

NATIVE BEES

By

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Bumblebees

A general account of the whole group of bees was given in a previous article (6). It is now proposed to present further description of the various kinds, and bumblebees will be taken up first. This name seems sufficiently significant to us because of the familiar, low, humming sound made by these insects. In Britain, they are called "humblebees", a name which is traced back into the 15th century. The name bumblebee is nearly as old, dating to the 16th century.

Orin Alva Stevens has been a member of the staff of the North Dakota Agricultural College since 1909. He was State Seed Analyst from 1909 to 1933, has been Associate Professor of Botany in the School of Applied Arts and Sciences since 1926, and is now a Botanist in the Experiment Station. He has long been in charge of the care and development of the College Herbarium and has in preparation a new Flora of North Dakota. His scientific interest has covered a wide range—weeds, wild flowers, bees, and wasps, and seed testing have claimed interest and upon each of these subjects he has published widely in both Experiment Station publications and in scientific journals.

The North Dakota Agricultural College conferred the honorary degree of Doctor of Science upon Professor Stevens at its June 1948 Commencement. The Bimonthly Bulletin hails him as its No. 1 contributor with more articles to his credit than have been contributed by any other staff member since the issuance of Vol. 1, No. 1 in September, 1938.

The article on Bumblebees which follows is the second in a series on bees. It will be followed by another contribution on the leaf-cutting bees, and additional papers. (H. L. W.)

The British species were described and beautifully illustrated by Sladen (5). This author moved to Canada where he had begun to study American bees but met an early accidental death. A more recent work is by Plath (4) who described the species of New England with a full survey of habits from extensive observations compared with earlier work. Franklin (1) gave a detailed systematic account of both North and South American species and Frison (3) published a number of papers on the group.

Queen bumblebees mature in late summer, are fertilized by the males and hibernate during winter. Plath found many queens

of *Bombus impatiens* two or three inches below the surface of the ground near the old nest entrance. He did not find queens of other species in such places and the most common place for hibernation is probably under dead leaves or other trash on the ground.

The queens come out of hibernation during warm days of early spring. A nesting place is found in an old mouse nest, in a burrow under ground or in some other cavity on or near the surface. Wax is secreted by bumblebees as by honeybees. The queen builds with the wax a honey pot near the entrance of the nest. In this she stores nectar for food during bad weather. The eggs are laid in a similar waxen cell near the center of the nest. Plath states that about eight eggs are laid in the first lot. They hatch in three or four days and the larval period is only a week. About three weeks are required between egg laying and maturing of the first young. The queen spends much time brooding the young and feeds them with both nectar and pollen.

When the larvae are full grown they spin parchment-like coverings which enclose them during the period of transformation. When mature, they cut out the tops of these chambers which are the "cells" usually seen in nests. While the first lot of young is developing, the queen lays other batches of eggs at the side of the first lot. These first workers are quite small (they do not grow larger after emerging). They at once begin to collect pollen and nectar and help care for the nest. During the summer larger workers are produced. Some are nearly as large as the queens and frequently large workers lay eggs. Males mature in our region in August, the first ones appearing about the last of July. During late August and early September, males are common on flowers. They have more elongated bodies, slightly longer antennae and are more sluggish in their movements as compared with workers. Their hind legs are more slender and lack the pollen collecting baskets. They are quite unable to sting as can readily be demonstrated by taking them in the hand.

Plath emphasizes that the workers in a colony often are not all the offspring of a single queen. Often the original queen dies or is killed by an intruding queen which takes over the nest. Behavior varies considerably with different species and at different times of year.

North Dakota Species

My collection, now in the American Museum of Natural History in New York City, contained about 1000 specimens, collected in all parts of the State from 1910 to 1948 at flowers of many species of plants. A number of specimens were identified by Franklin who published (2) some of the records, but they were not available in time to be included in his monograph (1).

Rather than to give a complete key to our species, I offer the following simpler one which should help a student recognize the most common ones.

Outer surface of hind tibia of female convex and hairy.

Psithyrus

Outer surface of hind tibia of female concave and smooth.

Bombus

Abdomen with red band.

Thorax with a distinct black cross-band.

Thorax with a dark spot, not a full band.

Abdomen without a red band (sometimes a little brown).

Thorax with a distinct black band.

Thorax without yellow behind the black.

Thorax with yellow behind the black.

Top of head black; side of thorax yellow.

Top of head yellow; side of thorax black.

Thorax yellow or with a black spot (not band).

No black on thorax; second segment of abdomen brownish.

A black spot on thorax; second segment of abdomen all yellow.

