

## NATIVE BEES<sup>1</sup>

by  
O. A. Stevens, Botanist

### Leaf-cutters

The leaf-cutters are stout black bees of medium to large size. Ours vary from  $\frac{3}{8}$  to  $\frac{3}{4}$  in. in length. They are readily recognized by the size and color, together with the prominent pollen brush on the under side of the abdomen of the female. The body is well covered with gray or yellowish hairs but these do not conceal the surface so much as in bumblebees. The surface of the body is strongly "punctured" with small pits. The largest bee known is a leaf-cutter from Sumatra, larger than a bumblebee.

The abdomen of the female is often not much longer than wide, slightly narrowed at the base and rounded at the tip. That of the male is narrower, the sides more nearly parallel. The name of the genus, *Megachile* (pronounced "me-gach'-iley") means "large lip", referring to the labrum, the part of the face just over the base of the tongue. This is less conspicuous, however, than the stout jaws, which are broad at the tips and usually have three or four large teeth. The tongue is long, much as in bumblebees.

This is one of the largest and most widely distributed groups of bees. Friese (1) monographed it in 1911, recognizing 529 species, distributed as follows: Europe, northern Asia and northern Africa, 190; North America, 58; South America, 95; southern Africa, 73; Indian region, 57; Australia, 56. Many have been described since then so that Mitchell (5) recognized over 100 species from North America in 1937. They are most numerous in the tropics where Friese (2) commented that half of the bees seen would be leaf-cutters.

Nests are made in hollow stems, in holes in the ground or other sorts of cavities. The tunnels are lined with oblong pieces of leaves and circular pieces are used to separate the cells in the tunnel. One European species is recorded as using pieces of birch bark instead of leaves. The French naturalist, Fabre, counted over 1,000 pieces of leaves in the nest tunnel of one leaf-cutter. Some years ago I happened to see one of these bees cut a piece from a strawberry leaf. She straddled the edge of the leaf and began to cut rapidly beneath her body. When the piece began to droop over she began to vibrate her wings enough to hold her position and with the last cut at once flew away. This is exactly as described by a British entomologist in 1866.

When the bees are cutting leaves they seem to continue in a small area, and the leaves of a particular kind of plant will show great numbers of holes. Friese (2) quotes a writer from Hungary who estimated that from 15,000 to 20,000 pieces had been cut from one lilac bush.

<sup>1</sup>Continued from article, pp. 49-54, Vol. XI, No. 2—N. Dak. Ag. Exp. Sta. Bimonthly Bulletin

The numerous species are much alike in appearance. Differences between them are often made on small details of structure, so that accurate identification is difficult. All of my specimens were identified by Dr. T. B. Mitchell of North Carolina in 1927. Referring to one group of species (not known in North Dakota), Mitchell commented that they were rare in collections and that the only species with which he was acquainted was very swift in flight, took alarm readily, visited only one kind of flower and had a very short flight period. Most of the species visit a variety of flowers. They are swift in flight and usually make a sharp whining sound. We know practically nothing about the nesting habits of the North Dakota species further than the general comments made here.

1. *Megachile latimanus* Say. This is one of our largest and most common leaf-cutters. It is a stout, black bee about one-half inch (12-14mm.) long, well covered with short hairs, mostly of a grayish or tawny color. The first two segments<sup>1</sup> of the abdomen are well covered with such hairs, but the rest have short black hairs and a fringe of short gray ones. The males are often quite tawny. The abdomen of the female has been described as "shovel-shaped". It is slightly narrowed at the base, more so and rounded toward the tip. The abdomen of the male is more nearly parallel sided, the rounded tip notched and slightly turned down. The name *latimanus* means "broad-handed" and refers to the fore feet of the male which are yellowish-brown and fringed with a heavy comb of hairs.

I had about 100 specimens taken in all parts of the State from June 21 to Sept. 15. They visit many kinds of flowers but seem most common on sunflowers, thistles and gumweed. They visit alfalfa freely and regularly trip the flowers. This bee has been taken on flowers of the following plants. In discussing other species, common names only are listed except for additional kinds.



Fig. 1. Leaf of hog peanut showing where pieces were removed by leaf-cutter bee.

<sup>1</sup>Abdominal segments will be numbered as commonly seen, the first being the second of recent technical publications.

