

Native Bees¹

By O. A. Stevens²

SILK BEES *Colletes*

This name has long been applied to certain bees which coat the nest chambers with a delicate, transparent material. The name silk might be a little misleading. The bees do not spin a thread as do spiders and some caterpillars, but brush on with their tongues a secretion from the mouth. The tongue is short and broadly two-lobed at the tip instead of slender pointed. We might claim that these bees were the originators of modern enamel finishes. In that case it was a very, very long time ago for they are regarded as some of the most primitive forms of bees. The name *Colletes*, first used by the noted French entomologist, Latreille in 1802, means a plasterer.

These are medium sized bees, considerably resembling species of *Andrena*. They can be distinguished by the differently shaped tongue and by the slightly S-shaped second recurrent vein in the fore wing (Fig. 2F). Most of them are thickly covered with fine gray or yellowish hairs which often conceal the body surface. These hairs rub off readily or become matted when wet and specimens may be badly disfigured if not carefully handled when collected. Pollen is carried chiefly on the femora instead of tibiae and the long curl of fine hairs is similar to that of *Andrena*.

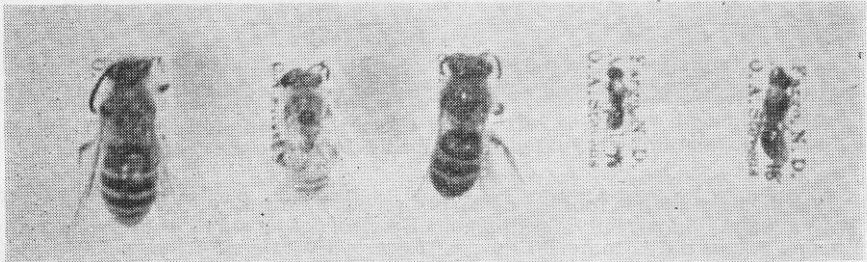


Fig. 1. Silk and Masked Bees, about twice natural size. Left to right: *Colletes inaequalis*, *C. susannae*, *C. kincaidii*, *Hylaeus pygmaeus*, *H. ziziae*. Photo by Don Nelson.

The species are fairly numerous and widely distributed but usually are far less common locally than those of many other genera. They are found in nearly all parts of the world except in Australia where many species of related genera are found. Rayment (6) has vividly portrayed the life histories of many of these and other Australian bees. Timberlake, in a recent paper (8) reported 27 species of *Colletes* for Colorado, about 16 for Nebraska and estimated 35 to 40 for California. I have been especially fortunate in having him identify my entire collection of over 400 specimens collected from 1907 to 1949 inclusive. Many species are much alike in appearance and identification is particularly difficult.

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Because of their short tongues these bees are able to visit only small or open flowers. *Colletes inaequalis* is an early spring species which visits willow, plum and other flowers. It is an important pollinator for early fruit trees. All of our other species appear much later and visit various composites and prairie-clover, also larger open flowers such as bluebell and ground cherry. Friese (3) listed only 9 species for central Europe, which included one early species much like our *inaequalis*. Nests consist of a single straight tunnel a few inches long in sandy ground. Species of *Epeolus* are parasitic in the *Colletes* nests.

From a review of the present records it appears that at a few times a considerable number of specimens were taken, often of two or three species at one kind of flower. In the greater number of cases only one or two specimens were taken along with 25 to 50 of other bees. The 1949 collection totaled only a dozen or so specimens of four species but three of these species had not been taken before.

1. *Colletes inaequalis* Say. Length 13 mm. ($\frac{1}{2}$ in.); black; head and thorax densely covered with long, fine, gray hairs, some black ones intermixed on thorax; abdomen with prominent bands on apical third of segments. The abdominal bands are composed of white hairs lying flat against the surface. The basal two-thirds of the segment (except the first, which has many long hairs), seems smooth, but when viewed under magnification in proper light, is finely and evenly punctured and covered with short gray hairs (some black toward tip of abdomen).

This is our largest species and the first to be described from North America in 1834. It is common through eastern U. S., but North Dakota seems about its northwestern limit. I found it common at willow in the sandhill area near Sheldon on Apr. 27, 1934, and have a number of specimens from Fargo, Apr. 10--May 11; two from Muskoda, Minn., Apr. 3, 1910.

