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British museum (Nat. hist.) Dept. of zoology

CATALOGUE

OF

BRITISH HYMENOPTERA

IN THE

BRITISH MUSEUM.

SECOND EDITION.

PART I.—ANDRENIDÆ AND APIDÆ.



LONDON:

PRINTED BY ORDER OF THE TRUSTEES.

1876.





*insects*

*112*

CATALOGUE

OF THE

BRITISH BEES

IN THE

COLLECTION

OF THE

BRITISH MUSEUM.

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BY

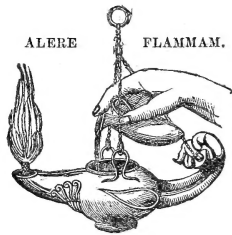
FREDERICK SMITH,

ASSISTANT KEEPER OF THE DEPARTMENT OF ZOOLOGY.

LONDON :

PRINTED BY ORDER OF THE TRUSTEES.

1876.



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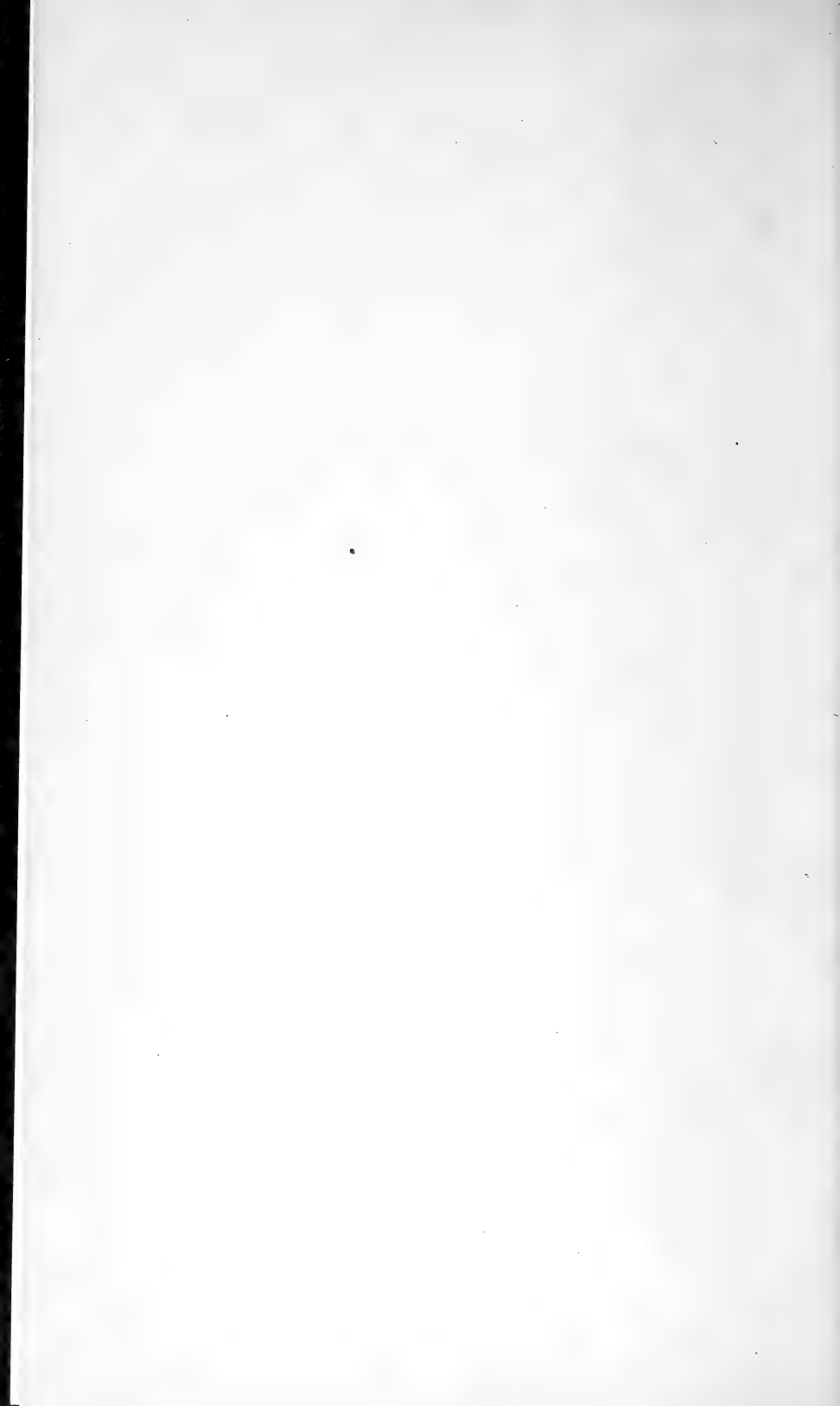
## PREFACE.

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THE First Part of the 'Catalogue of British Hymenoptera,' prepared by Mr. Frederick Smith, and published by order of the Trustees in the year 1855, contained an account of all the species of British Bees then known, with notes on their distribution and habits. Since that time the interest felt for the insects of this family has continued, and consequently many important additions to our knowledge of the species and their economy have been made, so that the issue of a second edition of this part in the form of a separate volume seems to be fully justified.

ALBERT GÜNTHER,  
*Keeper of the Department of Zoology.*

British Museum,  
Dec. 1876.



## INTRODUCTION.

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THE total number of British species of Bees known at present is 211, which number only slightly exceeds that contained in the first edition of this work, some of the forms therein enumerated as distinct species having proved to have been founded on sexual characters. Ten species are entirely new additions to this part of the British fauna, whilst two, formerly believed to be British, have been omitted (*Sphcodes fuscipennis* and *Andrena kirbyi*). Other errors have been corrected and the synonyms carefully revised. All the types of Kirby's Monograph have been reexamined, and the species contained in the Stephensian, Curtisian, Linnean, and Banksian collections have been again referred to.

Whenever practicable, the descriptions have been prepared from specimens in the finest possible condition; and, in accordance with the former edition, French measurement has been used. When both sexes have been described as distinct species by an author in the same work, the specific name given to the male has in every instance been adopted.

The letters B.M. indicate that the species is represented in the collection of the British Museum.

FREDERICK SMITH.

British Museum.  
Nov. 1876.



