle in five specimens including the type, black in the four remaining specimens; apex of segment 4 and whole of segment 5 red in three specimens; segment 4 black and segment 5 tinged with red in eight specimens, including type. Hairs on legs and underside black. Length, 22 to 24 mm.

WORKER.—Coloured like the queen.

One male, Bernard harbour, Northwest Territories, August 17-18, 1915 (F. Johansen); one darker male, Bernard harbour, Northwest Territories, July 10, 1916 (F. Johansen); eleven females, all from Bernard harbour, Northwest Territories, as follows: June 6, June 21, June 25 (type), July 2, July 9, July 30 to August 7, August 8, August 17 to 18 (two), 1915, June 16, July 3, 1916 (F. Johansen); three workers, Bernard harbour, Northwest Territories, July 19, August 10, and August 14, 1915 (F. Johansen).

***Bombus arcticus* (Kirby) Franklin.**

Bombus arcticus Franklin, Trans. Amer. Ent. Soc. XXXVIII, p. 302.

MALE. Malar space fully one-half as long as the eye, eighth ventral segment obtusely pointed. Head black, a patch of yellow on the vertex. Thorax black with a well-developed anterior yellow band and another equally wide behind; pleura black, the yellow extending only a short way below the bases of the wings. Abdomen, segments 1 and 2 densely clothed with yellow, the remaining segments black. Legs black, underside black. Length, 15-17 mm.

QUEEN. Malar space about one-half as long as the eye. Head black; in two examples a few of the hairs on the vertex are yellow. Thorax black with a well-developed anterior yellow band and another equally wide behind; pleura black but the yellow extends a short way below the bases of the wings. Abdomen with the two basal segments with dense yellow hair, the remaining segments black. Length, 20-23 mm.

Ten males as follows: four from Bernard harbour, Northwest Territories, August 14, 1915 (F. Johansen); one from Bernard harbour, Northwest Territories, July 10, 1916 (F. Johansen); and five from Herschel island, Yukon Territory, July, 1916 (F. Johansen).

Ten queens as follows: Four from Collinson point, Alaska, July 10, 1914, one of them somewhat undersized (F. Johansen); one from Barter island Alaska, June 25, 1914 (D. Jenness); two from Bernard harbour, Northwest Territories, August 10, 1915 (F. Johansen); two from Bernard harbour, Northwest Territories, August 17-18, 1915 (F. Johansen); one from Herschel island, Yukon Territory, end of July, 1916 (F. Johansen).

In unfaded examples of both males and queens the yellow is of a browner hue than in the other species of the *Kirbyellus* group.

One queen, about 11 mm. long, and five larvae "secured cape Ross, Melville island, Northwest Territories, June 21, 1916, by Emin (Eskimo)" (V. Stefansson). The Canadian National Collection contains another queen taken at Melville island, July 20, 1909, by F. C. Hennessey. Both the Melville island specimens differ from those taken on the mainland in being slightly smaller, length 19-20 mm., with the yellow pale and dingy, the yellow band on the posterior part of the thorax narrower than on the anterior part, and the pleura only faintly tinged with yellow. It is possible they represent a distinct variety or even species.

Bombus arcticus is probably the *B. hyperboreus* of European authors, found in Greenland and Arctic Eurasia.

(Two females of another species of the *Kirbyellus* group, *B. strenuus* Cr. from the Kutlan Glacier, Yukon Territory (alt. 9,000 feet), taken by H. F. J. Lambert and Alf. Pattison in June, 1913, are in the Canadian National Collection).

Pratorum Group.

Pratorum Group, Franklin, Trans. Amer. Ent. Soc. XXXVIII, p. 304.

Species of smaller size than those of the *Kirbyellus* group. Malar space shorter, one-quarter to one-third as long as the eye. Male genitalia very different.

Bombus sylvicola Kirby.

Bombus sylvicola Kirby, Fauna Boreali-Americana, Insecta 1837.

Bombus sylvicola Franklin, Trans. Amer. Ent. Soc. XXXVIII, p. 338.

MALE.—Hairs on head black, a patch of yellow on the middle of the face usually reaching upwards to between the antennae, vertex with a yellow patch, ventro-lateral sides of the head more or less yellow, sometimes entirely black malar space about one-fourth as long as the eye. Thorax with a wide anterior yellow band, a medial and about equally wide black band and a yellow band on the scutellum, the anterior median portion of which is more or less covered with an extension of the black from the medial band; pleura yellow to base of legs. Abdomen, first segment yellow, second and third red, sometimes more or less black in the middle, fourth and fifth yellow with more or less black in the middle, sixth and seventh segments black, often more or less yellow at the sides; hairs on venter mostly pale.

