

**Article IX.—REPORT ON THE BREMIDÆ COLLECTED BY THE  
CROCKER LAND EXPEDITION, 1913-1917<sup>1</sup>**

BY THEODORE H. FRISON

PLATE XXIV

Among the various insects collected by the Crocker Land Expedition are forty-four specimens of Bremidæ (= Bombidæ).<sup>2</sup> There are three species in all, representing two of our North American groups of bumblebees as adopted by Dr. H. J. Franklin in his monograph of 1913. The *Pratorum* Group of Radoskowski (1884) is represented by a single specimen of *Bremus couperi* (Cresson), and the *Kirbyellus* Group of Franklin by a series of *B. hyperboreus* (Schönherr) and *B. polaris* (Curtis).

Nearly one-half of the specimens were moldy but not so badly that identification was impossible. Mites were abundant on the specimens, occurring on all parts of the body.

Mr. W. E. Ekblaw, a member of the expedition, has very kindly furnished the writer with data concerning the environmental conditions under which the bumblebees live in western Greenland.

*PRATORUM* GROUP, RADOSKOWSKI

*Bremus couperi* (Cresson)

One specimen of the worker of *B. couperi* (Cresson) was collected by the members of this expedition. As this is the first time that the worker of this species has ever been taken, a description of it is included in this article. The specimen was collected at the Bay of Islands, Newfoundland, on July 21, 1913. The queen of this species was first described by Cresson (1878) and redescribed by Franklin from nine specimens in 1913. Franklin records the species from "Labrador, Isle Royal in Lake Superior, Mountains east of Codroy and Bay of Islands in New Foundland, Nepigon in Ontario and Anticosti Island."

In addition to the above, I have what is undoubtedly the male of this species collected by Mr. F. W. L. Sladen at Painsec, New Brunswick, on August 4, 1914. Mr. Sladen says that the male was taken at the same time and in the same place as the queens of *B. couperi* (Cresson). *B. frigidus* (F. Smith) is considered to be very closely related to *B. couperi* (Cresson) and Franklin says: "It seems quite possible that extensive

<sup>1</sup>Scientific Results of the Crocker Land Expedition.

<sup>2</sup>The change from *Bombus* to *Bremus* depends on the acceptance of the "Erlangen List," a still debatable point.—EDITOR.

collecting will prove that it should be considered either a subspecies or color variant of that species." A comparison of the genitalia, however, shows that, although closely related to *B. frigidus* (F. Smith), *B. couperi* (Cresson) is a distinct species.

In general, the male of *B. couperi* (Cresson) differs in external appearance from the male of *B. frigidus* (F. Smith) in that only the seventh dorsal abdominal segment and the posterior border of the sixth segment (a few hairs) bear ferruginous pubescence. The corbicular fringes are also dark in *B. couperi* (Cresson) and not tawny or ferruginous as in *B. frigidus* (F. Smith). It likewise differs from the male of *B. bolsteri* (Franklin) as described by Lutz (1916) in that there is no yellow pile on either the fifth or sixth dorsal abdominal segments, while the seventh segment is ferruginous.

*B. couperi* (Cresson) is a boreal form, but not nearly so much so as the other two species considered in this paper. A large number of the members of the *Pratorum* Group are found in the Austral and Transitional Zones.

The description of the male has been included along with that of the worker.

#### WORKER

In general like the queen.

Face with numerous black hairs above and below the bases of the antennæ; occiput mostly black, with a few yellow hairs near the center; cheeks black. Labrum with tubercle areas clearly separated, strongly rounded at basal margin, and sparsely punctate at mesal edge; shelf-like projection not prominent. Malar space about the same width as its apex, about one-fifth as long as the eye and impunctate. Clypeus moderately punctate, except for a rather impunctate central area. Antennæ with flagellum about twice as long as the scape; third antennal segment longer than the fifth, the fourth and fifth segments being nearly subequal in length. Ocelli not situated below the supra-orbital line and arranged nearly on the same straight line. Area below and on the sides of the ocelli more or less impunctate.

