NATIVE BEES[1]

By

O. A. Stevens[2]

Mason Bees

The name "mason bee" is one of the best established and is often applied to all species of the genus *Osmia* in its broadest sense. As a matter of fact, most of them are not masons. The name mining bee or burrowing bee would fit them better, but it would apply as well to the majority of species of most other groups.

Fabre (2) has most of one book on these bees, in which he tells how his students in surveying strayed from their work to seek honey in the cells of a true mason bee (*Chalcidoma muraria*) of southern France, which made its nests on the under sides of loose stones. He tells also of his experiments with another species, *C. sicula*, which built on house roof tiles or sometimes made a rounded nest on a tree branch.

The bees discussed in the following pages (except the small carpenter bee) are closely related to the leaf-cutters which they resemble in structure of wings and mouth parts and in having an abdominal pollen carrying brush. We know little about the nesting habits of most species.

The species of *Osmia* are stout, medium sized bees, usually blue green in color. The body is well covered with fine hairs but these are not dense enough to conceal the body color. They inhabit cooler regions than the leaf-cutters. Friese (4) listed 25 species in central Europe, of which four often nested in empty snail shells. Others used hollow stems, cavities in stones, walls, etc. He stated that in Europe they are most numerous in the Mediterranean region and that "each month from March to August shows its special kinds". He also reported (3) that the males appear as much as two weeks earlier than the females and that while species are numerous, the individuals of each species are not abundant. These two features, together with the similarity in appearance of different species, makes it a difficult group to study. One species of Europe lines its nest with pieces of the bright orange petals of poppy. Ours seem to be mostly spring and early summer insects. The specimens reported here were identified by Dr. Charles D. Michener.

1. *Osmia mandibularis* Cress. This is our largest species, 10—15 mm. (½ in.) long. The head is large with enormous jaws. The hairs of the pollen brush on the lower side of the abdomen are black. I found these nesting in considerable numbers in a vertical clay bank of the Heart River at Dickinson and at Williston, July 1—Aug. 8; also taken at Washburn, Mott and Kenmare. Flowers visited were milk-vetch (*Astragalus nitidus*), purple coneflower (*Brauneria angustifolia*), prairie thistle (*Cirsium undulatum*), prickly pear (*Opuntia humifusa*), red mallow (*Sphaeralcea coccinea*) and hedge-nettle (*Stachys palustris*). Hicks (5) found the cells in the nest tunnel separated by chewed plant leaves and many of the bees hibernating as mature insects.

[1]Continued from Vol. XI, No. 4, p. 135 of the Bimonthly Bulletin. For previous articles on Native Bees see the following: N. Dak. Agr. Expt. Station Bimonthly Bulletin, Vol. 10, No. 6, July-Aug. 1948, pp. 187-194; Vol. XI, No. 2, Nov.-Dec. 1948, pp. 49-54; and Vol. XI, No. 4, Mar.-April 1949, pp. 130-135.

[2]Botanist.

2. *Osmia lignaria* Say. Similar to *mandibularis*, the thorax more densely covered with gray hairs, the abdomen with short, black hairs. At the base of the mandibles are two short, stout "horns" which project forward. Medora, May 14 (C. H. Waldron), at flowers of false lupine (*Thermopsis rhombifolia*) is my only North Dakota record. Several were taken at Sylvan Lake, South Dakota, June 10, at willow flowers.

3. *Osmia felti* Ckll. Similar to a small *mandibularis* but with ordinary mandibles. Fargo, Kathryn and Devils Lake, June 12—July 16, at flowers of milk-vetch (*Astragalus canadensis*), dragonhead (*Dracocephalum parviflorum*), bushy vetch (*Lathyrus venosus*), hedge-nettle and white clover (*Trifolium repens*). One specimen from Moorhead, Minnesota, May 14 at gooseberry (*Ribes missouriense*) was doubtfully referred to this species.

4. *Osmia nigrifrons* Cress. Similar to *felti*, the face with black hairs. One specimen from Bowman, June 23, at flowers of *Astragalus tenellus*.

5. *Osmia dakotensis* Michener. Similar to *felti*, 10 mm. long. This was described (6) from several specimens from Bowman and Dickinson, June 23 and July 1, at flowers of *Astragalus nitidus* and *A. tenellus*.