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# CATALOGUE

OF THE

## BEES OF GREAT BRITAIN.

---

### Tribe ANTHOPHILA, Latr.

Consisting of two sexes in the solitary species, males and females, to which in the social ones, or dwellers in community, another is added called a neuter, worker, or abortive female. The females and workers (excepting in the case of the parasitic bees, and the queen or fertile female of honey-bees) furnished with apparatus for conveying pollen, and armed with a sting; having antennæ, twelve-jointed in the females and workers, and thirteen-jointed in the males; the females and workers having six segments in the abdomen, that of the males consisting of seven; all possessing four variously veined wings; two ovate compound eyes, placed laterally on the head, and three simple eyes, or ocelli, in a curve or triangle on the vertex; the tongue obtuse, lanceolate, or elongate and filiform; all, in the larva state, feeding on a mixture of pollen and honey, or on pure honey only, stored up by the parent. The parasitic bees in the larva state consuming the provisions stored up by the industrious bee for its own offspring.

## Division I. SOLITARIÆ.

## Fam. 1. ANDRENIDÆ.

This family is divided into two subfamilies, *Obtusilingues* and *Acutilingues* of Westwood. The first two genera only belong to the first division, in which the tongue resembles that of a wasp, being obtuse at the apex and more or less emarginate. The species belonging to the second division have the tongue lanceolate, acute at the apex.

## Subfam. I. OBTUSILINGUES, Westw.

## Genus 1. COLLETES, Latr.

- Apis* (pt.), *Linn. Syst. Nat.* i. 953 (1766).  
*Andrena* (pt.), *Fabr. Ent. Syst.* 307 (1793).  
*Megilla* (pt.), *Fabr. Syst. Piez.* 328 (1804).  
*Melitta* (pt.), *Kirby, Mon. Apum Angl.* i. 130 (1802).  
*Colletes*, *Latr. Hist. Nat. des Crust. et Ins.* iii. 372 (1802).  
*Evodia*, *Panz. Krit. Revis.* 207 (1806).

Head subtriangular, *ocelli* in a slight curve on the vertex; *antennæ* geniculated, filiform; *tongue* obtuse and slightly emarginate at the apex; the *paraglossæ* more than half the length of the tongue; the *labial palpi* 4-jointed, nearly equal and subclavate; the *maxillary palpi* 6-jointed and subequal; wings with one marginal and three submarginal cells.

The economy of the species that compose the present genus has been frequently quoted from Réaumur's interesting account, who observed them constructing their burrows in the interstices of stone walls that were filled with some soft kind of mortar. In this country they usually burrow into hard sand-banks. *Colletes daviesana* sometimes forms extensive colonies in such situations. Their burrows are from 8 to 10 inches in length; they line them at the end where the cells are constructed with layers of a colourless, delicate, semitransparent membrane that somewhat resembles gold-beater's skin. The cells are usually from five to eight in number; they are thimble-shaped, but rather more oblong. The insect having stored up a sufficient supply of pollen and honey to feed a single larva, then deposits an egg thereon, and closes the cell with similar membrane to that with which she lines the end of the tube. The other cells are similarly constructed. There is little doubt that the same bee constructs more than one of these tunnels, as no trace of lateral ones are ever observed running out of the main one, as is the case in many other species of solitary bees belonging to the genera *Halictus* and *Andrena*.

*Colletes* is subject to the attack of parasites; one, *Miltogramma*

*punctata*, feeds upon the larvæ. This Dipterous insect is very numerous in some colonies of these bees, and must greatly reduce their numbers; another parasite is a species of cuckoo-bee, *Epeolus variegatus*, whose larvæ feed upon the food stored up by the *Colletes* for her own offspring. Probably the destruction of the food, as well as of the larvæ, is greatest by the omnivorous insect *Forficula*; these I have found in the burrows in considerable numbers; and in some colonies I suspect more than half of the brood is devoured by these destructive insects.

### 1. *Colletes succincta*.

*C. nigra*, albido villosa, thorace fulvo; abdomine ovato, segmentis margine albis.

*Colletes succincta*, *Smith, Zool.* iv. 1276; *Bees Great Brit.* 3 ♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 206.

*Schenck, Nass. Bien.* 300.

*Thoms. Opus. Ent.* 14; *Hym. Scand.* ii. 163.

*Apis succincta*, *Linn. Syst. Nat.* i. 955.

*Christ. Hym.* 185, tab. 15. fig. 7.

*Melitta succincta*, *Kirby, Mon. Apum Angl.* ii. 32 ♂ ♀.

*Apis calendarum*, *Panz. Faun. Germ.* 83. 19 ♂.

*Megilla calendarum*, *Fabr. Syst. Piez.* 335.

*Spin. Ins. Ligur.* ii. 197.

*Colletes fodiens*, *Curtis, Brit. Ent.* ii. 85. fig. 85.

*St.-Farg. Hym.* ii. 298.

*Female.* Length  $5-5\frac{1}{2}$  lines.—Black; the clypeus roughly punctured, the punctures uniting and forming striæ at its apex; the vertex and the thorax above clothed with fulvous pubescence; beneath it is griseous; the pubescence on the tibiæ and tarsi pale fulvous, the claws ferruginous, the calcaria rufo-testaceous; the wings hyaline, their nervures and the tegula ferruginous. Abdomen shining, closely and finely punctured, the punctures strongest on the basal segment; its apical margin rufo-piceous, and with a little pale fulvous pubescence at its base; the apical margin of all the segments with a fascia of pale pubescence, usually widely interrupted on the basal segment.

*Male.* Length  $3\frac{1}{2}-4\frac{1}{2}$  lines.—Black; the face densely clothed with pale fulvous pubescence; on the vertex and thorax above it is fulvous; on the cheeks, thorax beneath, and on the legs it is griseous; the antennæ about the length of the thorax. Abdomen elongate-ovate, closely and more strongly punctured than in the female; the apical margins of the segments with pale pubescent fasciæ; beneath, the segments have a fringe of white pubescence.

This species is generally distributed, and frequently found on the heath on open commons during July and August.

2. *Colletes fodiens*.

*C. nigra*, albido villosa, thorace fulvescente; abdomine punctulatisimo, segmentis margine pallide fulvescente.

*Colletes fodiens*, *Smith*, *Zool.* iv. 1277; *Bees Great Brit.* 4 ♂ ♀.

*Lucas*, *Expl. Sc. Algér.* iii. 182.

*Nyland.* *Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 206.

*Schenck*, *Nass. Bien.* 299.

*Melitta fodiens*, *Kirby*, *Mon. Apum Angl.* ii. 34, tab. 15. fig. 1 ♀, 2 ♂.

*Female.* Length 4–4½ lines.—Black; the face with griseous pubescence, that on the vertex and thorax above fulvous; the cheeks, thorax beneath, and the legs with whitish pubescence; wings hyaline, the nervures dark fuscous. Abdomen fuscous, subopaque, and very closely punctured, the basal segment most strongly so, its apical margin usually more or less rufo-piceous; the apical margins of the segments with fasciæ of pale ochraceous pubescence; the ventral segments fringed with white pubescence. B.M.