Thorax with a broad black band between the bases of the wings; the anterior portion of the dorsum and the scutellum with yellow pubescence; pleura with yellow pubescence extending to the bases of the legs.

Abdomen with the first two dorsal abdominal segments covered with yellow pubescence; third and fourth segments black, except for some yellowish hairs on the extreme lateral margins; fifth segment with yellowish hairs throughout; sixth segment black. Venter with many light hairs on the third, fourth and fifth segments. No medium carina on hypopygium. Pubescence throughout somewhat fine and long.

Legs mostly black, except for some yellowish hairs near their proximal ends; corbicular fringes in this specimen black.

Length, 12 mm.; spread of wings, 24 mm.; width of abdomen at second segment, 6 mm. .

## MALE

Face and occiput well covered with yellow pubescence, the hairs above the bases of the antennæ noticeably darker than those below. Cheeks with a large number of light-colored hairs. Labrum with tubercle areas not prominent and not sharply separated, punctate. Malar space slightly longer than its width at apex. Clypeus densely covered with whitish yellow pile. Fifth antennal segment longer than either the third or fourth segments, the third segment being longer than the fourth.

Dorsum of the thorax with a distinct black band between the bases of the wings. Anterior portion of the thorax, the scutellum, and the pleura to the bases of the legs covered with yellow pubescence.

Abdomen with the first two dorsal segments yellow; third, fourth, fifth, and sixth segments black; seventh segment dull ferruginous. Ventral segments with a few pale hairs.

Legs with many light hairs at their bases on the inner surfaces. Femora of the fore and middle pairs of legs almost entirely covered with long pale hairs; hind femora considerably darker. Corbicular fringes black.

Length, 15 mm.; spread of wings, 28 mm.; width of abdomen at second segment, 7 mm.

The genitalia (Fig. 1) agree in their essential characters with the description of the genitalia of the *Pratorum* Group as described by Dr. Franklin. They may be distinguished from those of *B. frigidus* (F. Smith) by the more dilated or pad-like sickle-shaped head of the sagittæ. In *B. frigidus* (F. Smith) the cephalic aspect of the sickle-shaped head of the sagittæ decreases gradually in width from the base of the hook to the apex, except for an occasional very slight dilatation, or is constant in thickness. In *B. couperi* (Cresson) the cephalic aspect shows the apex of the hook of the sagittæ to be more curled and dilated. In respect to the dilatation of the apex of the sickle-shaped hook of the sagittæ, *B. couperi* (Cresson) resembles *B. vagans* (F. Smith) more than the remainder of the *Pratorum* Group which I have seen. The inner margins of the sagittæ at their bases are also more bulging in *B. frigidus* (F. Smith) than in *B. couperi* (Cresson).

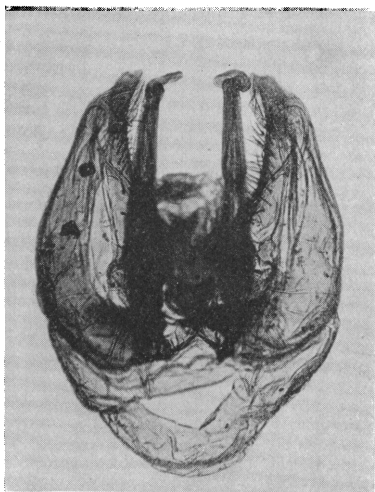


Fig. 1. Photograph of the Dorsal Aspect of the Genitalia of *Bremus couperi* (Cresson).

## KIRBYELLUS GROUP, FRANKLIN

All the bumblebees collected in Greenland by the members of this expedition belonged to this interesting group. Two species, *B. hyperboreus* (Schönherr) and *B. polaris* (Curtis), were taken and are repre-

sented by a series of forty-three specimens. It is surprising that *B. kirbyellus* (Curtis) is not in the collection, as it is reported from Greenland.