2. *Colletes robertsonii* D. T. Size of *inaequalis*; black with inconspicuous, short, gray hairs, those on abdominal segments forming prominent but narrow bands; collar with a rather prominent spine projecting at each side; thorax and abdomen coarsely and closely punctured, no black hairs on thorax. One specimen, Valley City, Aug. 13, 1912, at prairie-clover (*Petalostemum purpureum*).
3. *Colletes nudus* Rob. Very similar to *robertsonii* but with many black hairs mixed with short gray ones on the thorax. One male and one female, Fargo, June 30 at flowers of sumac (*Rhus glabra*).
4. *Colletes brevicornis* Rob. Length 9 mm.; closely but not coarsely punctured, dull rather than shining; hairs short and few, the abdominal segments with a transverse groove just in front of hind edge, weakly banded; collar with only a short point. This is a characteristic visitor to bluebell (*Campanula*

rotundifolia). Taken at Fargo, Aneta, Cavalier, Devils Lake, Rugby, Granville, Minot, Valley City, Mandan, Glen Ullin and Marmarth, June 29—July 30. One male was taken at german-der (*Teucrium occidentale*) and another at red mallow (*Sphaeralcea coccinea*.)

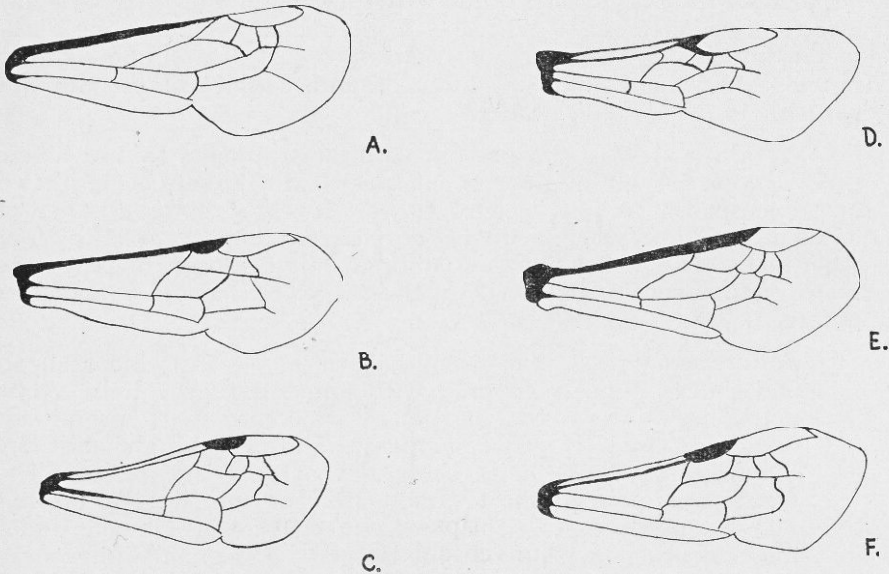


Fig. 2. Forewings of various bees. A, *Anthophora*; B, *Hylaeus*; C, *Ceratina*; D, *Melissodes*; E, *Nomada*; F, *Colletes*. Drawn by Thomas Swinland.

5. *Colletes latitarsis* Rob. Similar to *brevicornis* but collar with well developed spines and first joint of hind foot unusually wide. One female, Fargo, Sept. 5, 1912, at cultivated ground cherry (*Physalis ixocarpa*).
6. *Colletes willistoni* Rob. Similar to *brevicornis*. Two specimens from Fargo, a female Sept. 8, 1912, at *Physalis ixocarpa* and a male July 26, 1920 at *P. virginiana*. Swenk (7) stated that this species is most easily recognized by the striated, weakly punctured clypeus and that it is found from Washington, D. C. to Nebraska and Texas, but apparently not common. Timberlake (8) recorded it from Colorado and Utah.
7. *Colletes simulans* Cress. Length 10 mm.; thorax very coarsely punctured and with many black hairs; abdomen shining, finely punctured, bands well developed; collar with long spines nearly reaching the tips of the hairs. Ten specimens, Fargo, Sheldon, Medora, Jamestown, Lakota, Minot and Williston, Aug. 10—Sept. 12, were referred to the typical form. Eight specimens, Fargo, Breien, Minot, Schafer, also Detroit Lakes, Minn., July 31—Sept. 6, are subspecies *armatus* Patton. It visits gumweed, goldenrod, sunflower, also recorded from *Cleome*, *Eriogonum* and prairie-clover.