*Male.* Length 3½–4 lines.—Head and thorax black; the face densely clothed with pale fulvous pubescence; that on the thorax above ochraceous or pale fulvous; the cheeks, thorax beneath, and the legs with white pubescence. Abdomen fuscous, closely and rather strongly punctured; the apical margins of the segments with fasciæ of pale pubescence, which is longer and less even than in the other sex; the pubescence on the abdomen, between the fasciæ, is fuscous. B.M.

This insect appears in July or beginning of August; it frequents the ragwort (*Senecio jacobæa*) and also the tansy (*Tanacetum vulgare*). The species that most resembles it is *C. fasciata*. The latter is uniformly a much smaller insect; and the apical segment of the abdomen is not depressed at the sides as in *C. fodiens*. The species is generally distributed, and it has been taken in all parts of the United Kingdom.

3. *Colletes marginata*.

*C. nigra*, thorace pallide fulvescente, abdomine segmentis margine flavido-cinerascentibus.

*Colletes marginata*, *Smith*, *Zool.* iv. 1277 ♂ ♀; *Bees Great Brit.* 5 ♂ ♀.

*Schenck*, *Nass. Bien.* 300.

*Thoms.* *Opusc. Ent.* 314; *Hym. Scand.* ii. 165.

*Apis marginata*, *Linn. MS.*, type in *Cab. Mus. Linn. Soc.* ♂.

*Colletes succincta*, *Nyland.* *Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 206.

*Female.* Length 3¾–4 lines.—Black; the clypeus strongly punctured; the face densely clothed with pale fulvous pubescence. Thorax: the disk with fulvo-ochraceous pubescence; on the sides, beneath,

and on the legs it is much paler. Abdomen slightly shining, finely punctured, more strongly so on the basal segment, which, at its base, has some pale fulvous pubescence; the apical margins of the segments with fasciæ of pale fulvous pubescence. B.M.

*Male.* Length 3 lines.—Black; the face densely clothed with pale ochraceous pubescence, that on the clypeus and cheeks is nearly white. Thorax as in the female; the abdomen strongly punctured; the apical margins of the segments with pale pubescent fasciæ; the basal segment most strongly punctured; the ventral segments fringed with white pubescence. B.M.

This is the smallest species of the genus found in this country. I found it in plenty at Littlehampton at the beginning of July 1875; it frequented the yarrow (*Achillea millefolium*): it has also been found in Yorkshire and Cumberland. It was first discovered by Mr. Samuel Stevens in the same locality at which I took it in 1875; it is, however, very local. I found *Epeolus variegatus* in company with it, but do not know if it is parasitic on it. *Megachile argentata* was common at the time, and it is certainly parasitic on that insect.

#### 4. *Colletes daviesana*.

*C. nigra*, pallido villosula; abdomine lævi, nitidissimo, punctis minutis sparsioribus.

*Colletes daviesana*, *Smith, Zool. iv. 1278; Bees Great Brit. 6.*

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.*

*Thoms. Opusc. Ent. 315; Hym. Scand. ii. 164.*

*Female.* Length  $4\frac{1}{2}$ –5 lines.—Black; the clypeus covered with cinereous pubescence, becoming gradually fulvous to the vertex; the thorax punctured, with the disk nearly impunctate, thinly clothed with fulvo-ochraceous pubescence, on the sides it is paler, that beneath and on the legs being white; the wings hyaline, their nervures fusco-testaceous. Abdomen smooth and shining, finely punctured, most distantly so on the basal segment; the apical margins of the segments with a fascia of pale ochraceous pubescence, usually sparing on the basal segment. B.M.

*Male.* Length  $3\frac{1}{2}$ –4 lines.—The pubescence on the head and thorax similar to that of the female; the flagellum of the antennæ obscurely piceous beneath. Abdomen oblong-ovate and shining, the margins of the segments slightly constricted; rather more strongly punctured than in the female; the segments with similar fasciæ; beneath, the fasciæ curve upwards from the lateral margins to the middle of each segment, but do not meet in the centre. B.M.

This is the most abundant species of the genus in the south of England. Extensive colonies are not unfrequent. Mr. G. C. Champion found one near Farnham in a hard sand-bank which contained thousands of their burrows, in and about which he detected numbers of *Cryptophagus populi*. Many were obtained by striking

the bank, when they issued from the holes burrowed by the *Colletes*. They had doubtless fed upon the store laid up for the larvæ of the bees. I have found other species of *Cryptophagus*, as well as of *Antherophagus*, in nests of *Bombus muscorum*, *senilis*, &c. This *Colletes* is frequently found on the flowers of the wild tansy (*Tanacetum vulgare*), as well as on the ragwort. Its parasite is *Èpeolus variegatus*, also *Chrysis ignita*. It appears at the beginning of August.

### 5. *Colletes cunicularia*.

*C. nigra*, fusco-ferrugineo pubescens, abdomine vix griseo-fasciato.

*Colletes cunicularia*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 207 ♂ ♀.

*Schenck, Nass. Bien.* 161.

*Smith, Ent. Month. Mag.* v. 276 (1868-9); *Ent. Ann.* (1870), p. 21.

*Thoms. Opusc. Ent.* 314; *Hym. Scand.* ii. 161.

*Apis cunicularia*, *Linn. Syst. Nat.* i. 957 ♀.

*Schrank, Ins. Austr.* 402.

*Colletes hirta*, *St.-Farg. Hym.* ii. 296.

*Lucas, Expl. Sc. Algér.* iii. 182.

*Female.* Length 6 lines.—Black; densely pubescent, that on the face and cheeks griseous; the legs have fuscous pubescence above and griseous beneath; wings subhyaline, the nervures black. Abdomen ovate, with the apex acute, much less pubescent than the thorax, and convex; the apical margins of the segments fringed laterally with griseous pubescence; on the basal segment it is long and rufo-fuscous, and short and blackish on the other segments. B.M.

*Male.* Length 5-5½ lines.—Closely resembles the female, but is more slender; the face with long, dense, white pubescence. B.M.

In 1869 the discovery of this species in England was announced in the 'Entomologist's Monthly Magazine,' where it was stated that the insect had been taken in the Isle of Wight by Mr. Isaac Cooke. This has been subsequently discovered to be incorrect, the mistake having been occasioned by some specimens being placed in the box that contained the Isle-of-Wight captures. The *Colletes* was first discovered by Mr. Nicholas Cooke on sand-hills near Liverpool. Subsequent to 1869 a number of the living bees were forwarded to me. These were set at liberty on Shirley Common, in the hope of establishing a colony. The year following, and again in 1876, specimens were taken in the same locality.

### Genus 2. *PROSOPIS*, Fabr.

*Apis* (pt.), *Linn. Syst. Nat.* i. 953 (1766).

