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Bumble Bees of Arkansas (Hymenoptera, Apidae, Bombinae)

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THE BUMBLE BEES OF ARKANSAS (HYMENOPTERA, APIDAE, BOMBINAE)

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PREFACE

The Department of Entomology, University of Arkansas, undertook a visiting scientist program during the summer of 1964. The major objective of this program was to further the development of a biosystematic program which would contribute to the many facets of entomological research and teaching. In 1964, the emphasis was placed on the organization of the Hymenoptera section of the university collection.

The role of the university collection is often not well-understood. Its central position in a university program cannot be overemphasized, however. Locally, it serves as a reference library of biological forms; it preserves materials for both biological and historical analysis; its data are not only the pinned and preserved specimens but the labels and accompanying notes. From a synthesis of these data, patterns of distribution, dispersal, faunal change, seasonal occurrence and ecological amplitudes can be derived. These are the dynamic aspects of a collection.

To the science of entomology, the collection serves as a regional repository and contributes basically to studies of wider geographic scope. Usually, such a collection has both strengths and weaknesses among insect groups reflecting, in general, the interests of faculty, students and other contributors.

A collection, pinned in drawers and held in cabinets, cannot serve a great number of persons. Contrawise, an individual engaged in putting names on museum specimens does not have sufficient opportunity to study the populations in the field. There is, therefore, a definite need for a cooperative endeavor between the groups which can be achieved through publications.

This is the intent of this paper. The bumble bee species of the state are listed, keys are presented for their identification, and the distributional records as now known are included. Much of the latter information is presently fragmentary. Interested persons can, however, contribute to these sections and include studies on behavior, pollination, population dynamics and other biological aspects. In turn, the specialist can direct his attention to these same or similar studies.

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INTRODUCTION

Bumble bees are of two kinds, the nest-making species with queen and worker castes of the genus **Bombus;** and, the parasitic species which have no worker caste of the genus **Psithyrus.** Females of **Bombus** have the hind tibiae expanded, fringed with long hairs, the central portions bare. This development is called a corbicula and it is in these corbiculae that pollen is collected for transport to the nest. Popularly, these are called pollen-baskets. The females of **Psithyrus** do not collect pollen and have lost these pollen-baskets. While the fringes may have somewhat longer hair, the central area is also covered with hairs. Female **Psithyrus** invade the nests of the true bumble bees and utilize the existing workers in provisioning and tending the parasitic brood.

Several recent publications are available that treat the bumble bees in more detail. In addition, each contains a list of references invaluable to the investigator. These references are Stephen (1957) on western America, LaBerge and Webb (1962) on Nebraska bumble bees, Mitchell (1962) on the bees of the eastern United States and Medler and Carney (1963) on the bumble bees of Wisconsin. A check list of North American species may be found in Muesebeck, **et al.** (1951) and the supplement (Krombein, 1958). Milliron (1961) published on a different classification of the bumble bees but this is beyond the scope of this paper. Hazeltine and Chandler (1964) presented a preliminary atlas for the identification of female bumble bees.

Franklin (1913) recorded six species of **Bombus** and one of **Psithyrus** as occurring in Arkansas. We have added one additional species of **Bombus,** but believe that **B. fervidus,** recorded by Franklin, does not occur within the state.

KEY FOR THE IDENTIFICATION OF GENERA AND SEXES OF BUMBLE BEES OCCURRING IN ARKANSAS

1. Antennae 12-segmented; abdomen with six visible abdominal segments; with a sting; inner tarsal claws much shorter than outer ones and diverging from them ..... Females 2

1'. Antennae 13-segmented; abdomen with seven visible abdominal segments; without a sting; inner tarsal claws nearly equal in length to the outer ones and nearly parallel to them ..... Males 3

2. Hind tibia bare centrally, fringed with long hairs (possessing a pollen basket); abdomen covered with hairs obscuring the surface; last abdominal segment straight in profile, not at all, or weakly ridged ..... (queens & workers) **Bombus**

2'. Hind tibia covered with hairs leaving no central bare area (without a pollen basket); abdomen shining, hair sparse and not obscuring the surface to any extent; last abdominal segment curved downward in profile with strong lateral ridges ..... (females) **Psithyrus**

3. Hind tibia somewhat flattened, hairs in central area irregularly dispersed, occasionally with much of the area shining; face usually with some yellow hairs ..... **Bombus**

3'. Hind tibia somewhat rounded, hairs stiff and covering the outer surface uniformly; face with dense, bristly black hair, never with yellow hairs ..... **Psithyrus**