8. *Colletes tegularis* Swenk. Three males from Medora, Aug. 20, 1914, at goldenrod (*S. canadensis* and *rigida*) were placed here with some question. They are quite gray with prominent abdominal bands. It is a western species which Swenk (7) stated to be related to *armatus*.
9. *Colletes vicinalis* Graen. Length 9 mm.; not very hairy; thorax moderately coarsely punctured and with some black hairs, collar with short points; abdomen not punctured, the first segment especially smooth and shining, bands moderate. Two specimens, Fargo, June 25 at sweet clover (*M. officinalis*.)
10. *Colletes andrewsi* Ckll. Length 13 mm.; black with rather scanty gray hairs; face nearly square (narrower below in most species); thorax and abdomen closely punctured, abdomen with narrow hair bands which tend to be interrupted in the middle. One female, Garrison, June 29, 1949, at flowers of *Heuchera richardsoni*. This species was first described from Colorado in 1906. Timberlake in 1943 recorded only two other specimens from Nebraska, all three taken at *Heuchera* flowers. My specimen has most of the hairs of the top of the thorax rubbed off but they are said to be yellowish or red.
11. *Colletes rufocinctus* Ckll. Length 10 mm.; thorax with yellowish and some black hairs, closely punctured but with a large, central, polished area; abdomen black with well defined white bands on tips of segments and one on base of second segment, surface shining and finely punctured. Many localities, mostly in August. Gumweed (*Grindelia squarrosa*) seems to be the favorite flower with goldenrods (*Solidago canadensis* and *rigida*) second; other flowers visited were: aster (*Aster ericoides* and *paniculatus*), sunflower (*Helianthus petiolaris*), broomweed (*Gutierrezia sarothrae*), prairie-clover (*Petalostemum oligophyllum*) and coneflower (*Ratibida columnifera*). The earliest date is August 7 and there is a late one of October 18 at dandelion.

This proves to be the commonest North Dakota species, the present collection containing 60 female and 75 male specimens. It was first described from Colorado in 1929 and in 1943 Timberlake (8) had seen only three males from Colorado, Wyoming and Arizona.

12. *Colletes kincaidii* Ckll. This looks much like *rufocinctus* but the thorax has no black hairs and the abdomen is more coarsely and closely punctured. Many specimens from Fargo and from other localities, June 30—Aug. 24, at flowers of false anise (*Agastache anethiodora*), wild onion (*Allium stellatum*), leadplant (*Amorpha canescens*), dogbane (*Apocynum androsaemifolium*), virgin's bower (*Clematis virginiana*), bee plant (*Cleome* sp.), blue lettuce (*Lactuca pulchella*), sweet clover (*Melilotus alba*), prairie-clover (*Petalostemum oligophyllum* and *purpureum*), sumac (*Rhus glabra*), tumbling mustard (*Sisymbrium altissimum*), goldenrod (*S. canadensis*), wolfberry (*Symphoricarpos occidentalis*) and dandelion (*Taraxacum* of-