*Hylæus* (pt.), *Fabr. Ent. Syst.* ii. 302 (1793).

*SpheX* (pt.), *Panz. Faun. Germ.* fasc. 53. 1.



Melitta (pt.), *Kirby, Mon. Ap. Angl.* 134\*b (1802).  
Prosopis (pt.), *Fabr. Syst. Piez.* p. 293 (1804).

Head subtriangular, flattish, as wide as the thorax; the *stemma* in a triangle on the vertex; the tongue subemarginate at the apex; the *maxillary palpi* 6-jointed, the *labial palpi* 4-jointed; the *superior wings* having one marginal and two submarginal cells, the second submarginal cell slightly restricted towards the marginal, the first recurrent nervure received at the apex of the first submarginal cell, the second at the apex of the second.

The bees of which the present genus is composed, being destitute of the usual apparatus for collecting pollen, were long regarded as belonging to the family of parasites. Some years ago two of the species were bred from bramble-sticks, the larvæ having been exposed and found to be arranged in the same regular order as in the acknowledged industrious or working species. This observation was made by Mr. Thwaites in 1841. Since that time I have repeatedly bred them from a similar nidus. But all doubt of their habits has been removed by the observations of Sir Sidney S. Saunders, who has bred an Albanian species in great profusion. They construct their cells in bramble-sticks, which they line, in the same manner as *Colletes*, with a thin transparent membrane, calculated for holding semiliquid honey, which they store up for their young. The Albanian species were usually much infested by a *Stylops*. I had a very interesting nest of one of these bees given to me. The bee was observed to have chosen a hollow piece of flint stone, on breaking which a number of the silken cocoons were found, some containing perfect bees when received. Mr. Walcott had in his collection two specimens of *Prosopis communis* which had apparently been attacked by a species of *Stylops*. The fact has not been previously observed in this country; but in the 'Transactions of the Entomological Society,' vol. i. new ser. p. 58, will be found an interesting account of a species of *Stylops* which attacks *Prosopis rubicola*, found by Sir Sidney S. Saunders in Albania.

The geographical distribution of the genus *Prosopis* is of wide extent, the species being found both in the Old and New World, and well represented in Australia. The British species make their appearance in the month of June, and continue to be found during the two following months in different parts of the kingdom. The most common habit of these bees is to perforate the pith of dead bramble-sticks; but I have found them occupying holes in a brick wall. They line their burrows with a delicate transparent membrane, after the manner of *Colletes*. The cells are provisioned with semiliquid honey; but *P. hyalinata* is said to form small pellets of honey and pollen, as observed by Mr. Bridgman, of Norwich. They are frequently found on the flowers of the bramble, but their favourite flowers are those of the different species of *Reseda* (mignonette). When these insects are handled in a living state they emit an agreeable odour. All the species are occasionally bred from dead perforated bramble-sticks.

1. *Prosopis communis*.

*P. atra*, fronte maculata, tibiis posticis albido maculatis.

*Prosopis communis*, *Smith, Bees Great Brit.* 8; *Entomol.* 3.  
*Schenck, Nass. Bien.* 321.

*Hylæus communis*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.*  
ii. 234.

*Thoms. Opusc. Ent.* 307; *Hym. Scand.* ii. 128.

*Melitta annulata*, *Kirby, Mon. Apum Angl.* ii. 36 (*nec Linn.*).

*Hylæus annulatus*, *Smith, Ent. Soc. Lond.* iv. 29; *Zool.* vi. 2202.

*Female.* Length  $2\frac{1}{2}$ –3 lines.—Black; head and thorax finely and very closely punctured; the face has on each side of the clypeus an oblong angulated macula, touching the eyes, sometimes reduced to a mere line. Thorax: an interrupted yellow line on the collar, rarely obliterated; the tubercles and a spot on the tegulæ yellow, that on the former sometimes obliterated, that on the latter rarely so; the posterior tibiæ have a pale yellow ring at their base, and the extreme base of the anterior and intermediate pairs sometimes yellow. Abdomen ovate, smooth and shining. B.M.

*Male.* Length  $1\frac{3}{4}$ – $2\frac{2}{3}$  lines.—Black; punctured as in the female, the thorax beneath coarsely so; the clypeus, a triangular shape above it, and the face on each side as high as the insertion of the antennæ yellow; the sides of the clypeus sometimes black; in rare instances a yellow line in front of the scape of the antennæ; the intermediate and posterior tarsi at their base and also the posterior tibiæ at their base yellow. B.M.

The typical specimen of *P. annularis* is preserved in the Linnæan Cabinet, and differs from the present species in several particulars; it has not yet been found in this country, but it may probably occur in Scotland.

The face of this species is more triangular than that of the other species, and the yellow markings are of a deeper colour.

This species is found in all parts of the kingdom; its time of appearance is usually the beginning of June.

2. *Prosopis dilatata*.

*P. atra*, fronte maculata, tibiis omnibus flavo annulatis. *Mas ater*, tibiis flavis, nigro annulatis; antennis scapo patelliformi.

*Prosopis dilatata*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 188.

*Smith, Bees Great Brit.* 9, pl. i. fig. 1d.

*Schenck, Nass. Bien.* 318.

*Melitta dilatata*, *Kirby, Mon. Apum Angl.* ii. 39 ♂.

*Melitta annularis*, *Kirby, lib. cit.* 36 ♀.

*Hylæus dilatatus*, *Curtis, Brit. Ent.* viii. 273, tab. 273 ♂.

*Smith, Trans. Ent. Soc. Lond.* iv. 31, tab. 3. fig. 1 ♂; *Zool.* vi.

2204. fig. 4; *Bees Great Brit.* 9, pl. 1, 1d ♂.

*Thoms. Hym. Scand.* ii. 132.

*Female.* Length  $2\frac{1}{2}$ –3 lines.—Black; head orbiculate, the clypeus truncate anteriorly, a yellow or sometimes a fulvous macula below the insertion of the antennæ, not touching the eyes; the apex of the flagellum fulvous beneath; the collar has an interrupted line, the tubercles, and a spot on the tegulæ in front yellow; all the tibiæ yellow at the base; the wings hyaline, beautifully iridescent, their nervures fuscous; the abdomen very smooth and shining, the margins of the segments sometimes narrowly rufo-piceous.

B.M.