6. *Osmia* sp. A distinctive looking but unidentified specimen, 12 mm. long; thorax with dense, slightly yellowish hair, face with black hairs. Sheldon, June 16, at flowers of western wallflower (*Erysimum asperum*), no. 14984.

7. *Osmia trevoris subtrevoris* Ckll. Smaller than *felti*, 8 mm. long. Bowman, Gasgoyne and Dickinson, June 19-28, at *Astragalus nitidus*, *A. tenellus* and red clover (*Trifolium pratense*).

8. *Osmia canadensis* Cress. Similar to *felti*. One male from Fargo, May 10, at yellow violet (*Viola eriocarpa*).

9. *Osmia atriventris* Cress. Similar to *trevoris*. One from Fargo, May 7 at willow; also one from Detroit Lakes, Minnesota, June 17 at meadow parsnip (*Zizia*).

10. *Osmia hesperella Ckll.* Similar to *trevoris*. One from Bowman, June 23, at *Astragalus tenellus*.

11. *Osmia illinoensis* Rob. A small species, bright green or bottle green. Two from Bowman and Gasgoyne, June 16 and 23, at *Astragalus tenellus* and *Eriogonum flavum*, were referred to this species with a question.

Some Small Black Bees

12. *Ashmeadiella bucconis* (Say). A slender, black bee, 7—10 mm. long. The body is strongly punctured, not very hairy, head large, base of abdomen smooth and slightly concave without a rim as in *Heriades*. This is a summer bee, chiefly a visitor of gumweed (*Grindelia squarrosa*). Specimens from Stutsman County west. Purple coneflower is the only other flower on which they were taken.

13. *Ashmeadiella stevensi* Michener. Described (6) from one specimen taken at Bowman, June 23, at flowers of prickly pear cactus (*Opuntia polycantha*).

14. *Heriades gracilis* Ckll. Similar to *Ashmeadiella*, 6—8 mm. long, slender and very coarsely punctured, the smooth base of abdomen bordered by a distinct ridge. A common bee in all parts of the State, June 16—Aug. 22, at flowers of wild onion (*Allium stellatum*), leadplant (*Amorpha canescens*) dogbane (*Apocynum androsaemifolium*), milkweed (*Asclepias speciosa*), aster (*Aster sagittifolius*), bee plant (*Cleome serrulata*), blue lettuce (*Lactuca pulchella*), skeleton weed (*Lygodesmia juncea*), wide bergamot (*Monarda fistulosa*), prairie-clover (*Petalostemum oligophyllum*), sumac (*Rhus glabra*), red mallow (*Sphaeralcea coccinea*), goldenrod (*Solidago canadensis*), wolfberry (*Symphoricarpos occidentalis*), tamarix (*T. pentandra*) and meadow parsnip (*Zizia aurea*).

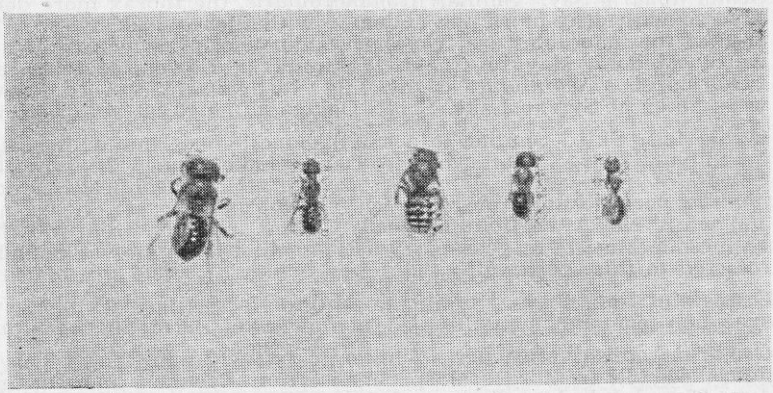

Fig. 1. Earth and stem nesting bees, natural size. Left to right: *Osmia mandibularis, Hoplitis simplex, Anthidum tenuiflorae, Ashmeadiella bucconis, Ceratina dupla.* Photo by Don Nelson.

15. *Heriades variolosus* (Cress.). Smaller than *H. gracilis*, 5—7 mm. long. Fewer specimens are represented, but widely distributed. Prairie thistle and gumweed are among the flowers visited.