KEY FOR THE SEPARATION OF FEMALE **BOMBUS**

1. Dorsum of thorax entirely yellow 2

1'. Dorsum of thorax largely black or with a distinct black hair band between the wing bases 4

2. First abdominal segment yellow, usually with a median, apical notch; remainder of abdomen black ..... **B. impatiens**

2'. First abdominal segment yellow, second segment with either yellow or rusty hair 3

3. Second abdominal segment with yellow hairs, sometimes in the form of two yellow lobes, sometimes crescent-like ..... **B. bimaculatus**

3'. Second abdominal segment with rusty hairs, usually crescent-like but occasionally covering most of the segment .... **B. griseocollis**

4. Black band between wings well-defined, its edges more or less parallel 5

4'. Black area between wings irregular covering most of the posterior part of the thorax at times; not a well-defined band 6

5. First two abdominal segments yellow; remainder of abdomen black ..... **B. fraternus**

5'. First four abdominal segments yellow; remainder of abdomen black ..... **B. fervidus**

6. Top of head with some yellow hairs, occasionally forming two yellow lines; posterior part of thorax usually with some yellow hairs; ocelli placed below a line drawn tangentially across the tops of the compound eyes; first abdominal segment with varying amounts of yellow, second and third segments yellow, remainder black; fourth and fifth antennal segments subequal, third segment as long as fourth and fifth together ..... **B. nevadensis auricomus**

6'. Top of head with hairs all black; posterior part of thorax usually black; ocelli placed above a line drawn tangentially across the tops of the compound eyes; first abdominal segment largely yellow, second and third segments yellow, remainder black; fifth antennal segment longer than fourth, third somewhat shorter than the fourth and fifth combined ..... **B. americanorum**

KEY FOR THE SEPARATION OF MALE **BOMBUS**

1. Eyes large, bulging from the sides of the head; ocelli large and set below the level of the top of the eyes 2

1'. Eyes normal, not bulging from the sides of the head; ocelli small and set above the level of the top of the eyes 4

2. First abdominal segment yellow, second with a median rusty patch or nearly all rusty ..... **B. griseocollis**

2'. First abdominal segment yellow, or occasionally black, second segment wholly yellow without rust colored hairs 3

3. First two abdominal segments yellow, remainder of abdomen black; black band between wings sharply defined; malar space reduced to a line ..... **B. fraternus**

3'. First three, or at least second and third abdominal segments yellow, remainder of abdomen black; either no black hairs between wing bases or the black area irregular; malar space well-defined ..... **B. nevadensis auricomus**

4. First five abdominal segments yellow, remainder of abdomen black, yellow or with reddish hairs 5

4'. Yellow confined to first and/or second segments, occasionally yellow laterally on the fourth segment but this is not continuous with the yellow of the first segments 6

5. Tip of abdomen usually with reddish hairs, but these may also be yellow or black; black band between wings poorly defined; yellow hairs of body dull yellowish ..... **B. americanorum**

5'. Tip of abdomen with black hairs; black band between wings usually well-defined; yellow hairs of body bright lemon yellow ..... **B. fervidus**

6. First segment of abdomen yellow; (occasionally the yellow hairs will encroach somewhat upon the median portion of the second segment); remainder of abdomen black; space between eye and mandible (malar space) short ..... **B. impatiens**

6'. First segment of abdomen yellow, second segment with a crescent or bilobed yellow area; yellow hairs of ventral surface occasionally covering fourth segment (var. **ridingsii**); space between eye and mandible long ..... **B. bimaculatus**

BOMBUS NEVADENSIS AURICOMUS (ROBT.)

B. nevadensis is a polytypic species with an eastern **(B. n. auricomus)** and a western **(B. n. nevadensis)** subspecies. The two subspecies may be differentiated in the females by the color of the pile on the dorsum of the thorax; this being entirely yellow in **B. n. nevadensis,** and extensively black, posteriorly, in **B. n. auricomus.** In the males, the apical abdominal segments of **B. n. nevadensis** have yellow pile; these segments have black hair in **B. n. auricomus.** Only the eastern subspecies has been recorded from Arkansas.

Females of **B. n. auricomus** are often confused with those of **B. americanorum.** The key characters, however, will separate the two species rather readily.

B. n. auricomus has been collected in the following counties: Arkansas, Benton, Desha, Lafayette, Lee, Washington and White.

BOMBUS FRATERNUS (SMITH)

This is a widespread, easily recognized species. In addition to the characters given in the key, the pile of **B. fraternus** is much shorter and appears more appressed than any of the other species of bumble bees.