*Male.* Length 3 lines.—Black; the face below the insertion of the antennæ and the scape in front cream-coloured; the mandibles are of the same colour in the middle, having their base black and their apex ferruginous; the scape of the antennæ broadly expanded, subquadrate, concave beneath; the flagellum, except the basal joint, fulvous beneath; the collar with an interrupted line and the tubercles and tegulæ in front white; the latter are ferruginous behind, as well as the extreme base of the wings and their nervures; the wings pale rufo-hyaline; the tibiæ, tarsi, and knees pale yellowish white; the anterior and intermediate tibiæ have a black stain behind, and the apical half of the posterior pair black; the apical joints of the tarsi pale ferruginous. The abdomen oblong-ovate, covered with a short pile, particularly on the apical margins of the segments.

B.M.

I captured both sexes of this rare species near Lowestoft, at Pakefield, in August 1859, on flowers of the bramble. I also observed it entering its burrows, which were excavated in stems of the common dock. The following summer I reared both sexes from these nests. I have a suspicion that the bee usually burrows in dead stems of the bramble, and that my finding them in the situation mentioned was a deviation from the usual habit of the species. I have also taken it at Blackwater, Hants, and at Kingsdown, near Deal. It has also been taken at Bournemouth, and at Arundel, Sussex. I have received from Paris specimens supposed to be this insect, but they were black varieties of *P. variegata*. The true species has been sent from Germany by Prof. Müller.

### 3. *Prosopis cornuta*.

*P. atra*, fronte maculata, tibiis flavo maculatis, clypeo cornuto.

*Prosopis cornuta*, *Smith, Bees Great Brit.* 10, pl. 1. fig. 1 ♀, 1a, 1b ♂.

*Hylæus cornutus*, *Smith, Trans. Ent. Soc. Lond.* iv. 32, tab. 3. fig. 4 ♀; *Zool.* vi. 2204.

*Hylæus plantaris*, *Smith, Trans. Ent. Soc. Lond.* iv. 32, tab. 3. fig. 2 ♂; *Zool.* 2205.

*Female.* Length  $3\frac{1}{4}$  lines.—Black; head rotundate, a stout angular tooth on each side of the clypeus, which has its base raised, forming an elevation which passes backwards between the antennæ; the

flagellum fulvous beneath, except one or two of the basal joints; a spot on the tegulæ, and sometimes an interrupted line on the collar, white; the posterior tibiæ have a ring at their base and the extreme base of the anterior and posterior tibiæ yellowish white, the claw-joints of the tarsi ferruginous; the wings hyaline, their nervures testaceous; abdomen oblong-ovate, very bright and shining. B.M.

*Male.* Length 3 lines.—Black; the antennæ pale yellow, having a fusco-ferruginous line above; the front above the clypeus is raised, and the antennæ inserted on each side of the prominence; a spot on the tegulæ in front and sometimes an interrupted line on the collar white; the wings hyaline, having a slight fulvous stain, and their base yellowish; the anterior tibiæ in front, and the intermediate and posterior pairs at their base, pale yellow; all the tarsi of that colour, with the claw-joint ferruginous; the basal joint of the intermediate tarsi dilated in front; the abdomen elongate-ovate, slightly pubescent at the apex; beneath, in the middle of the apical margin of the second segment, is a depression clothed with short fulvous pubescence.

There is a specimen of the female of this species in Mr. Kirby's type collection without a name; but in his own interleaved copy of the 'Monographia' it is named *cornuta*, which name I have adopted. Both sexes were taken on Cove Common, near Blackwater, Hants, and described as distinct species. Since that time the species has been bred from the stem of the common dock; the sexes are therefore united as constituting one species.

#### 4. *Prosopis punctulatissima*.

*P. nigra*, tibiis flavo annulatis, abdomine segmentis punctulatis-simis.

*Hylæus punctulatissimus*, *Smith, Trans. Ent. Soc. Lond.* iv. 33 ♂ ♀;  
*Zool.* vi. 2205; *Bees Great Brit.* 11 ♂ ♀.

*Female.* Length 3 lines.—Black; the head and thorax strongly and closely punctured; the inner orbits of the eyes have a broad yellow stripe as high as the insertion of the antennæ; the tubercles, a spot on each side of the collar and another in front of the tegulæ pale yellow; wings subhyaline, the anterior and intermediate tibiæ at their extreme base and a ring at the base of the posterior pair pale yellow; the abdomen shining and strongly punctured, and having on each side of its apical margin a line of white pubescence; the rest of the abdomen is more finely punctured, and has a short silvery pile, observable in certain lights.

*Male.* Length 3 lines.—Black; the face and the scape in front yellowish white; the apical half of the flagellum testaceous; a yellow line on the mandibles; the thorax punctured as in the female; a spot on the tegulæ, the anterior tibiæ in front, the intermediate

and posterior pairs at their base, and the basal joint of the posterior tarsi pale yellow; the apical joint fusco-ferruginous. Abdomen oblong-ovate, shining, closely and distinctly punctured, the margins of the segments more or less rufo-testaceous. B.M.

The female resembles *P. signata*, but is rather smaller, its face being longer, and a broad yellow stripe on each side running above the insertion of the antennæ; the basal segment of the abdomen is evenly and rather strongly punctured, it is also shining; the following segments are subopaque, more finely but very closely punctured. The male is distinguished by the yellow line on the mandibles.

### 5. *Prosopis signata*.

*P. atra*, fronte maculata, abdomine segmento primo margine utrinque albo pubescente.

*Prosopis signata*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. i.* 190.

*Smith, Bees Great Brit.* 12 ♂ ♀.

*Schenck, Nass. Bien.* 318.

*Sphex signata*, *Panz. Faun. Germ.* 53. 2 ♀.

*Melitta signata*, *Kirby, Mon. Apum Angl.* ii. 41.

*Hylæus signatus*, *Smith, Trans. Ent. Soc. Lond.* iv. 30; *Zool.* vi. 2206.

*Prosopis atrata*, *Fabr. Syst. Piez.* 295 ♂.

*Female.* Length  $3\frac{1}{2}$  lines.—Black; the flagellum fulvous beneath; the face has on each side an angular yellow stripe, sometimes only a small spot, not reaching above the insertion of the antennæ; a line on each side of the collar, the tubercles, a spot on the tegulæ in front, and the extreme base of the tegulæ yellowish white; the tibiæ sometimes entirely black, or only one or more pairs slightly pale at their extreme base; the anterior tibiæ usually more or less fulvous in front. The abdomen smooth, shining, and delicately punctured; the extreme lateral apical margins of the basal segment have sometimes a little fringe of white pubescence. B.M.

*Var. β.* The face sometimes entirely black.

*Male.* Length  $3-3\frac{1}{2}$  lines.—The face below the insertion of the antennæ white; the flagellum, except the two basal joints, fulvous; the thorax has a fine short scattered white pubescence, particularly on the sides of the metathorax and beneath; sometimes a spot on each side of the collar, another on the tubercles behind, and a minute one on the tegulæ in front white; the extreme base of the posterior tarsi and tibiæ white; the anterior tibiæ fulvous in front; the claws ferruginous. The abdomen closely and distinctly punctured, more strongly than in the female, the basal segment having on its apical margin laterally a short fringe of white pubescence; the margins of the other segments slightly pubescent laterally. B.M.