The specimens from Nome and Teller are smaller (average length, 11 mm.) and have the pile somewhat shorter and less shaggy, and on the average more yellow (less black) on the fourth and fifth segments than those from Herschel island (average length, 12.75 mm.), and Bernard harbour (average length, 13.27 mm.). In five of the specimens from Bernard harbour the red extends more or less on to the fourth segment.

QUEEN, REGULAR FORM.—Head black with a patch of pale yellow on middle of face between and below bases of antennae and a smaller, fainter one above antennae, vertex yellow. Thorax with a wide pale yellow band in front and a narrower one behind separated by a black band, pleura pale yellow to base of legs. Abdomen: segment 1 pale yellow, segments 2 and 3 red, segments 4, 5 and 6 pale yellow with more or less black in the middle of the segments. Length, 20 mm.

QUEEN, MELANIC VARIETY *johanseni*, n. var.—Head black, face black, a few dingy pale yellow hairs on vertex. Thorax with a band of dingy pale yellow in front, more or less narrowed by encroachment of the black, but black hairs are not mixed in with the yellow to any great extent; a broad black band between the wings and a narrow pale yellow band on the posterior part of the thorax, this band interrupted in the middle by an extension of the black from the interalar band; pleura black, in some specimens faintly tinged with yellow. Abdomen with the first segment pale yellow interrupted in the middle with decumbent dark hair which is scanty; segments 2 and 3 red; segments 4, 5 and 6 black with more or less pale yellow hair on sides of segment 4. Hair on legs and underside black, corbicular fringes tinged with red in the type and in several specimens. Length, 18 to 20 mm.

WORKER, REGULAR FORM.—Coloured like the queen.

WORKER, MELANIC VARIETY *johanseni*.—Coloured like the queen of this variety.

Six males from Nome, Alaska, August 24-25, 1916 (F. Johansen); six males from Teller, Alaska, July 26, and five on July 29, 1913 (F. Johansen); nine males from Herschel island, Yukon Territory, end of July, 1916 (F. Johansen); six males from Bernard harbour, Northwest Territories, July 30 to August 7, 1915 (F. Johansen); one August 8, two August 10, two August 14, 1915, all from Bernard harbour (F. Johansen).

One queen of the regular form from Barter island, Alaska, July 4, 1914 (D. Jenness); one, abdomen missing, from west of Collinson point, Alaska, June 11, 1914 (E. de K. Leflingwell).

Twenty-nine queens of the melanic variety *johanseni*, all taken by Mr. F. Johansen, as follows: One from Bernard harbour, Northwest Territories, July 3 (type), two July 4, one July 6, two July 7, one July 11, one July 12, one July 19, nine July 30 to August 7, one August 8, two August 10, one August 14, all from Bernard harbour in 1915; one Chantry island (Bernard harbour), June 17, one Bernard harbour July 9, and three Bernard harbour July 11, 1916. One queen from Port Epworth, Coronation gulf, taken by Mr. J. J. O'Neill on July 15, 1915, in bad condition, appears to agree with the description of *johanseni*. One queen from Herschel island, Yukon Territory, end of July, 1916 (F. Johansen), has the yellow bands on the thorax as wide as the black band and has a narrow pale yellow band on the apices of segments 2 and 3.

The melanic variety *johanseni* approaches *melanopygus* Nyl., which, according to Franklin, can be readily separated from *sylicola* by the difference in the coloration of the head and fore part of the thorax, which is of "thoroughly mixed black and yellow hairs." However, in specimens of *melanopygus* from British Columbia the black hairs stand out conspicuously among the yellow on the fore part of the thorax.

B. sylicola is probably the same species as *lapponicus* Fab. found in Northern Europe and the mountains of Britain. The coloration of both species is the same and the spreading of the red to the fourth segment as noted in five of the Bernard harbour males occurs in varieties of *lapponicus* found in Scotland and the Pyrenees.

Bombus pleuralis (Nyl.) Franklin.

Bombus pleuralis Franklin, Trans. Amer. Ent. Soc. XXXVIII, p. 361.