#### DISTRIBUTION AND GENERAL HABITS

The *Kirbyellus* Group is the most boreal group known and occurs in the colder parts of both the Old and New Worlds. Both *B. hyperboreus* (Schönherr) and *B. polaris* (Curtis) have the long, fine pile which is so characteristic of the northern species of bumblebees. The development of hairy species of insects is also very noticeable in the case of Diptera. *B. polaris* (Curtis) well illustrates the development of ferruginous pubescence so frequently found in bumblebees of a northern distribution. *B. hyperboreus* (Schönherr), however, judging by the plain, sober black and yellow of its pubescence, might easily be mistaken for a more austral form.

The life history and conditions (see Plate XXIV) under which these northern species of bumblebees live are very interesting. Nielson (1907) says "The Hymenoptera follow after the Diptera with the greatest number of species (52). With the exception of the humble-bees, that are common to both East and West, and the three saw-flies, of which two are found in the West and one in the East, all the remainder belong to the Ichneumon-forms." The fact that the bumblebees are so commonly met with in the arctic regions where so few hymenopterous genera, in fact any insect genera, are known to occur is rather indicative of an northern ancestry. Dr. F. E. Lutz (1916) holds the opinion that the bumblebees actually originated in the north at a time when the climatic conditions were at least mild.

All the specimens of this group were collected between latitudes 76° 30' N. and 78° 20' N. The bumblebees occur much farther north than this, however, and were observed in Discovery Harbor in latitude 81° 40' N. The most northern record for a bumblebee of which I am aware is that given by M'Lachland (1877) where he states: "Moreover there are two species of Humble-bees, and an example of one of these was chased by Capt. Feilden (but not captured) in so far north as latitude 82° 30'."

When the bumblebees are first on the wing the temperature is about 35–40° F. near the latitude where the majority of the bumblebees in this collection were taken (76° 30' N.). The highest temperature (55–60° F.) is reached about August. It was observed that when the temperature fell rapidly the bumblebees crawled about on the surfaces

and in the crevices of warm rocks. A queen of *B. hyperboreus* (Schönherr) has likewise been observed sitting on a rock by V. G. Jakobson (1898).

The bumblebees of the arctics are very industrious and may be found working on the flowers for pollen and nectar the whole twenty-four hours of a day.

#### TIME OF APPEARANCE OF THE BUMBLEBEES AND THEIR

##### ANTHOPHILOUS HABITS

In Greenland, as throughout their entire range, the bumblebees are dependent for their existence upon the flowers; and the arctic flowers require the services of the insects for their cross-fertilization. In a region like Greenland, where the insect agents of pollination are so scarce, the importance of the bumblebees to the flowers is evident. The first flowers begin to bloom in the month of May. In 1916, the first flowers of *Saxifraga oppositifolia* appeared on May 17 and those of *Salix arctica* on May 7. At this time the sun is gradually reaching its maximum height and shines steadily twenty-four hours a day. Patches of gravel from which the snow has melted then begin to be covered with various kinds of flowers.

The first bumblebee noticed by Mr. Ekblaw in 1916 was on May 26. Nielson (1911) says "the hibernating queens appear in the middle of June and the workers appear already (*sic?*) at the end of this month." It is probable that the queens appear a week or so earlier than Nielson observed. Judging from the habits of the species of bumblebees whose life histories are better known, the immature stages require about a month's time before reaching maturity (Frison, 1917, 1918). By the middle of August the summer begins to wane, the flowers to disappear, and the bumblebee queens to seek their winter quarters.

The bumblebees are commonly found in Greenland on the flowers of *Saxifraga*, *Pedicularis*, *Potentilla*, *Salix*, *Dryas*, *Rhododendron*, *Cassiope*, and *Hesperis*. Altevand reports *B. hyperboreus* Schönherr in Norway on *Astragalus alpinus*.