This is the largest British species and also one of the most com-

mon. I omit St.-Fargeau's quotation in consequence of his confused and unwarranted assumption of three of Kirby's species being simply varieties of *P. signata*. Dr. Sichel believed all the British species to be varieties of *P. bifasciata*, a very distinct species, very rare in this country. *P. signata* frequently constructs its cells in the crevices of old walls, at another time it excavates tunnels in the pith of dead bramble-sticks. Like all the species of the genus, it frequents, in preference to all other plants, the mignonette (*Reseda lutea*).

### 6. *Prosopis hyalinata*.

*P. atra*, alis hyalinis, tibiis flavo annulatis.

*Prosopis hyalinata*, Smith, *Bees Great Brit.* 13 ♂ ♀.

*Hylæus hyalinatus*, Smith, *Trans. Ent. Soc. Lond.* iv. 33; *Zool.* vi. 2206.

*Female*. Length 2-3 lines.—Black; head elongate as in "*P. communis*;" the flagellum, except one or two of the basal joints, fulvous beneath; the face with an angular yellow spot on each side, varying in size, sometimes almost obsolete. Thorax rotundate, closely punctured; a line on each side of the collar, the tubercles behind, and the tegulæ in front white; the tibiæ white at their base; the wings clear hyaline and splendidly iridescent, the nervures black. Abdomen ovate, smooth, and shining; the apical margin of the basal segment with a little white pubescence laterally; this is frequently obliterated. B.M.

*Male*. Length 2-2½ lines.—The face yellowish white; the flagellum, except two or three of the basal segments, fulvous beneath; the anterior tibiæ in front and the intermediate pair at their extreme base yellow, the posterior pair broadly annulated with yellow at their base; the four posterior tarsi have their basal joint yellowish white. Abdomen smooth and shining, with a little white pubescence on the apical margin of the basal segment laterally; a fine silky pile on the sides and apex of the abdomen. B.M.

This species closely resembles *P. communis*, particularly in the female; but the thorax is rounder and the markings whiter; the male is readily distinguished. It is very abundant in some localities in July and the beginning of August; it commonly frequents the flowers of the bramble, on which I have observed it at Ventnor and in Sandown Bay, also at Deal, Walmer, and Folkestone. *P. signata* is less common than this species.

### 7. *Prosopis varipes*.

*P. atra*, tibiis flavis nigro annulatis, fronte trimaculata.

*Prosopis varipes*, Smith, *Cat. Hym. Ins. in Coll. Brit. Mus.* pt. i. 12 ♂ ♀; *Bees Great Brit.* 14.

*Female*. Length 1½ line.—Black; head and thorax closely punc-

tured; the scape of the antennæ black, the flagellum reddish yellow and more or less fuscous above; a minute spot at the anterior margin of the clypeus and an oblong angulated one on each side of the face reddish yellow. Thorax: the collar, tubercles, tegulæ in front, and the basal half of the tibiæ yellow; the apical joints of the tarsi fusco-ferruginous; the metathorax covered with short white pubescence, except the enclosed portion below the scutellum, which is deeply rugose. Abdomen short, rounded, smooth and shining. The spots on the face sometimes quite or nearly obsolete. B.M.

*Male.* Black; the face below the insertion of the antennæ and their scape in front pale yellow; the flagellum fulvous beneath. Thorax, the collar, tubercles, and tegulæ in front, tibiæ and tarsi bright yellow; a spot on all the tibiæ behind and the apical joints of the tarsi ferruginous; wings hyaline, splendidly iridescent. Abdomen closely and finely punctured. B.M.

This is a rare species; I never met with it at large, but have bred it from bramble- and rose-sticks sent from Bristol. In the British Museum are specimens from Devonshire.

### 8. *Prosopis perforator.*

*P. atra*; capite subovato, fronte maculata; tibiis posticis albido annulatis.

*Prosopis rubicola*, *Smith, Ent. Ann.* (1869) p. 74 (*nec Saunders, Trans. Ent. Soc. Lond.* new ser. i. 58).

*Female.* Length  $2\frac{1}{2}$  lines.—Black; head nearly rounded and, as well as the thorax, opaque; an impressed line extending from the anterior ocellus to the insertion of the antennæ; a narrow white line on the face on each side anteriorly, sometimes more or less obsolete. Thorax: a minute spot on the tegulæ anteriorly and the base of the posterior tibiæ yellow; the claw-joint of all the tarsi more or less rufo-testaceous; wings subhyaline and iridescent, their nervures rufo-testaceous, the stigma darkest. Abdomen shining and very finely and delicately punctured. B.M.

*Male.* Length  $2\frac{1}{4}$  lines.—Head and thorax opaque, black and finely punctured; the face white; the scape of the antennæ short and broad, with sometimes a minute white spot at the apex outside; the flagellum, except the basal joint, fulvous beneath. Thorax: a minute yellow spot on the tegulæ in front; the wings hyaline and iridescent; the anterior tibiæ yellow in front, and the apical joint of the tarsi testaceous; the extreme base of the intermediate tibiæ and the basal joint of the tarsi yellow; the posterior tibiæ at their base and the first joint of the tarsi yellow. Abdomen black, shining, and very delicately punctured. B.M.

This species was bred from bramble-sticks by Mr. Rothney, and has been captured by Mr. Bridgman near Norwich; it has also occurred at Sidmouth.

9. *Prosopis rupestris*.

*P. atra*, fronte linea maculata, tibiis posticis flavo annulatis.

*Prosopis rupestris*, *Smith, Ent. Ann.* (1872) p. 103 ♀.

*Female.* Length  $2\frac{1}{4}$  lines.—Black; the head and thorax semiopaque; the basal segment of the abdomen impunctate and very glossy, the following segments shining and very delicately punctured. The head short and rounded; the flagellum slightly piceous beneath; on each side of the face a pale yellowish-white line that does not run higher than the insertion of the antennæ. A spot on the tegulæ in front, the tubercles, and the base of the posterior tibiæ yellowish white. The wings subhyaline, the nervures black; the first recurrent nervure uniting with the first transverse median nervure, the second recurrent nervure entering the second submarginal cell near its apex. The metathorax abruptly truncate; a triangular enclosed space at its base coarsely rugose with longitudinal furrows.