Black spot large, often nearly a band.

Black spot small.

1. *Bombus ternarius*
13. *Bombus rufocinctus*

3. *Bombus terricola*

8. *Bombus fervidus*

9. *Bombus borealis*

11. *Bombus separatus*

13. *Bombus rufocinctus*

5. *Bombus vagans*

Description of Species

Thirteen of the species given brief description belong to the genus *Bombus* and four belong to the genus *Psithyrus*, or Guest Bumblebees.

1. *Bombus ternarius* Say. One of our commonest and most distinctive species. The second and third abdominal segments are red, first and fourth yellow, fifth and sixth black. The black band between the wings is wide and v-shaped at the back. It is a medium sized bumblebee, queen 14-17 mm., worker 8-14 mm., male 10-13 mm. (25 mm. equals 1 inch). The earliest date is Apr. 10, 1910 (a very early spring), the latest Oct. 18, 1915. One nest was found under the porch of a house. The collection contained over 100 specimens collected on 50 kinds of flowers.

2. *Bombus huntii* Greene. Very similar to *ternarius* but the black thoracic band is narrower, not v-shaped at the back; females with much yellow on top of head (none in *ternarius*). This is a western species. I had specimens from Kulm, Glen Ullin, Dickin-

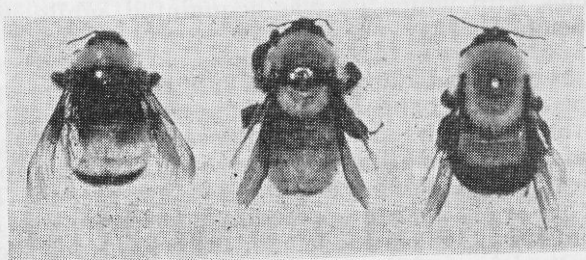


Figure 1. Queens of three species of bumblebees, about natural size. Left to right: *Bombus terricola*, *fervidus*, *separatus*. Photo by Don Nelson.

son, Sentinel Butte and Minot. One male from Fargo, Aug. 1, 1914, identified by Franklin, is in the collection of the Massachusetts Agricultural College.

3. *Bombus terricola* Kirby. A very common, medium-sized species. The thorax is black except for yellow on the front part and the first segment of the abdomen is black. The second and third segments of the abdomen are yellow, the rest black with some light hairs on the sides of the last. This bumblebee seems rather short and broad. The extensive black color of the central part of the body readily distinguishes it. One nest was found under the floor of a shed. Plath found them nesting mostly underground. He states that this species, as well as *B. affinis*, makes tall cylinders in which they store pollen.

4. *Bombus pennsylvanicus* Geer. This is very similar to *terricola* but the wings are quite smoky and the tip of the abdomen is all black. It is a common species farther south but rare here. Specimens from Fargo, Nicholson (Sargent Co.) and Churchs Ferry (Ramsey Co.). Various writers have agreed that this bee is a vicious one. It is often called *B. americanorum* Fab. The interpretation of these names has been much discussed. The male was first described as *Apathus (Psithyrus) elatus* Cress.

5. *Bombus vagans* F. Sm. Thorax and first two segments of abdomen yellow, the rest black. The thorax has a small, central bare spot which often has a few black hairs around it. This is quite a common species, usually found around wooded areas rather than in prairie. I have thought of it as one of the smallest species, but Franklin gives the same length as for *ternarius*. Plath credited this bee with a mild disposition.

6. *Bombus affinis* Cress. This resembles *vagans* but has a larger dark spot on thorax. The second segment of the abdomen shows a faint but very characteristic trace of red. It is one of our rare species. Three specimens had been taken, all at Fargo, but several were seen late in 1948. Plath rated this as an exceptionally gentle species.

7. *Bombus perplexus* Cress. This is similar to *vagans*, somewhat larger and more distinctly yellow. I had only three specimens all taken at Fargo in spring. Franklin stated that this was the gentlest species with which he was acquainted, while *vagans* was the most ferocious.

8. *Bombus fervidus* Fab. One of our commonest species, all yellow except a black band between the wings and the last two segments of the abdomen. Subspecies *dorsalis* (Cress.) has thorax all yellow and sometimes all of abdomen of male. This form is less common than the typical one with which it intergrades. This bumblebee is a little larger than the preceding species, queens 15-21 mm. Dates are from May 11, 1915 to Oct. 20, 1915. Plath considered this one of the most vicious of the bumblebees and found that it would not tolerate the guest bumblebees. A nest taken at Fargo, August

30, 1912, contained a large number of typical *fervidus*, about a dozen of *dorsalis* of all sexes and several intergrades.