Plant species upon which *Megachile latimanus*, a large common leaf cutter  
bee, were taken.

Females	Males
.....	False Anise ( <i>Agastache anethio-</i> <i>dora</i> )
Hollyhock ( <i>Althaea rosea</i> )	.....
Leadplant ( <i>Amorpha canescens</i> )	Milkweed ( <i>Asclepias syriaca</i> )
.....	.....
White Prairie Aster ( <i>Aster eri-</i> <i>coides</i> )	.....
Tall White Aster ( <i>Aster panicula-</i> <i>tus</i> )	.....
Purple Coneflower ( <i>Brauneria an-</i> <i>gustifolia</i> )	.....
Garden Aster ( <i>Callistephus chinen-</i> <i>sis</i> )	do
Bluebell ( <i>Campanula rotundifolia</i> )	.....
Knapweed ( <i>Centaurea jacea</i> )	.....
Golden Aster ( <i>Chrysopsis villosa</i> )	.....
Prairie Thistle ( <i>Cirsium undula-</i> <i>tum</i> )	do
.....	Tall Thistle ( <i>Cirsium altissimum</i> )
Bee Plant ( <i>Cleome serrulata</i> )	.....
Fireweed ( <i>Epilobium angustifol-</i> <i>ium</i> )	.....
.....	Boneset ( <i>Eupatorium perfoliatum</i> )
Gaillardia ( <i>Gaillardia aristata</i> )	do
Gumweed ( <i>Grindelia squarrosa</i> )	do
Common Sunflower ( <i>Helianthus an-</i> <i>nuus</i> )	do
Narrow-leaved Sunflower ( <i>Helian-</i> <i>thus maximiliani</i> )	do
Rough Sunflower ( <i>Helianthus rig-</i> <i>idus</i> )	.....
.....	Jerusalem Artichoke ( <i>Helianthus</i> <i>tuberosus</i> )
Blue Lettuce ( <i>Lactuca pulchella</i> )	do
Alfalfa ( <i>Medicago sativa</i> )	do
.....	White Sweet Clover ( <i>Melilotus al-</i> <i>ba</i> )
.....	Yellow Sweet Clover ( <i>Melilotus of-</i> <i>ficinalis</i> )
.....	.....
Evening Star ( <i>Mentzelia decapeta-</i> <i>la</i> )	.....
Purple Prairie-clover ( <i>Petaloste-</i> <i>mum purpurem</i> )	do
Obedient Plant ( <i>Physostegia parvi-</i> <i>flora</i> )	.....
Silverleaf ( <i>Psoralea argophylla</i> )	.....
.....	Tall Coneflower ( <i>Rudbeckia lacin-</i> <i>iata</i> )
Stiff Goldenrod ( <i>Solidago rigida</i> )	.....
Perennial Sow Thistle ( <i>Sonchus ar-</i> <i>vensis</i> )	.....
.....	.....
.....	• Hedge-nettle ( <i>Stachys palustris</i> )
.....	Dandelion ( <i>Taraxacum officinale</i> )
.....	Germander ( <i>Teucrium occidentale</i> )

2. *Megachile dentitarsus* Sladen. This closely resembles the preceding and was not recognized until described by Sladen in 1918 from western Canada. The female has the hairs on the first two abdominal segments white, not yellowish. The male has a pair of short spines on the under side of the body in front of the basal joints of the second pair of legs. Specimens from Dickinson westward, mostly from flowers of alfalfa.
3. *Megachile parallela* Sm. This seems even stouter than *latimanus*. The tip of the abdomen of the male has six teeth which caused Robertson to name it *M. sexdentata*. This was a more appropriate name, but Mitchell concluded it was the same species as described by Smith in 1853. Specimens from Dickinson westward on sunflowers and gumweed.
4. *Megachile manifesta* Cress. Smaller than *latimanus*, the male with black feet and a small spine at tip of abdomen. One specimen from Sentinel Butte on *Grindelia* and one from Beach by C. N. Ainslie.
5. *Megachile dakotensis* Mitchell. This was described from South Dakota specimens in 1926. It is slightly smaller than *latimanus*, less hairy, the abdominal bands very narrow; abdomen of male rounded at tip; feet slender. Several specimens from Washburn on prairie-clover (*Petalostemum*).