16. *Hoplitis producta* (Cress.) One of the commonest bees of this sort. It is 7—8 mm. long. The base of the abdomen is smooth and rounded except for a faint median groove. The lower side of the second abdominal segment has a large, conical spine. The antennae of the males are pinched at the tip. Many localities, June-Aug. This is a common twig-nesting bee and its habits have been described by several writers. Elderberry (*Sambucus*) twigs are favorite locations. These plants are not native to North Dakota but in planted specimens I found a number of nests. Rau (9) was uncertain whether they used old burrows. I thought that the weathered appearance of some of mine indicated they were old. Occupied twigs can usually be recognized by the plug at the end made by the bee from chewed leaves. These, mixed with saliva from the bee's mouth form a hard mass. Rau observed the young bees escape from the twig by digging away additional pith to loosen the plug. *Stelis lateralis* and *S. sexmaculata* are common parasites of this bee. Hicks (5) found in 211 cells, 64 of *Stelis*. The coccoons of host and parasite are easily distinguished. The covering of the *Hoplitis* is fairly transparent and fills the cavity. That of *Stelis* is brownish, opaque, shorter and pointed at the top. This species and the three following have commonly been placed in a genus *Alcidamea*, but Michener (7) includes it and others in the Old World genus *Hoplitis*.

17. *Hoplitis pilosifrons* (Cress.). Michener (8) states that this species is peculiar in having a low rounded protuberance on the lower side of the abdomen on the second segment. It is widely distributed and about as common as *H. producta*. Taken on flowers of wild onion (*Allium stellatum*), mustard (*Brassica juncea*), bluebell (*Campanula rotundifolia*), fleabane (*Erigeron philadelphicus*) western wallflower (*Erysimum asperum*), sunflower (*Helianthus petiolaris*), blue lettuce (*Lactuca pulchella*), evening primrose (*Oenothera serrulata*), wood sorrel (*Oxalis violacea*), beardtongue (*Penstemon gracilis*), rose (*Rosa* sp.), ragwort (*Senecio canus*) and germander (*Teucrium occidentale*).

18. *Hoplitis truncata* (Cress.). The occurrence of this in North Dakota is indicated by Michener (8) but no specimens were in the present collection.

19. *Hoplitis cylindricus* (Cress.). Resembles *producta* but is somewhat larger. One male from Fargo, June 20, at flowers of fleabane (*Erigeron philadelphicus*) and another from Union, July 16, at leadplant (*Amorpha canescens*) were determined as this species by Michener. A number of females from Union, one from Fargo and two from Kindred were not placed. This was formerly called *Andronicus cylindricus* Cress. Hicks (5) found this bee nesting in stems and each one emerging by gnawing through the side of the stem instead of going up to the end of it. Fabre stated most species of this general group, if unable to go to the top, would attempt to go out by the side but rarely had sufficient strength to do so.

20. *Hoplitis albifrons* (Kby). One specimen collected by C. H. Waldron, Detroit Lakes, Minn., June 17 at flowers of carrot (*Daucus carota*). It may occur in northeastern N. D. The specimen is 12 mm. long, has much gray hair on the thorax and a black abdomen. Formerly called *Monumetha albifrons* Kby.

21. *Stelis lateralis* Cress. A small, not very hairy, black bee, 5—7 mm. long, with a narrow, yellowish white spot at each side of each abdominal segment. It is a common parasite of *Hoplitis producta*. In the longer twig in Fig. 2, three cells were occupied by pupae of this parasite. The cocoons are easily recognized by their thick, papery covering, short form with a pointed upper end. Professor Swenk identified several of the specimens.

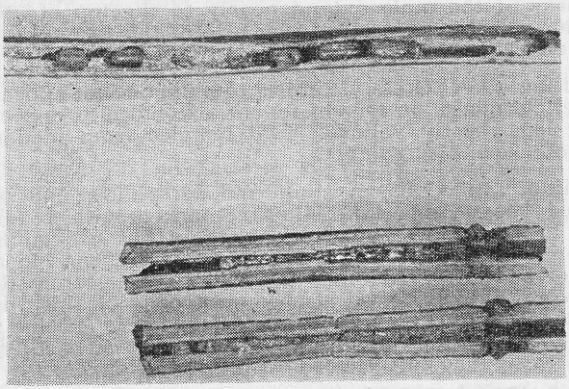

Fig. 2. Nests of bees in stems, ¾ natural size. Larger stem contained 9 cells: 1, 2, 4, 5, 8 and 9 from entrance at right were *Hoplitis producta;* 3, 6 and 7 were *Stelis lateralis*. Shorter stem contained *Hylaeus pygmaeus*.