9. *Bombus borealis* Kirby. Considerably like *fervidus*, but with more black, especially on sides of thorax. The yellow hair is tawny instead of the pale, greenish yellow *fervidus*. I had thought of this as a large species but Franklin gives 15-19 mm. for the queens, slightly less than for *fervidus*. The queens in my specimens look fully as large as those of *fervidus*. It is fairly common. Dates are from May 11, 1915 to Oct. 27, 1915.

There is a specimen of *Bombus fraternus* F. Sm. in the Agricultural College collection, labeled as collected at Fargo in 1906, but I suspect there was an error in the label. The species resembles *borealis* but has a black face (much yellow in *borealis*) and large ocelli as in *nevadensis*.

10. *Bombus nevadensis* Cress. Resembles *fervidus* but has a rounded black spot on the thorax and only three segments of the abdomen yellow. A large, stout species, the queens 18-22 mm. This is a western form. I had specimens from Fargo, Kulm, Dickinson and Williston.

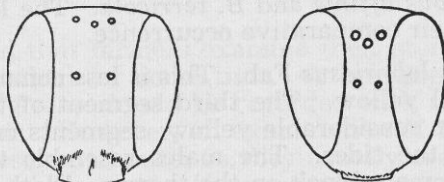


Fig. 2. Heads of two species of male bumblebees, enlarged. Left, *Bombus pennsylvanicus*; right, *B. separatus*. The three upper circles are the ocelli, or small eyes; the two lower circles represent the bases of the antennae.

11. *Bombus separatus* Cress. One of our most common species, easily recognized by the yellow thorax (usually a bare central spot), first segment of abdomen yellow, the second with a brownish spot on the basal middle, rest of abdomen black. This species, also *nevadensis*, *auricomus* and *rufocinctus* belong to the group separated by Robertson as a different genus, *Bombias*, which most authors consider a subgenus of *Bombus*. In this group the ocelli are larger than in other bumblebees and are placed lower on the face. In *B. separatus*, the eyes of the males are very large and there is scarcely more than enough room for the ocelli between them. Plath agreed with an earlier writer that this species was "nearly as ferocious as *B. ternarius*".

12. *Bombus auricomus* Robt. A large bumblebee, resembling *pennsylvanicus*, from which it differs by the large ocelli. It has a more southern distribution and is rare here. I had three specimens from Fargo and Kulm.

13. *Bombus rufocinctus* Cress. Quite a common species but variable in color of abdomen. The thorax has a large, rounded, dark spot, which is a good recognition character. The first two segments of the abdomen are yellow, the next two often red, the rest black or with some yellow. Franklin gives the length of the queen as 14-16 mm.

Guest Bumblebees (*Psithyrus*)

Reference has already been made to the fact that there are certain bumblebees which do not collect pollen nor make nests, but deposit their eggs in nests of other species. Only females and males are produced. Plath and others have observed the behavior of these insects. The females enter the nests and frequently go through a process of mauling the workers which then accept the intruder. The original queens are often killed by the *Psithyrus*. Some species of *Bombus* accept the intruders more readily than other species. The females of *Psithyrus* are less active than those of *Bombus* and often make more of a buzzing sound than the usual humming. They visit flowers freely to secure daily food or may be seen hunting for nests. Late in summer the males are common on flowers.

14. *Psithyrus ashtoni* (Cress.). This is the most common species in our area. The thorax is mostly yellow, often with an indistinct dark spot or band. The abdomen is mostly black but usually has a yellow band on the fourth segment, some yellow at the sides on the third and more on the fifth segment. Plath reports this species in nests of *Bombus affinis* and *B. terricola*. The latter seems indicated here by their comparative occurrence.

15. *Psithyrus laboriosus* Fab. This is less common than *ashtoni*. The thorax is all yellow. The third segment of the abdomen has a yellow band or considerable yellow; segments one, two and four some yellow at the sides. The males resemble those of *Bombus vagans* but have more black on the thorax. Plath reports this species commonly in the nests of *Bombus vagans*.

16. *Psithyrus variabilis* (Cress.). This is a dark colored bee. The thorax has a black band or spot and the abdomen of the female is all black. Only one specimen has been taken at Fargo, Sept. 8, 1913, which is in the collection of the Massachusetts Agricultural College. It presumably infests the nests of *Bombus pennsylvanicus*.

17. *Psithyrus insularis* Sm. This is a small species which resembles *Bombus vagans*. Franklin identified two specimens as this species, both collected at Fargo in September, 1912.

References

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