##### NESTING HABITS

The bumblebees in the arctic regions are on the wing scarcely three months. One might easily infer from the relatively short active season, that the bumblebee colonies never get to be as large or prosperous as those established in temperate climates. Two nests were found by

the expedition. The larger of these two contained about thirty individuals and the smaller about twenty. The nests were in crevices in the rocks, the crevices being filled with grass and moss. Another observer, Nielson, found a queen of *B. hyperboreus* (Schönherr) "at the end of June in the act of crawling down into a marmot hole, presumably seeking for a place to build its nest. On digging out the marmot hole a clump of old, moulded bumblebee cocoons was found in it." It would be interesting to know if these cocoons were the remains of a nest of the previous year or a deserted nest of the same year. It seems strange that a queen should be seeking a nest at the end of June in a region where the season is so short and already so well advanced. According to the same writer both *B. hyperboreus* (Schönherr) and *B. balteatus* (Dahlbom) build their nests under the ground in deserted marmot and lemming holes. A further account is given by Nielson (1911) of the finding of a nest of *B. balteatus* (Dahlbom) on July 15, 1908, on the northeastern coast of Greenland. This nest was "padded with a thin layer of moss and indeterminable bits of plants." The nest contained twenty empty worker cocoons, thirteen larvæ, eleven pupæ, and about twenty eggs. No mention was made of the exact number of individuals in the nest when it was opened.

It is a question as to what species of bumblebee is referred to by *B. balteatus* (Dahlbom). Dr. Franklin lists *B. balteatus* (Dahlbom) as a questionable synonym of *B. kirbyellus* (Curtis), and Friese and Wagnér (1912) have done likewise. There is a possibility, however, that the *B. balteatus* (Dahlbom) mentioned by Nielson may be *B. polaris* (Curtis).

*B. hyperboreus* (Schönherr) is recorded by V. G. Jakobson (1898) as nesting deep in the ground between thin plates of slate. An Eskimo stated to Mr. Ekblaw that the bumblebees occasionally nest in the deserted nests of the snow-bunting (*Plectrophenax nivalis nivalis* Linneus). The Eskimos are said to be very much afraid of being stung by the bumblebees.

#### ***Bremus hyperboreus* Schönherr**

*B. hyperboreus* (Schönherr) (1809) is the name adopted for the species listed by Franklin as *Bombus arcticus* (Kirby) (1821), for the two are undoubtedly the same, *B. hyperboreus* (Schönherr) having priority. Dr. Franklin states: "It is not improbable that this is the same species which is present in the northern regions of Europe and Asia and is known as *B. hyperboreus* Schönherr." My reasons for considering the

two identical are the following. First, one of the species of *Bremus* known from the west coast of Greenland by the European workers is styled by them as *hyperboreus* Schönherr. Second, the color patterns of both are the same. Third, a comparison of the genitalia with the figure of Friese and Wagner and the description by Dr. Schmiedeknecht (1882) proves them to be identical.

By way of comment on the above, it is rather strange to suppose that, where so few species are to be found, the European workers should always find *B. hyperboreus* (Schönherr) and never *B. arcticus* (Kirby) and the Americans vice versa. I know of no instance in which two species of bumblebees have exactly the same coloration without some external distinguishing marks. Furthermore, though the figure by Friese and Wagner is poor, the genitalia of the male in hand agrees with the figure cited. This is all the more strikingly brought out by a comparison with the figure of the genitalia of *B. kirbyellus* (Curtis) by the same authors; in the latter the inner margin of the squama is shown to be less straight and the inner apical projection of the volsella not extending so far forward into a point as in *B. hyperboreus* (Schönherr).

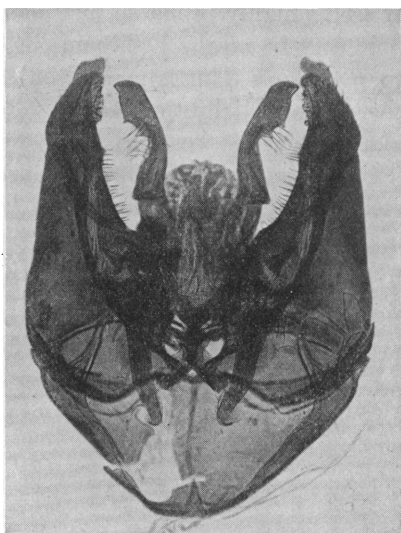


Fig. 2. Photograph of the Dorsal Aspect of the Genitalia of *Bremus hyperboreus* (Schönherr).

Figure 2 is from a photograph of the dorsal aspect of the genitalia of this species.