MALE. Head and thorax clothed with yellow pile; a few black hairs on the inner and outer margins of the eyes and around the ocelli and a well-defined black interalar band. Abdomen with segments 1 and 2 yellow; segments 3 and 4 bright red, with a few black hairs at the bases of the segments in one specimen; segments 5 to 7 black, a few red hairs on segment 5; venter mostly pale yellow. Length, 13-14 mm.

WORKER. Head black with a small patch of yellow between the antennae and extending above them, and another on the vertex. Thorax yellow with a well-defined black interalar band. Abdomen: segments 1 and 2 yellow with, in three specimens, a few dark hairs in the middle, segments 3 and 4 red, 5 and 6 variable. Length, 10-12 mm.

Two males from Nome, Alaska, August 24-25, 1916 (F. Johansen); four workers, Nome, Alaska, August 24-25, 1916 (F. Johansen).

This is Franklin's "colour variant" of *pleuralis*. In the red band on the abdomen it approaches *flavifrons* Cr. and *centralis* Cr. but is distinguished therefrom by the clear black interalar band and the weak yellow on the face. However, extensive collecting of the three forms in Western Canada by the writer shows that *flavifrons* and *centralis* are merely varieties of *pleuralis*. The name *pleuralis* is applied by Vogt to one of the forms of the *Kirbyellus* group.

Bombus frigidus, Smith.

Bombus frigidus, Franklin, Trans. Amer. Ent. Soc. XXXVIII, p. 360.

MALE. Head and thorax pale yellow, a few black hairs around the margins of the eyes, the insertion of the antennae and the ocelli, and a well-defined black interalar band. Abdomen: segments 1 and 2 pale yellow, segments 3, 4 and base of 5 black. Apex of 5 and remaining segments dingy white with a ferruginous tinge, evidently faded. Length, 12½ mm.

WORKER. Face black, vertex pale yellow. Thorax pale yellow with a broad black interalar band. Abdomen: segments 1 and 2 pale yellow, segment 3, and base of 4, black; apex of segment 4 and remaining segments pale ferruginous. Length, 10-11 mm.

One male, Nome, Alaska, August 24, 25, 1916 (F. Johansen); two workers, Nome, Alaska, August 24, 25, 1916 (F. Johansen). (The Canadian National Collection contains a worker of *Bombus mixtus* Cr. taken in the Porcupine Mountain district, Yukon Territory, on June 15, 1912, by D. D. Cairnes.)

Terrestris Group.

Terrestris Group, Franklin, Trans. Amer. Ent. Soc. XXXVIII, p. 261.

Distinguishable from the other groups by its broad face, very short malar space, less than one-fifth as long as the eye, and the very different genitalia of the males.

Bombus lucorum, L., variety **moderatus** Cr.

Bombus terrestris, var. *moderatus* Franklin, Trans. Amer. Ent. Soc. XXXVIII, p. 262.

WORKER.—Head black; thorax black, with an anterior pale yellow band. Abdomen: segment 1 black, pale yellow at the sides; segment 2 pale yellow, segment 3 and base of segment 4 black; apex of segment 4 and segments 5 and 6 white. Length, 12 mm.

One worker, Nome, Alaska, August 24-25, 1916 (F. Johansen) differs from specimens of the queen in the Canadian National Collection from Banff, Alta., in having the first segment of the abdomen not wholly black.

NOTES ON THE BUMBLE-BEES.

The specimens generally are remarkable for their long shaggy hair and their large size, both well-known attributes of the arctic *Bombus*. Two species, *B. neoboreus* and *B. sylvestris* var. *johanseni* from Bernard harbour, Northwest Territories, show pronounced melanism. Melanism is rare in the North American bumble-bee fauna and has been heretofore met with only in occasional specimens, but there is a large region of pronounced melanism in Northwestern Europe centred in Denmark and extending to the Alps, the British Isles and Southern Scandinavia.

Bombus is particularly well adapted to arctic conditions. These bees develop considerable body heat and their warm coat enables them to keep active in low temperatures. Even in the temperate region the queens of some of the species may be seen collecting nectar and pollen from the willows and other flowers in the sunshine of early morning while frost is still on the ground. The arctic summer permits such activity at almost any hour of the day or night, provided nectar can be obtained, and this probably is an easy matter on account of the numerous flowers.