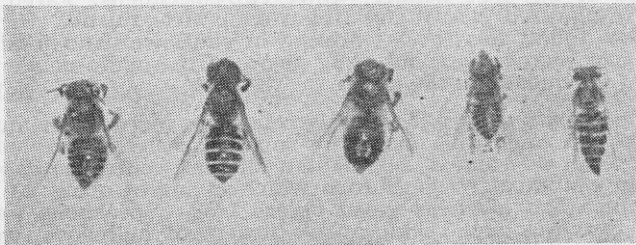


Fig. 2. Female leaf-cutter bees, natural size. Left to right: *Megachile latimanus*, *M. pugnata*, *M. melanophaea*, *M. brevis*, *Coelioxys rufitarsis*. Photo by Don Nelson.

6. *Megachile texana* Cress. Similar to the preceding. Abdomen of male notched at tip; feet slender. Specimens from Union (S.E. Cavalier Co.) Devils Lake, Charlson and Williston on alfalfa, milkweed, prairie clover and lead plant. Some from Washburn on sweet clover and prairie-clover were identified as var. *cleomis* Ckll.
7. *Megachile wheeleri* Mitchell. Similar to *dakotensis*. Abdomen of male rounded but rough at tip; feet well fringed. Specimens from Edgeley, McKenzie and Williston, all on gumweed; Washburn on skeleton weed (*Lygodesomia juncea*). Mitchell recorded two from Bottineau, collected by C. N. Ainslie.
8. *Megachile vidua* Sm. As large as *latimanus* and quite black, the white hairs few and short; abdomen of male notched at tip; feet well fringed but dark. Fargo and Charlson on sweet clover and alfalfa.
9. *Megachile mendica* Cress. Much like *vidua* in appearance but smaller; abdomen of male notched at tip; feet slender. Specimens only from Fargo on tall white aster, cornflower and alfalfa. Mitchell indicates that it is a widely distributed and common species.
10. *Megachile melanophaea* Sm. This is a distinctive species with the first two abdominal segments covered with gray, the rest with black hairs. The hairs are all slender and erect, no apical bands on the segments. The body is more slender than in *latimanus*. This leaf-cutter is quite common in the western part of the State and a common visitor of alfalfa flowers. It was taken also on milk-vetch (*Astragalus, bisulcatus* and *A. tenellus*), bluebell (*Campanula rotundifolia*), lupine (*Lupinus argenteus*) and wolfberry (*Symphoricarpos occidentalis*). One specimen was secured from a box of lady's slippers (*Cypripedium reginae*) sent from Walhalla.