- ficinale*). Prairie-clover was most often represented, otherwise the flowers are of a great variety as compared to the almost restricted visits of *Colletes rufocinctus* to composites.
13. *Colletes phaceliae* Skil. Similar to *kincaidii* but abdominal segments more fully covered with gray hairs. Two records for Fargo, a few others eastern, but chiefly from the western part of the state; mostly July, Aug., one June 2 and one Sept. 17. The flower records are varied as for *kincaidii*: leadplant, milkvetch (*Astragalus tenellus*), aster, *Eriogonum annuum*, western wallflower (*Erysimum asperum*), gumweed, broomweed, wild flax (*Linum lewisii*), alfalfa (*Medicago sativa* and *falcata*), sweet clover, prairie-clover, tumbling mustard (*Sisymbrium altissimum*), red mallow (*Sphaeralcea coccinea*), goldenrod (*S. rigida*), wolfberry, and tamarix (*T. pentandra*—cult.). These seem to show a distinct preference for legumes and mustards.
 14. *Colletes hyalinus* Prov. Length 7—8 mm.; similar to *phaceliae* but a blacker appearing bee, the abdominal bands very narrow and surface shining with fine scattered punctures. About 15 specimens from Fargo and northern part of State, west to Granville, July 8—Sept. 15, at aster, gumweed, snakeroot (*Sanicula marylandica*), goldenrod and wolfberry.
 15. *Colletes lutzi* Timb. Similar to *hyalinus*. Five males, Logging Camp Ranch, Slope Co., July 2, 1949 at tumbling mustard. This was described in 1943 from Colorado.
 16. *Colletes americanus* Cress. Similar to *hyalinus*, hairs of abdomen quite long, especially on first segment; front coxae with blunt spines. Three females from Fargo, one male from Sheldon, Aug. 21—Sept. 15, at aster (*A. ericoides*) and gumweed.
 17. *Colletes petalostemonis* Swenk. Length 7 mm.; closely covered with short, white hairs; clypeus brownish, smooth with few punctures. One female, Washburn, July 23, 1926, at prairie-clover (*P. oligophyllum*) along with several of *susannae*, *wilmattae* and *kincaidii*. A small white species, resembling *phaceliae* but quite distinctive in the clypeal marking.
 18. *Colletes albescens*, Cress. A female and two males from Kindred, July 4, at leadplant, were referred here. The female, 9 mm. long, has prominent white abdominal bands nearly as wide as the contrasting black bases of the segments. The thorax is strongly punctured, first segment of abdomen shining, covered with long hairs, the black portion of the others very finely punctured.
 19. *Colletes susannae* Swenk. Length 10 mm.; closely covered with white hairs; thorax dull, closely punctured with moderate sized punctures; abdomen except at base, completely covered with close lying hairs, these more dense to form indistinct bands on apical half of segments; wing veins pale. Many females, Washburn, July 22, 1926 at prairie-clover (*P. oligophyllum*); also St. Cloud, Minn., Aug. 8, 1925 at *P. purpureum*. One male at Marmarth, July 4, at sunflower (*H. petiolaris*).

20. *Colletes aberrans* Ckll. Length 11 mm.; similar to *susannae* but hairs yellowish and very short on thorax; abdomen distinctly banded, the hairs very short and sparse on basal half of segments; wing veins dark; legs dark. Five females, Sheldon and Amidon, Aug. 2—11 at prairie-clover (*P. oligophyllum* and *villosum*).
21. *Colletes wilmattae* Ckll. Like *susannae* but distinctly greenish yellow, abdomen about uniformly hairy, legs and abdomen reddish brown. Six females, Washburn and St. Cloud, Minn., July 22—Aug. 21, at prairie-clover (*P. candidum* and *oligophyllum*).
22. *Colletes solidaginis* Swenk. Length 10 mm.; densely covered with moderately long yellow hairs on thorax and flat ones on abdomen. It is more deeply colored than *wilmattae* and hairs of thorax longer. One female, Muskoda, Minn., Aug. 7, 1949, at *Solidago missouriensis*.

MASKED BEES *Hylaeus*

These are small black bees with very few, inconspicuous hairs. The females usually have two narrow stripes on the face (fig. 4B). The males have much of the face yellow and this is what caused them to be called "masked bees". These markings are the most available distinguishing characters for the different species, but there is considerable variation and there has been much difficulty in determining species. The females have little variation in face markings so that they must be identified by other characters and this has been especially difficult.

The genus is often known as *Prosopis*, a name also used for a well known genus of plants. The present tendency seems to be to use *Hylaeus*. The species are fairly numerous and occur in most parts of the world. Metz (4) recognized only 20 in North America but at least twice as many are recognized by other writers. Related forms are especially numerous in Australia. The mouth parts are

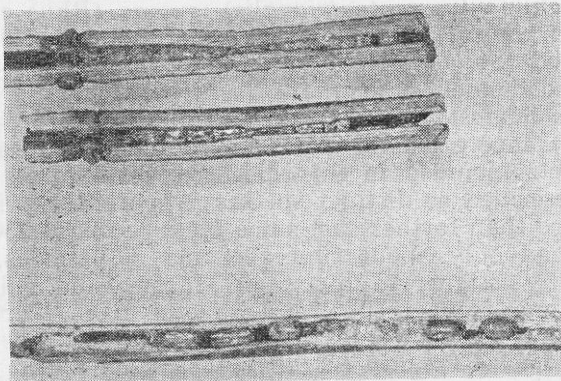


Fig. 3. Nests of twig-nesting bees. Upper (twig split), *Hylaeus pygmaeus*; lower (side cut away), *Hoplitis producta*.

very short and simple in structure, more nearly like those of wasps than most bees. The tongue is very short, broad and two-lobed at the tip instead of pointed. The females do not collect pollen on the legs or body but swallow it and regurgitate pollen and honey to feed the young. Nests are located in hollow twigs or weed stems.