The home of the bumble-bee colony is always made in a nest composed of warm material, usually the deserted nest of some mammal or bird. The Arctic species, so far as we know, like most of the other species, select nests under the ground, a position which provides good protection from the weather. The brood of *Bombus* needs to be incubated by heat from the body of the adult bees, but can endure a longer-continued and greater degree of chill than that of *Apis* without dying, but its development is retarded and the lustre of the coat of the resulting perfect insect is reduced if the pupae are chilled. A lack of lustre is characteristic of some Arctic specimens of *Bombus*. It is, however, probable that the chilling of the brood is not frequent, because under favourable conditions the queen will, in two or three hours, collect and store in a large waxen cell she constructs in her nest, enough nectar to keep herself and her brood warm for twelve to twenty hours, and, in a later stage of the colony, the workers will accumulate enough honey in the vacated cocoons to last several days.

One of the species of *Bombus* from the Canadian Arctic belongs to the *Pratorum* group, several temperate zone species of which are very hardy and early. *B. pratorum* itself is the earliest species of *Bombus* to start nesting in England, where the young colonies occasionally have to withstand a snow-storm in April. The four other species from the Canadian Arctic belong to the *Kirbyellus* group which is confined to the Arctic and high mountain regions of the northern hemisphere. The brood and adults of this group may be expected to resist cold still better than those of the *Pratorum* group, and to be especially well able to survive, in a state of semi-torpority, a period, lasting several days, when long-continued bad weather prevents the collecting of food, a character already fairly well developed in *Bombus pratorum*.

The taking by an Eskimo at Cape James Ross, Melville island, on June 21, 1916, at a latitude of almost 75°, evidently from a nest, of five nearly full-fed *Bombus* larvae, which were brought back by Mr. Stefansson, indicates that the eggs must have been laid not later than the 8th or 9th of June, and is surely a remarkable record of the favourable conditions that exist for bumble-bee life in the far north, at least in some seasons. Half a dozen *Bombus* cocoons containing dead pupae were taken from the same locality by Mr. Storkerson in April, 1916.

An old *Bombus* nest containing a couple of dead pupae was brought in by Dr. R. M. Anderson on November 12, 1913, from the Sadlerochit river, Alaska; it

was in an old fly-catcher's nest, composed of ptarmigan feathers, hairs of mountain sheep, etc., and was found in a crevice in bare rock at a creek near the camp. Large empty fly cocoons were found in the bird's nest and in some of the bee cells. Another but inhabited nest was found on the southwest coast of Victoria island by Dr. Anderson in July, 1911; this was in an old lemming burrow at the base of a rock, and was of the size of a child's fist.

Many of the specimens of *Bombus* taken carried parasitic mites (*Parasitus bomborum* Andemans) in their coat.

FROM F. JOHANSEN'S FIELD NOTES.

Observations on bumble-bees at the Arctic Coast of North America from Point Barrow in the west to Coronation gulf in the east, and adjoining islands:

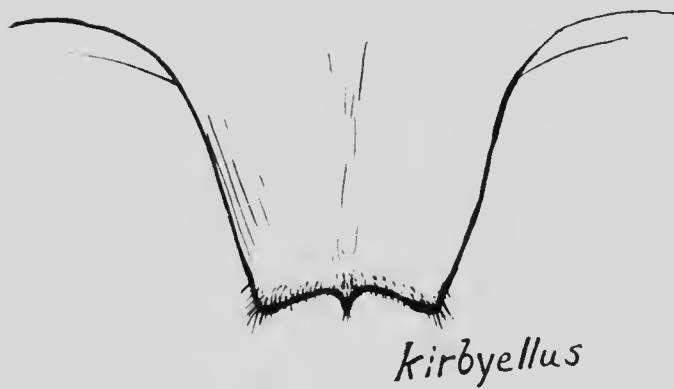
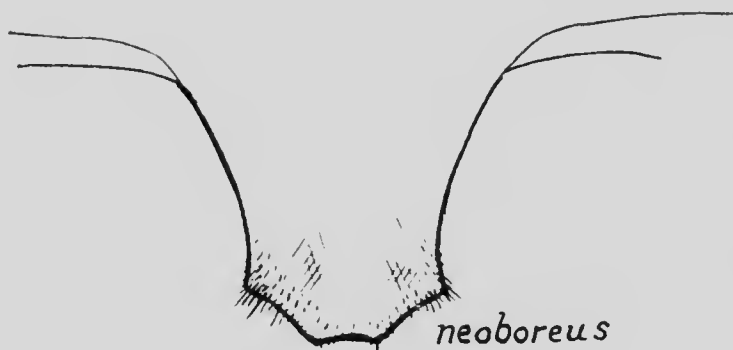
"The first bumble-bees were seen at the beginning or middle of June while the snow was yet covering the ground to a large extent. The summer comes a little earlier west of Mackenzie river than east of it; except when there is an especially early season in the eastern region. The temperature during June is generally above the freezing point, and even if the nights are colder, it is fairly warm during the middle of the day, especially when the sun is out.