This species was discovered in 1872 at Sidmouth, S. Devon, during the month of August; as the male was not found, probably July would be the best time to meet with it. Three species belonging to this genus have a close general resemblance; they are *P. hyalinata*, *P. perforator*, and *P. rupestris*. They may be distinguished as follows:—The face of *P. hyalinata* is comparatively oblong triangular, the flagellum of the antennæ pale fulvous beneath, and the spots on the face of the female are of an elongate angular shape. The face of *P. rupestris* is shorter and rounder, and the spots are nearly parallel lines, being very slightly broadest below; the antennæ are black, the flagellum occasionally obscurely piceous beneath. *P. perforator* is smaller than the others; its face as broad as long, the spots like those of *P. rupestris*, but its metathorax is less coarsely sculptured. I believe several other small species will yet be discovered.

10. *Prosopis variegata*.

*P. atra*, thorace maculato; abdomine rufo, apice fusco, segmentorum marginibus cinereis; tibiis albo annulatis.

*Prosopis variegata*, *Fabr. Syst. Piez.* 295.

*St.-Farg. Hym.* ii. 534.

*Smith, Bees Great Brit.* 14.

*Schenck, Nass. Bien.* 318.

*Prosopis colorata*, *Panz. Faun. Germ.* 89. 14.

*Hylæus variegatus*, *Smith, Zool.* vi. 2202.

*Female.* Length 2–3 lines.—Black; a cream-coloured line on each side of the face nearly extending to the vertex; a spot or line of the same colour on the anterior margin of the clypeus; the flagellum fulvous beneath, except one or two of its basal joints. Thorax: the collar, tubercles, and tegulæ in front, also a spot on each side at the base of the scutellum cream-coloured; all the tibiæ at their



base, the anterior pair in front, and the femora at their extreme apex cream-coloured; the apical joints of the tarsi ferruginous. Abdomen: the two basal segments ferruginous, and the apical margins of the following rufo-piceous; sometimes only the basal segment red, or that and a portion of the second red. B.M.

*Male*.—Black, finely punctured; the face, scape in front, and base of the mandibles white; the scape short and somewhat dilated. Thorax: a line on the collar, another on the tegulæ in front, and the tubercles white; sometimes a spot on each side of the scutellum, these frequently obsolete; the anterior tibiæ in front and the base of the intermediate and posterior pairs white; the anterior tarsi and the apical joint of the intermediate and posterior pairs rufo-testaceous. Abdomen, the apical margin of the basal segment with a patch of white pubescence laterally.

*This species varies greatly in colour, every gradation from a red to a black abdomen occurring.*

There are three specimens of this species in the collection of the British Museum, said to have been taken at Kingsbridge, Devon; and I found a female in a collection of Hymenoptera from the neighbourhood of Bideford: I have collected at the latter locality, but never found it. This has been regarded by an eminent Hymenopterologist of France, Dr. Sichel, as a variety of *P. signata*.

### 11. *Prosopis bifasciata*.

*P. nigra*, capite et thorace albo maculatis, abdominis segmento primo secundoque rufis.

*Prosopis bifasciata*, *Jurine, Hym.* 220, pl. ii. fig. 30.

*St.-Farg. Hym.* ii. 536.

*Smith, Cat. Hym. Ins.* pt. i. 22; *Entom.* iii. 309.

*Prosopis albipes*, *Panz. Faun. Germ.* 105. 15.

*Female*. Length  $3\frac{1}{2}$ –4 lines.—Black; head closely and strongly punctured, an elongated cream-coloured spot on each side of the face; the flagellum of the antennæ, except one or two of the basal joints, ferruginous beneath; the tips of the mandibles and the anterior margin of the clypeus more or less ferruginous, the latter with occasionally a minute white spot. The thorax above with strong confluent punctures; a slightly interrupted line on the collar, two spots on the scutellum, a spot in front of the tegulæ, and the tubercles cream-coloured; the basal portion of the tibiæ white; the tips of the tarsi ferruginous; the wings hyaline, with their apex slightly clouded. Abdomen closely punctured; the two red basal segments usually with their apical margins more or less blackish.

B.M.

*Male*.—Resembles the female, but with the face, mandibles, and scape in front yellowish white.

This is a very variable species in colour, specimens of every shade

between those described and totally black individuals occurring, black males being most common.

Added to the British list on the authority of a single specimen in the British collection of Apidæ in the British Museum; it has a label with the locality *Bantham*, a village about four miles from Kingsbridge, S. Devon. Several of the once doubtful Devonshire captures by Dr. Leach have been rediscovered, although this has not been met with more recently; I therefore include it among the British Bees.

## Subfam. II. ACUTILINGUES, Westw.

### Genus 3. SPHECODES, Latr.

*Sphex* (pt.), *Linn. Syst. Nat.* i. 941 (1766).

*Apis* (pt.), *Christ. Hym.* p. 153 (1791).

*Nomada* (pt.), *Fabr. Ent. Syst.* ii. 345 (1793).

*Melitta* (pt.), *Kirby, Mon. Ap. Angl.* i. 137\*\*a (1802).

*Sphcodes*, *Latr. Hist. Nat.* xiii. 368 (1805).

*Dichroa*, *Germ. Faun. Ins. Europ.* fasc. 5 (1817).

Head as wide as the thorax, body nearly naked; the *tongue* acute, short, not folded; the *labial palpi* 4-jointed, the first joint nearly as long as the two following, the apical joint shortest; the *paraglossæ* minute; the *maxillary palpi* 6-jointed, the basal joint short, the second twice its length, the four apical joints of about equal length, about one third shorter than the second joint; the *superior wings* having one marginal and three submarginal cells—the first submarginal about as long as the two following, the second slightly narrowed towards the marginal, subquadrate, its inferior margin angulated and receiving the first recurrent nervure a little beyond the middle. The *ocelli* placed in a triangle on the vertex; the *antennæ* of the males submoniliform. The posterior legs and abdomen of the female destitute of polliniferous apparatus.