11. *Megachile pugnata* Say. This species has a long (11-18 mm.), slender body. The female has a stout tooth on the cheek. The male has the tip of the abdomen notched and the feet well fringed. It seems rare here but was taken at Fargo, Kulm and Mott at flowers of burdock (*Arctium minus*), purple coneflower and Jerusalem artichoke.
12. *Megachile inermis* Prov. Similar to *pugnata* but technically quite different. The front legs of the male are mostly light brown instead of black as in *pugnata*; feet well fringed. It seems to be associated with wooded areas. Specimens from only Fargo and Turtle Mts., also Moorhead, Frazee and Wahkon, Minn., at flowers of prairie thistle, bushy vetch (*Lathyrus venosus*), catnip (*Nepeta cataria*), raspberry (*Rubus idaeus*) and black snakeroot (*Sanicula marylandica*).  
The specimen from Wahkon has an unusual history. I was sitting on a road-side bank in a sunny, open area, watching for insects. This female leaf-cutter, a large bee,  $\frac{3}{4}$  of an inch long, alighted on my thumb and began to "lick" it. So intent was she that I studied the action of tongue with a magnifying glass. This habit is frequently observed in some species of *Halictus*, the "sweat bees".
13. *Megachile montivaga* Cress. Similar to *inermis*; abdomen of male rounded at tip; feet slender. Only two specimens: Fargo on knapweed (*Centaurea jacea*) and Union on prairie thistle. Hicks (4) in Colorado, found this species nesting in sunflower and mullein stalks which had been cut off and using pieces of the white petals of prickly poppy (*Argemone*) in the nests.
14. *Megachile centuncularis* L. Closely related to *inermis* but much smaller (8-12 mm.) and thus one of our smaller species. Many authors had considered it the same as *inermis* but Mitchell concluded it was identical with *centuncularis* of Europe which is one of about 40 species of bees which had been described before 1758. Specimens from Fargo, Kulm, Bismarek and Dickinson at flowers of hollyhock, cornflowers (*Centaurea cyanus* and *C. jacea*), prairie thistle, fleabane (*Erigeron philadelphicus*), gumweed, sunflower, alfalfa, sweet clover (*M. alba* and *officinalis*), perennial sow thistle, dandelion and ironweed (*Vernonia fasciculata*).
15. *Megachile relativa* Cress. Separated from *centuncularis* by several small details. A large number of specimens were taken at Fargo but others only at Grand Forks, Lisbon and Turtle Mts., thus indicating a woodland distribution. Flower records include aster (*A. ericoides*), *paniculatus* and *sagittifolius*, wild turnip (*Brassica campestris*), knapweed (*C. jacea*), dragonhead (*Dracocephalum parviflorum*), fleabane (*E. philadelphicus*)—many specimens, gumweed—many, false sunflower (*Heliopsis*), blue lettuce, sweet clover, ground cherry (*Physalis ixocarpa*), buttercup (*Ranunculus macounii*), raspberry, ragwort (*Senecio* sp.) goldenrod (*Solidago flexicaulis*, *rigida* and *serotina*), perennial sow thistle, dandelion, alsike clover (*Trifolium hybridum*) and meadow parsnip (*Zizia aurea*).
16. *Megachile petulans* Cress. Similar to *relativa* in appearance but not closely related to any other North American species. Abdomen of male notched at tip; feet slender. Only one specimen from Jamestown on gumweed. Mitchell found it nesting in the ground.
17. *Megachile brevis* Say. Our smallest species (7-12mm.) and even more widely distributed in North America than *latimanus*. It is similar to the two preceding, the hairs usually quite white but often tawny in the male; abdomen of male notched or only roughened at tip; feet slender. Many localities, at flowers of leadplant, milk-vetch (*Astragalus tenellus*), purple coneflower, knapweed, fleabane, gumweed, sunflower, false sunflower, blue lettuce, sweet clover, wood sorrel (*Oxalis violacea*), evening primrose (*Oenothera serrulata*), silverleaf, prairie clover, sideranthus (*Aplopappus spinulosus*), wolfberry and

goldenrod. Rau (quoted by Hicks, 4) found a nest of this species in Missouri in a sumac stem where only yellow flower petals had been used to line the nest tunnel. Hicks found a nest in Colorado under the edge of a rock. This had both rose petals and leaves. One female which I collected at Washburn, North Dakota was cutting petals of the tooth-leaved evening primrose (*Oenothera serrulata*).

#### Parasites of Leaf-cutters—*Coelioxys*

The members of this genus are easily recognized. They are black with narrow bands of white hairs on the abdominal segments. They do not collect pollen and the female has no pollen brush. The abdomen of the female is conical, sharply pointed at the tip. That of the male is blunt with several teeth at the tip. The eyes are covered with very small hairs which can be seen with a magnifying glass. Our species of this group have not been identified. The commonest one is probably *C. rufitarsis* Sm., which is about  $\frac{1}{2}$  inch long and has red feet as indicated by the name. It is quite common and usually will be found with *Megachile latimanus* which probably is its chief host. Two or three smaller species are represented in the collection.

Graenicher (3) found an egg of *C. rufitarsis* in a nest of *M. latimanus*. It hatched in four days but the larva soon died. He reared a specimen of the same parasite from a nest of *M. melanophaea*, the larva of which was missing. In another pair of species he observed the *Coelioxys* egg hatch and kill the *Megachile* larva, but the parasite did not mature.

#### References

1. Friese, H. Megachilinae. Das Tierreich, Lfg. 28. Berlin, 1911.
2. Friese, H. Die europaischen Bienen. Berlin and Leipzig. 1923.
3. Graenicher, S. Some observations on the life history and habits of parasitic bees. Bull. Wis. Nat. Hist. Soc. 3:153-167. 1905.
4. Hicks, Charles H. Nesting habits and parasites of certain bees of Boulder County, Colorado. Univ. Colo. Studies 15:217-252. 1926.
5. Mitchell, T. B. A revision of the genus *Megachile* in the Nearctic Region. Trans. Am. Ent. Soc. 8 pts.; 1934-1937.