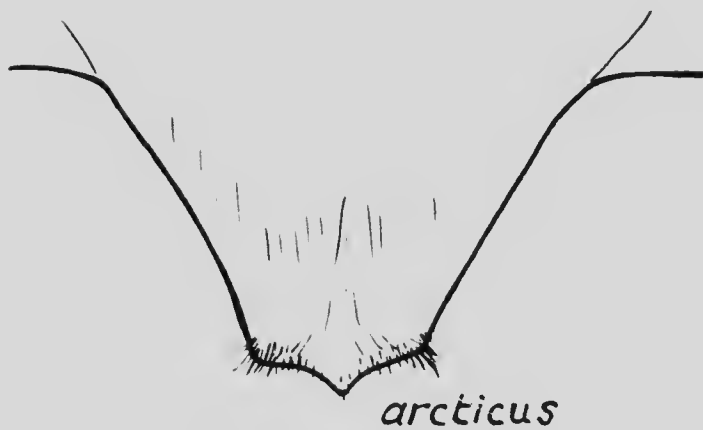
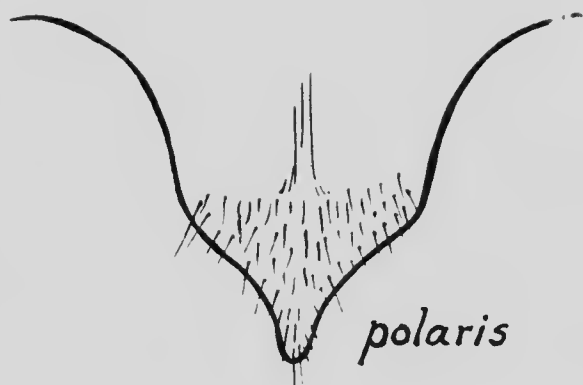
"The first bumble-bees seen in the season were mostly flying high up at rapid speed. A few days later the bees were seen feeding on the first flowers out (the male catkins of *Salix pulchra*, *S. angulorum*, and the flowers of *Saxifraga oppositifolia*). From the middle of June additional flowers were out (*Salix ovalifolia*, *Oxytropis n. griseus* and *O. arctica*, *Pedicularis lanata*, and during the end of June still more (*Salix reticulata*, *Dryas integrifolia*, *Cassiope tetragona*, *Pedicularis arctica*, *P. sudetica*, etc.), all of importance to the bumble-bees, and greatly utilized by them. From July on, there was no lack of flowers; in addition to the above mentioned were *Silene acaule*, *Lupinus neokalanensis*, *Hedysarum mackenzii*, *Astragalus alpinus*, *A. frigidus*, *Saxifraga groenlandica*, *S. tricuspidata*, *S. Cernua*, *Aconitum delphinifolium*, *Pedicularis capitata*, *Polemonium carolinicum*, *Catchfly pallida*, *Mipsotis silvestris*, *Lagotis glauca* and *Lychnis apicalis*. Few plants upon which the bees depend for food begin their flowering so late as August; among these are *Epilobium latifolium*, *Campanula uniflora*, and various *Compositae*. Few bumble-bees were seen in September, and none after the first week of this month. Although the temperature in September may be about the same as in June the flowers which are out now are mostly of a kind (*Grasses*, *Compositae*) of little use to the bees, which seem to understand that the winter is near.

"In the preceding notes the many smaller islands skirting the Arctic coast examined are treated as a part of the latter; a few miles of open sea are no barrier for bumble-bees; they are found on all of the islets and show the same characteristics there. The few observations we have from the two large islands (Banks and Victoria islands) farther north show, however, that over there the season is considerably later, and bumble-bees were therefore not seen much before July. On the other hand, it seems the season along the south side of Coronation gulf and in Bathurst inlet is somewhat earlier than along the Arctic coast farther west, and bumble-bees and flowers may be looked for at the end of May in this more southern latitude.