We have records of its occurrence as follows: Ashley, Benton, Chicot, Clark, Crittenden, Desha, Grant, Little River, Lonoke, Nevada, Sebastian and Washington.

BOMBUS GRISEOCOLLIS (DeGEER)

B. griseocollis differs from all other species in Arkansas by the presence of rusty (ferruginous) pile on the second abdominal segment. Typically, this color is restricted to the anterior portion of the second segment, but in some workers and males, it tends to cover the entire segment. There is also a tendency for this to fade in older or worn individuals, being more yellow in appearance. The position of the ocelli are diagnostic, however.

The males of **B. griseocollis** are "big-eyed" as are those of **B. n. auricomus** and **B. fraternus.** In all three species the males exhibit a territorality behavior. The tendency for **B. griseocollis** males to occupy terminal branches of isolated trees has given rise to the local name of "shade bees".

B. griseocollis has been recorded from the following counties: Arkansas, Benton, Franklin, Grant, Lafayette, Little River, Logan, Marion, Miller, Montgomery, St. Francis, Sebastian and Washington.

BOMBUS AMERICANORUM (FABR.)

This is the most widespread and most common species of bumble bee in Arkansas . It is also the most variable in color pattern. As men-

tioned previously, the females resemble those of **B. n. auricomus;** the males (with the apical abdominal segments black) are difficult to distinguish from **B. fervidus** and only genitalic characters are reliable (see Medler and Carney, 1963). In addition to being the most abundant, it is also the most vicious species of bumble bee in the state.

There is a considerable controversy as to the correct name to be applied to this species. According to our usage, **B. pennsylvanicus** (DeG.) is a synonym.

B. americanorum has been collected in the following counties: Arkansas, Benton, Boone, Clark, Cleveland, Craighead, Crawford, Franklin, Grant, Hempstead, Lafayette, Lawrence, Lincoln, Little River, Logan, Lonoke, Miller, Mississippi, Phillips, Prairie, St. Francis, Sebastian, Sevier, Sharp, Washington and White.

BOMBUS FERVIDUS (FABR.)

Franklin (1913) stated that **B. fervidus** was absent from the greater part of Arkansas. We have not been able to locate the early collection records to which Franklin alluded. It is certainly probable that **B. fervidus** occurred within the state during the early 1900's. However, it also appears certain that the species does not now occur in Arkansas. Any record based upon males should be confirmed by studies of the genitalia. The females are distinct.

The range of **B. fervidus** is essentially more northern than any of the other species. Medler and Carney (1963) have shown that certain species in Wisconsin have withdrawn northward within recent times. Similar instances are indicated in Indiana and the early records of bumble bee species in Illinois (Frison, 1919) complement Medler's study.

The value of collections as a source of historical and distributional data is emphasized by this example.

BOMBUS BIMACULATUS CR.

B. bimaculatus queens are among the first to appear in the spring. Workers and males are produced extremely early in the season. During the summer, this species is rarely encountered, but there is a short period of activity in late summer or early fall.

Although color variants are not now considered deserving of nomenclatorial status, the varietal name **ridingsii** was given to a color form in which the fourth abdominal segment is extensively covered with yellow hair instead of black. This variant occurs throughout the range of the species and has been taken in Arkansas.

The county records of **B. bimaculatus** are: Benton, Franklin, Mississippi, Montgomery and Washington.

BOMBUS IMPATIENS CR.

The color and color pattern of **B. impatiens** is remarkably stable. There has been some confusion with **B. bimaculatus,** especially if there is a reduction in the amount of yellow pile on the second segment of the latter. The difference in malar space, however, is constant.

B. Impatiens is known from the following counties: Dallas, Grant, Hempstead, Washington and White.

PSITHYRUS VARIABILIS (CR.)

This is the only species of **Psithyrus** recorded from Arkansas. It is a parasite of **B. americanorum.** The females have the dorsum of the thorax covered with yellow hair, but the pleura are largely black. The abdomen is sparsely covered with blackish hairs, the cuticle being almost completely visible and shiny. The last abdominal sternite is strongly bent downward.

The thorax of the male is similarly colored except for a tendency toward a black interalar band. The abdomen is more densely covered with hair with varying amounts of yellow hairs on segments 2, 3 and 4. Although the top of the head has a large amount of yellow hair, the face is covered with stiff, black hairs, never with an admixture of yellow.

Our only record of **P. variabilis** is from Washington County.

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