22. *Stelis subemarginata* Cress. This species is larger (8 mm.) than *lateralis* and the spots on the abdomen form nearly complete, narrow bands. Two specimens from Lisbon, June 5, at flowers of meadow parsnip, were identified by Swenk (11) as the previously undescribed male of this species. Another from Turtle Mts., July 8 at fleabane, may be the same. This is probably a parasite of *Anthidium*.

Resin Bees

The bees formerly included in the genus *Anthidium* are black or brown with prominent bands of yellow on the abdomen and spots on the thorax. The males are larger than the females. There are many species, widely distributed but found, like the leaf-cutters, chiefly in warm regions. Friese (4) called them "woolbees" because some species line their nests with plant hairs. Others use resin, usually mixed with sand, dirt or pieces of leaves. Some species dig their own burrows, others use various cavities and sometimes nests are attached to twigs of bushes. Specimens of most of the following species were identified by H. F. Schwarz.

23. *Anthidium emarginatum* Say. Black, about 10 mm. long; well covered with slender gray hairs; all abdominal segments with cream colored bands; 4 spots on hind edge of thorax, and legs marked with yellow; face of female black, that of male yellow to base of antennae. Bowman, June 23 at flowers of *Phacelia leucophylla*. Hicks (5) saw a bee of this species scrape hairs from a thistle stem.

24. *Anthidium tenuiflorae* Ckll. Similar to *emarginatum* but no spots on hind edge of thorax. Bowman, Marmarth, Devils Lake, Rugby and Langdon, June 23-July 16, at flowers of milk-vetch (*Astragalus flexuosus* and *tenellus*), blue lettuce (*Lactuca pulchella*), silverleaf (*Psoralea argophylla*) and white clover (*Trifolium repens*). This species is our most common *Anthidium* according to the evidence at hand. One specimen was verified by Cockerell. Hicks (5) saw a bee of this species carry pebbles into a cavity between some rocks. On moving a rock he found a mass of cottony material surrounded by pebbles.

25. *Anthidium clypeodentatum* Swenk (*A. psoraleae* Rob.?). Resembles the two preceding species; a pair from Union, July 26, are the largest *Anthidia* taken (15 mm.). A female from Bowman, June 23, at *Astragalus tenellus*, is smaller.

26. *Dianthidium pudicum* (Cress.). Similar to the three preceding but smaller (8 mm.); the hairs sparse and short; thorax with 4 spots on front border, narrow ones on hind border, legs mostly dark. The lateral face marks of the male extend nearly to the top of the head. The female has a yellow mark on each side of the face. Union, July 26 at flowers of leadplant.

27. *Dianthidium ulkei* Cress. Similar to *pudicum* but appearing stouter in form; yellow marks on face of female extending to top of head and on clypeus; legs mostly yellow. Two females from Medora, Aug. 3, at flowers of *Cleome serrulata*.

28. *Dianthidium sayi* Ckll. A stout, reddish yellow and black, strongly punctured bee, 8 mm. long; thorax marked with reddish nearly all around; broad yellow bands on abdomen but broken in the middle, except on first segment; legs red. One female from Medora, Aug. 3, at flowers of sunflower (*H. annuus*). Three males from Rhame, Aug. 8, at gumweed. Hicks (5) described nest cells of this species made of resin and sand in very sandy soil, 2 to 4 inches below the surface. Custer and Hicks (1) described a colony of nests on a hillside and found that the bees collected resin from sunflower stems.

    On July 3, 1949, I found both sexes of this bee common on sunflowers at the Logging Camp Ranch on the Little Missouri River in Slope County. They were very inactive, sucking nectar from the flowers or resting on leaves.