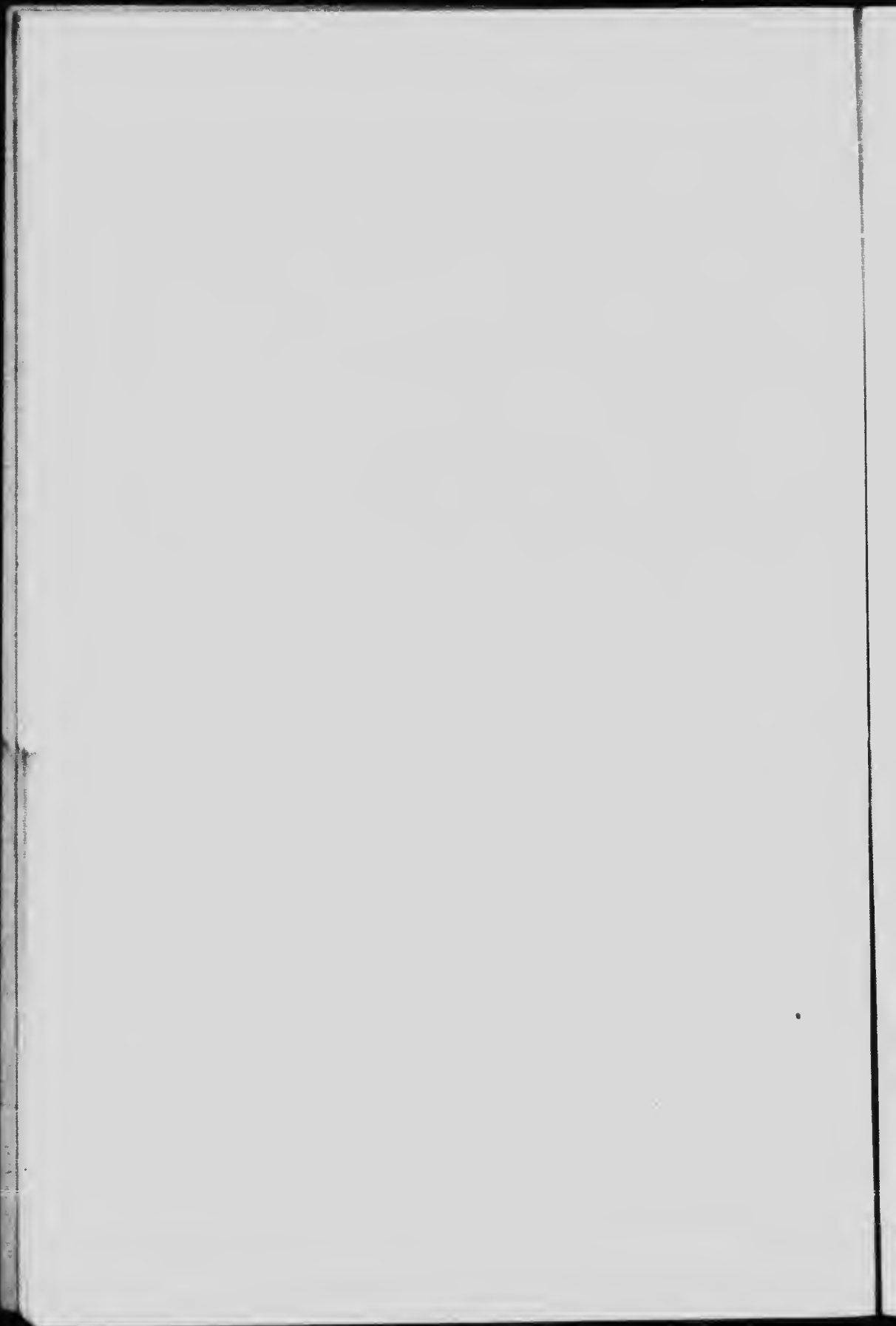
The first bees to appear are naturally all queens; the first workers were noticed in the beginning of July (about July 10) and the first males at the same time."

Two sheets of drawings, showing the 8th ventral segment in males of *Bombus neoboreus*, *Kirbyellus, polaris* and *arcticus*, accompany this paper.

Eighth Ventral Segment in ♂ *Bombus*.



Eighth Ventral Segment in ♂ *Bombus*.



The Plant Galls collected by the Canadian Arctic Expedition, 1913-18

By E. PORTER FELT.