Rau (5) reported that *modestus* nested in sumac twigs, never more than 3 inches deep. Figure 3 shows a twig of wolfberry (*Symphoricarpos occidentalis*) sent me by Dr. J. F. Brenckle from Kulm, N. D. Specimens of *pygmaeus* were reared from this twig. Rayment (6) found a large Australian species boring into adobe bricks or using old holes, another working in old stems of rush (*Juncus*). The cells can be distinguished from those of other twig nesters by the thin, transparent lining, with which the female coats the chamber.

1. *Hylaeus ziziae* (Rob.) Length 6 mm.; prominent yellow spots on collar and shoulders; face marks of female much wider in middle (fig. 4B), those of male about equal width throughout their upward extensions or somewhat wider at top (fig. 4A). This is one of our larger and commoner species. Metz stated that he examined about 60 specimens and recorded 8 kinds of flowers visited. The present collection contained about 200, chiefly from North Dakota. The most western localities are Mandan and Kenmare; dates May 31—Aug. 20. Meadow parsnip (*Zizia aurea*) was the favorite flower, but many were taken on sweet clover (*Melilotus alba*) and others on catsfoot (*Antennaria* sp.), false anise (*Agastache anethiodora*), dogbane (*Apocynum androsaemifolium*), milkweed (*Asclepias verticillata*), *Boltonia latisquama*, knapweed (*Centaurea jacea*), *Cleome serrulata*, fleabane (*Erigeron philadelphicus*), strawberry (*Fragaria virginiana*), *Gerardia tenuifolia*, gumweed (*Grindelia squarrosa*), blue lettuce (*Lactuca pulchella*), prairie-clover (*Petalostemum candidum* and *purpureum*), obedient plant (*Physostegia parviflora*), cinquefoil (*Potentilla arguta* and *norvegica*), *Polytaenia nuttallii*—in Kansas, buttercup (*Ranunculus septentrionalis*), sumac (*Rhus glabra*), rose (*Rosa arkansana* and *blanda*), water parsnip (*Sium suave*), goldenrod (*Solidago rigida* and *gigantea*), tamarix (*T. pentandra*) and dandelion (*Taraxacum officinale*).
2. *Hylaeus modesta* (Say). Very similar to *ziziae*; upper ends of yellow face marks of male sloping outward to a point (fig. 4F). Metz included in this species several forms which had been described as distinct species. Apparently it is less common here than farther east since Metz recorded 250 specimens and I had only about 50 males and 30 females, the latter doubtfully assigned to this species. Most of the males are from Fargo, one from Lisbon and several from Turtle Mts. It seems more restricted to wooded areas than *zizae*, *pygmaeus* and *stevensi*. *Clematis* (*C. virginiana*), honewort (*Cryptotaenia canadense*), snakeroot (*Sanicula marylandica*) and raspberry (*Rubus idaeus*) are among the flower records of males.

3. *Hylaeus pygmaeus* (Rob.) Length 3—5 mm.; lateral extensions of face marks of male narrow, somewhat wider at top, not touching the eyes (fig. 4E).

This is the most common and most widely distributed North American species. Dates are May 30—Sept. 22 and flower records additional to those listed above: wild onion (*Allium stellatum*), aster (*A. multiflorus*, *paniculatus* and *sagittifolius*), mustard (*Brassica nigra*), dodder (*Cuscuta gronovii*), boneset (*Eupatorium perfoliatum*), cow parsnip (*Heraclium lanatum*), waterleaf (*Hydrophyllum virginianum*), sweet cicely (*Osmorrhiza longistylis*), tumbling mustard (*Sisymbrium altissimum*), sow thistle (*Sonchus arvensis*) and vervain (*Verbena urticifolia*). This bee has often been listed as *cressoni* Ckll.

4. *Hylaeus rudbeckiae* (Ckll. & Casad.) About 25 males were doubtfully separated from the numerous specimens of *pygmaeus*. They differ in having the lateral face marks still narrower and well separated from the eyes at the very base. The females cannot well be separated from those of *pygmaeus* and all are included in the above records of that species.
5. *Hylaeus grossicornis* (Sw. & Ckll.). Some 20 specimens are referred to this species. It is the size of *pygmaeus* or smaller; lateral face marks of male sharp pointed, not extending above central spot. These were taken along with *pygmaeus* and the females are not definitely recognized.