#### ***Bremus polaris* Curtis**

*B. polaris* (Curtis) is represented in the collection by twelve queens and thirty-seven workers. Some of the specimens of this species are from one of the nests opened by the members of this expedition. The variation in the color of the pubescence is noticeable in the series; the pubescence of the apical dorsal abdominal segments varying from a deep ferruginous to a dull yellow color. In two workers the third

segment is almost entirely covered with yellowish instead of blackish pubescence. One worker is malformed in that the posterior medial margin of the third dorsal segment is deeply incurved, the remaining apical segments being much flattened and the pubescence very short. The clypeus of this specimen is also rugose.

There is considerable variation in the size of the workers. Several of the workers were scarcely 10 mm. in length, with a wing expansion of 24 mm. and the second abdominal segment less than 6 mm. wide.

Friese and Wagner considered only two species of bumblebees as occurring in the arctic regions, but we now know that there are three. It seems highly probable that some of the references (*B. balteatus* Dahlbom and *B. nivalis* Dahlbom) listed under *B. kirbyellus* (Curtis) apply to *B. polaris* (Curtis). Nielson says that *B. balteatus* (Dahlbom) has the same distribution as *B. hyperboreus* (Schönherr), which occurs along the whole west coast of Greenland. The fact that *B. hyperboreus* (Schönherr) and *B. polaris* (Curtis) are associated so closely in this collection seems to indicate that what Nielson called *balteatus* Dahlbom may be what we know as *polaris* Curtis. *B. kirbyellus* (Curtis) is more western in its range than either *B. hyperboreus* (Schönherr) or *B. polaris* (Curtis) and is found in Alaska.



## BIBLIOGRAPHY

- CRESSON, E. T. 1878. Proc. Acad. Sci. Nat. Phil., II, p. 185.
- FRANKLIN, H. J. 1913. The *Bombidæ* of the New World. Trans. Amer. Ent. Soc., XXXVIII, pp. 177-486 and XXXIX, pp. 73-200, Pls. I-XXII.
- FRIESE, H. AND WAGNER, F. v. 1912. Zoologische Studien an Hummeln. Zool. Jahrb., Suppl. 15, pp. 155-210, taf. v-ix.
- FRISON, T. H. 1917. Notes on *Bombidæ*, and on the life history of *Bombus auricomus* Robt. Ann. Ent. Soc. Amer., X, pp. 277-286, Pls. XXIII-XXIV.
1918. Additional notes on the life history of *Bombus auricomus* Robt. Ann. Ent. Soc. Amer., XI, pp. 43-48, Pl. III.
- JAKOBSON, V. G. 1898. Insecta Novaja Zemljensia. Mém. Acad. Sci. St. Pétersbourg, VII.
- LUTZ, F. E. 1916. The geographic distribution of *Bombidæ*, with notes on certain species of Boreal America. Bull. Amer. Mus. Nat. Hist., XXXV, Art. 26, pp. 501-521.
- M'LACHLAND, R. 1877. Report on the Insecta (including *Arachnida*) collected by Captain Feilden and Mr. Hart between the Parallels of 78° and 83° North Latitude, during the recent Arctic Expedition. Journ. Linn. Soc. Zool., XIV, pp. 98-122.
- NIELSON, J. C. 1907. The insects of East Greenland. Meddelelser om Gronland, XXIX, pp. 365-414.
1911. A catalogue of the insects of North-East Greenland with descriptions of some larvæ., XXXXIII, Art. III, pp. 55-68, Pls. VII-VIII.
- RADOSKOWSKI, O. J. 1884. Bull. Soc. Nat. Moscow, XLIX, part 1, p. 59.
- SCHMIEDEKNECHT, H. L. O. 1882. *Apidæ Europææ*, I, p. 307.





Fig. 1. Photograph of a *Rhododendron* Heath on the Northwestern Coast of Greenland. The arctic willow also grows here and it is in such places as this that one most frequently finds the arctic bumblebees.



Fig. 2. Photograph of a Typical Ranging and Feeding Ground of *Bremus hyperboreus* (Schönherr). On the northwestern coast of Greenland.