The following report is based upon the material which was collected by Mr. F. Johansen. It is obviously fragmentary though nevertheless interesting because the records are from a little explored region. The galls on *Salix borealyi* appear to be new and the deformity produced by the Nematid is especially interesting. A provisional identification was obtained through the courtesy of Dr. L. O. Howard from Mr. S. A. Rohwer of the United States National Museum. The Eriophyid galls were submitted to Mr. H. E. Hodgkiss of the Agricultural Experiment Station, Geneva, N.Y., and the few comments he saw fit to make are appended to the characterizations of the deformities. It hardly appears wise to bestow names upon these galls and thus add invalid or nearly invalid names to a literature already overburdened with such appellations.

Salix (willow).

Nematid gall on *Salix borealyi*, labelled Teller, Alaska, July 26, 1913, Frits Johansen.

The gall is an irregular, oval, white, woolly mass projecting equally on each surface of the leaf, divided by the midrib and with a major diameter of about 1 cm. The woolly fibers are 2 to 3 mm. long and within the compound mass are two somewhat elongate ovate hollows, one on each side of the midrib.

One gall examined contained a Nematid (possibly a species of *Pteronidea*) and a parasite, a species of *Eurytoma*. The identification of the larva was made by Mr. S. A. Rohwer of the United States National Museum. The gall was 1 mm. and that of the parasite by Dr. L. O. Howard, Chief of the Bureau of Entomology.

Cecidomyia species on *Salix borealyi*, labelled Teller, Alaska, July 26, 1913, Frits Johansen.

The gall is a somewhat irregular, rounded elevation, with a diameter of about 4 mm., projecting almost equally from both surfaces of the leaf. It is pale greenish-yellow, the surface with irregular rounded elevations and located near the midrib. The interior is hollow, whitish, and the walls have a thickness of approximately 0.5 mm. This is possibly the work of an *Oligotrophus*.

Willow beak gall (*Phytophaga rigida* O.S.) Specimens labelled *Salix* species, Jasper Park, Alta., middle September, 1916.

The galls are typical for this species except that they are smaller and greatly wrinkled, a condition very suggestive of parasitism. The galls have a length of about 1.5 cm., a diameter of 0.5 cm., and the surface is mostly dark brown or blackened; the distal third of the gall is lighter, rather strongly recurved and with the characteristic partly opened soft tip or beak.

This insect ranges across the continent, if one may safely draw conclusions from specimens of the galls. It is one of the more common willow inhabiting forms, occasionally so abundant as to attack the tips of a considerable proportion of the shoots in individual clumps. There is but one generation annually, the insect wintering in the gall, and the midges appearing in early spring. An extended bibliography is given in New York State Museum Bulletin 186, pages 213-214.

Eriophyes species on *Salix*, labelled Teller, Alaska, July 26, 1913, Frits Johansen.

This is a small irregular pouch gall projecting on the upper surface of the leaf and with a diameter of 1 to 2 mm. The enlargement is greenish or yellowish green. There is a distinct entrance on the lower side of the leaf frequently guarded by a rather thick mass of short, procumbent, whitish hairs. Hodgkiss states that this type of gall does not appear to be described and that no mites were found in the deformities.

Eriophyes species on *Salix*, labelled Teller, Alaska, July 26, 1913, Frits Johansen.

These are purplish brown, sparsely haired pouch galls on the leaves, mostly on the under surface, and sometimes so numerous as to deform the basal half or even the whole leaf. They are more or less coalescent. The individual galls have a diameter of 2 to 3 mm., the vestiture is whitish, short, and sparse. Hodgkiss refers this to *Eriophyes* species, adding that it is possibly new.

Eriophyes species, labelled *Cecidomyia* species, galls on *Salix* leaves, Cockburn point, Dolphin and Union strait, Arctic Canada, August 30, 1914.

The individual galls are oval or subglobose, have a diameter of 2 to 3 mm., project distinctly on the upper surface, are somewhat smooth though sometimes slightly hairy, rounded elevations and on the under surface are indicated mostly by corresponding oval depressions filled, or nearly filled with a mass of yellowish or whitish plant hairs. Hodgkiss refers this to *Eriophyes* n. sp., adding that a single specimen, apparently new to science, was found in this material.

Eriophyes species, labelled *Cecidomyia* (?) galls on leaves of creeping *Salix*, August 16, 1915, rearing 92. Locality, Bernard harbour, Northwest Territories.

The leaves were badly browned and discoloured, though the gall appears similar to the preceding. Hodgkiss states that this type of gall is not mentioned in literature, and that no mites were found in the galls.