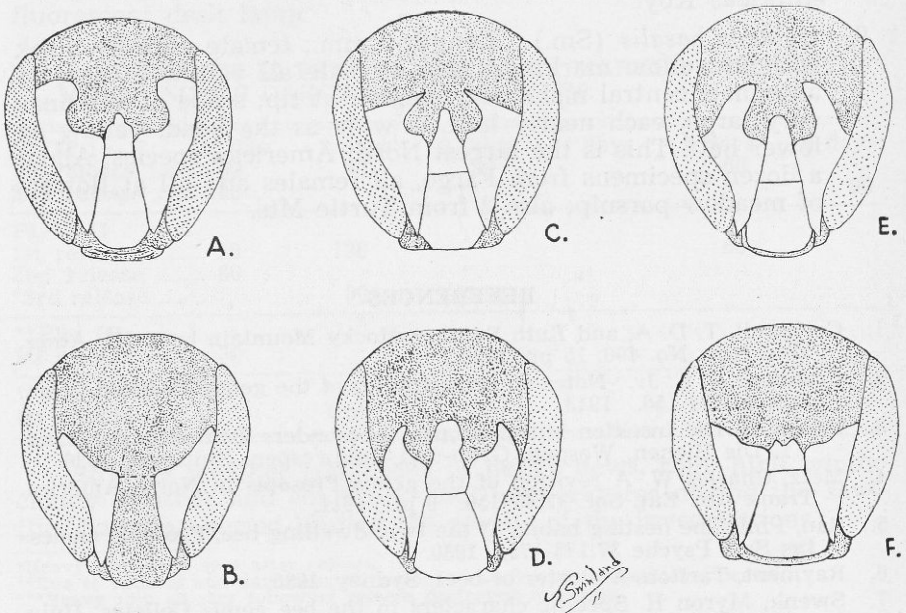


Fig. 4. Face markings of Masked Bees. A, *Hylaeus ziziae*, male; B, same, female; C, *H. varifrons*, male; D, *H. verticalis*, male; E, *H. pygmaeus*, male; F, *H. modestus*, male. Drawn by Thomas Swinland.

6. *Hylaeus stevensi* (Cwfd.) Length 4—5 mm.; thorax coarsely punctured; light markings much as in *ziziae* but nearly white instead of deep yellow; lateral face marks angular at tip. This is a distinctive species, easily recognized by the nearly white markings. It was originally described (2) in 1913 from 4 specimens taken at Fargo. Later I secured many specimens from Barney, Enderlin, Breien, Bismarck, Carpio, Washburn and Minot, May 31—Sept. 24. I took it also at St. Cloud, Minn., Aberdeen, S. D. and Blue Rapids, Kans. My sister, Edna M. Stevens, caught it at Denver, Colo., the first record for that state. Cockerell and Sumner (1) reported it from Colorado, Idaho, Utah and Wyoming. Crawford found that it is more closely related to *pygmaeus* than to *modestus*.
7. *Hylaeus verticalis* (Cress.). Length 7 mm.; abdomen strongly punctured; yellow mark between bases of antennae unusually long, lateral marks narrowed to a point and curved inward (fig. 4D). This rather large species was taken only at Fargo, Lisbon and Moorhead, Minn., about 30 specimens.
8. *Hylaeus varifrons* (Cress.). Length 5—6 mm., lateral face marks of male broad, completely filling space between eyes and antennae, slightly sloping upwards and curving around base of antennae (fig. 4C); scape (1st segment of antennae) broad, partly yellow. About 25 specimens from Fargo, Lisbon, Valley City, Kulm, Moorhead, Minn., and Detroit Lakes, Minn. Cockerell and Sumner state that this is the same as *H. ellipticus* Kby.
9. *Hylaeus basalis* (Sm.). Length 9 mm.; female entirely black without yellow markings; face of male all yellow to base of antennae, central mark very slender at tip; scape of antennae very large, each nearly half as wide as the head, yellow on lower half. This is the largest North American species. About a dozen specimens from Fargo, all females and all at flowers of meadow parsnip; also 2 from Turtle Mts.

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