29. *Dianthidium boreale* Rob. Similar to *sayi*, more coarsely punctured, ground color nearly black and markings bright yellow; first segment of abdomen with two widely separated spots, second with a wide band, third to fifth with two large spots and very small ones at sides; rear angle of head with a prominent yellow band. One female from Steele, Aug. 18, on flowers of prairie-clover. Some authors put this in a separate genus, *Anthidiellum*, distinguished by having the hind angle of the thorax produced backward in a thin, roof-life projection.

Carpenter Bees

30. *Ceratina dupla* Say. This belongs to a different family from the bees above described but may as well be discussed here. It is a small, dark, blue green bee with few hairs. It has a long tongue as in the mason bees but can be distinguished by having three sub-marginal cells in the fore wing and pollen brushes on the legs. The female has a small yellowish mark on the clypeus, the male a larger one.

This is a common bee all through the summer. The adults hibernate and are found visiting willow flowers in early spring. They are common in midsummer and in the fall and have been taken on the following flowers: Leadplant (*Amorpha canescens*), aster (*A. laevis, paniculatus* and *sagittifolius*), wild turnip (*Brassica campestris*), false flax (*Camelina sativa*), knapweed (*Centaurea jacea*), golden aster (*Chrysopsis villosa*), thistle (*Cirsium altissimum* and *undulatum*), dragonhead (*Dracocephalum parviflorum*), fleabane (*Erigeron philadelphicus*), yellow avens (*Geum strictum*), gumweed (*Grindelia squarrosa*), sunflower (*Helianthus maximiliani*), water leaf (*Hydrophyllum virginicum*), blue lettuce (*Lactuca pulchella*), wood sorrel (*Oxalis violacea*), sumac (*Rhus glabra*), raspberry (*Rubus idaeus*), willow (*Salix* spp.) goldenrod (*Solidago serotina*), dandelion (*Taraxacum officinale*), alsike clover (*Trifolium hybridum*), ironweed (*Vernonia fasciculata*) and meadow parsnip (*Zizia aurea*).

These bees burrow in pith of plant stems. I have found them especially in broken stems of raspberry, sometimes the adult bees crowded into a stem near the ground line late in fall. In one stem of wild bergamot (*Monarda fistulosa*) I found 19 adults late in the fall. In our area, sumac and raspberry stems are freely cut by rabbits and these provide favorable locations. Rau (10) cut off the ends of a number of sumac stems and three-fourths of them were occupied by *Ceratina*, while uncut stems were not used. He found no evidence that this bee used old burrows of other species.

The large carpenter bee (*Xylocopa virginica*) has not been found in North Dakota, but possibly may occur in the southern part of the State. It resembles a bumblebee and bores tunnels in wood.

References

1. **Custer, Clarence P. and Charles H. Hicks.** Nesting habits of some anthidiine bees. Biol. Bull. 52:258-277. 1927.
2. **Fabre, J. H.** The Mason Bees. Transl. by de Mattos. New York, 1914.
3. **Friese, H.** Die europaischen Bienen. Berlin and Leipzig, 1923.
4. **Friese, H.** Die Insekten Mitteleuropas, insbesondere Deutschlands. Band 1. Die Bienen, Wespen, Grab-und Goldwespen. Stuttgart, 1926.
5. **Hicks, Charles H.** Nesting habits and parasites of certain bees of Boulder County, Colorado. Univ. Colo. Studies 15:217-252, 1926.
6. **Michener, Charles D.** Descriptions and records of North American bees. Ann. Mag. Nat. Hist. (10) 19:393-410. 1937.
7. **Michener, Charles D.** Comparative external morphology, phyllogeny and a classification of the bees. Bull. Amer. Mus. Nat. Hist. 82:157-326. 1944.
8. **Michener, Charles D.** A revision of the American species of *Hoplitis*. Bull. Amer. Mus. Nat. Hist. 89:257-318. 1947.
9. **Rau, Phil.** The nesting habit of the pulp-making bee, *Alcidamea producta* Cress. Psyche 35:100-107. 1928.
10. **Rau, Phil.** The nesting habits of the little carpenter-bee, *Ceratina calcarata*, Ann. Ent. Soc. Am. 21:380-396. 1928.
11. **Swenk, Myron H.** Studies of North American bees. III. Families Nomadidae and Stelididae. Univ. (Nebr.) Studies 15:155-193. 1915.