The bees which are included in this genus have hitherto been regarded as parasites on those comprised in the genus *Halictus*; and, indeed, many circumstances tend to support such a supposition; they are usually found burrowing not only in similar situations, but forming mixed colonies. The females of both genera appear some time before the males, and, in fact, their economy is alike. St.-Fargeau places them amongst his division of parasites, immediately following his exotic genus *Rathymus*, with which they have not the slightest affinity, their only resemblance being in the distribution of the colours, black and red. The result of my observations leads to the conclusion that no species of the Andrenidæ is parasitic. The only apparent support of the theory of parasitism is the absence of the usual polliniferous organs; such, however, is also the case in *Prosopis*, *Ceratina*, &c. In the year 1849 I discovered a mixed colony of the *Halictus abdominalis*, *Andrena nigro-cenea*, *Halictus*

*morio*, *Sphecodes subquadratus*, and *Sp. ephippius*: this being at a short distance from my house, I had an opportunity of frequently observing their economy; yet, notwithstanding, I could not in a single instance detect the *Sphecodes* entering the burrows of *Halictus*; those into which the former bee entered were of a smaller diameter than those of *Halictus*, in fact intermediate in size between the burrows of *H. abdominalis* and *H. morio*—too small to have admitted the female of *H. abdominalis*. These proceedings were observed on several occasions: no males of any of the bees were to be seen at this time, those of *Andrena* having disappeared some time, and those of the *Halicti* not being developed. On visiting the colony one cloudy morning, I was much delighted to observe the heads of the bees at the mouth of most of the burrows—the female *Halicti* at their own burrows, and *Sphecodes* also at *their own*. The result of my observations of this colony led me to believe, still more firmly, that *Sphecodes* is not a parasite. Since the time when the above observations were made, I have on several occasions detected *Sphecodes* busily engaged in forming her burrow, a fact which I consider conclusive of the correctness of the opinions above stated.

Shuckard, in his work on ‘British Bees,’ says, with regard to the non-parasitism of this genus, “It still remains a debatable point, from the fact of the destitution of polliniferous brushes.” I am willing to admit the doubt, because the nests have not been so thoroughly investigated as is certainly desirable, but not on the structural deficiencies, since the genera *Prosopis* and *Ceratina* are thus circumstanced, and their industrial habit is confirmed beyond question. Mr. Bridgman, of Norwich, points out that *Sphecodes*, like the known parasitical species of bees, differ greatly in size; this is correct, and is evidence against my conclusions; but just as great a difference is to be observed, in the males more particularly, of several species of *Andrena* and *Halictus*: the question, however, is not satisfactorily settled. Dr. Sichel most assiduously investigated the habits of *Sphecodes*, and records the fact of having observed them burrowing in situations where no *Halicti* were found; he also states that he has observed these bees with pollen on the head and clypeus, and that they discharge honey like other Mellifera.

This genus of bees inhabits all quarters of the globe; but the species do not appear to be numerous anywhere; the largest number has hitherto been found in Europe.

The economy of this genus of bees in one respect resembles that of the *Halicti*; early in spring only females make their appearance, but in autumn both sexes are found.

### 1. *Sphecodes gibbus*.

*S. aterrimus*; abdomine ferrugineo, basi apiceque nigris; alis nigricantibus.

*Sphecodes gibbus*, Nyland. *Notis. ur Sällsk. pro Faun. et Flo. Fenn.*  
i. 93.

Smith, *Bees Great Brit.* 16.

*Schenck, Nass. Bien.* 306.

*Sichel, Ann. Soc. Ent. Fr.* (1865) 413.

*Thoms. Opusc. Ent.* 98; *Hym. Scand.* ii. 153.

*Sphex gibba*, *Linn. Syst. Nat.* i. 946; *et Cab. Mus. Linn. Soc.*

*Nomada gibba*, *Rossi, Faun. Etrus.* ii. 63.

*Fab. Ent. Syst.* ii. 212.

*Melitta sphecoides*, *Kirby, Mon. Apum Angl.* ii. 46 ♀.

*Melitta monilicornis*, *Kirby, lib. cit.* ii. 47, tab. 15. fig. 6 ♂.

*Melitta picea*, *Kirby, lib. cit.* ii. 48 ♂.

*Sphcodes sphecoides*, *Smith, Zool.* iii. 1013. fig. 3 ♂, fig. 4 ♀.

*Female.* Length 4-4½ lines.—Head and thorax black, the head a little wider than the thorax, strongly and closely punctured, the clypeus very coarsely so; the thorax smooth, shining, and having scattered deep punctures; the base of the metathorax coarsely rugose; the tegulæ rufo-piceous at their outer margins, the nervures fusco-ferruginous, the stigma ferruginous; the wings fuscous, their apical margins having a darker cloud. Abdomen shining red; the first segment more or less black at its base, the three apical segments black, sometimes the apical margin of the second segment black; this sex, in rare instances, has the legs red. B.M.

Var. *α.* The abdomen with the apex only slightly fuscous.

*Male.* Length 3-4 lines.—Black; the head rather wider than the thorax, the face covered with silvery white pubescence; the antennæ as long as the head and thorax, submoniliform; thorax and wings as in the female; the second, third, and basal margin of the first segment red; the apical margin of the second usually more or less black; or the second and third segments having each a central black band, sometimes only one of these bands present. The metathorax coarsely rugose, not having a distinctly enclosed space at its base. B.M.

Var. *β.* Abdomen entirely black.

This is the true *S. gibba* of Linnæus; it is very distinct from the *Nomada gibba* of Fabricius, and may be distinguished by its shining thorax, with large scattered punctures; the *N. gibba* of Fabricius has the thorax closely punctured and has hyaline wings. The species is common in July and August, frequenting thistle-heads and the flowers of the ragwort. The black varieties of the male were taken at Lowestoft.

## 2. *Sphcodes rufiventris*.

*S. ater*; abdomine ferrugineo, apice nigro.

*Sphcodes rufiventris*, *Wesm. Obs. Gen. Sphéc.* 8.

*Sichel, Ann. Soc. Ent. Fr.* (1865) 413.

*Smith, Entomol.* (1867) 336.

*Schenck, Nass. Bien.* 302.

*Apis gibba*, *Christ. Hym.* 183, tab. 15. f. 3.

*Nomada gibba*, *Fabr. Ent. Syst.* ii. 348 ♀; *et Cab. Mus. Dom. Banks.*

*Melitta gibba*, *Kirby, Mon. Apum Angl.* ii. 42.

*Dichroa analis*, *Illig. Mag.* v. 48.

*Eversm. Volgo-Ural.* 48.

*Sphecodes gibbus*, *St.-Farg. Hym.* ii. 542.

*Sphecodes rufescens*, *Smith, Bees Great Brit.* 17.

*Sphecodes pellucidus*, *Smith, Zool.* iii. 1014, var.

*Female.* Length 4–4½ lines.—Head and thorax black and shining, closely and finely punctured; head about the same width as the thorax, the flagellum testaceous beneath, the face having a scattered short griseous pubescence; the disk of the thorax not so closely punctured as the head, the metathorax having at its base a semi-circular rugose enclosed space; wings fusco-hyaline, the nervures black, the anterior tibiæ slightly ferruginous in front; the apical joints of the tarsi ferruginous; the abdomen shining, delicately punctured, the sixth segment and apical margin of the fifth black. B.M.

*Male.* Length 3–3¾ lines.—Coloured as in the female, differing only in having the base of the abdomen more or less black, in rare instances the apex only black; the face clothed with white pubescence; the wings clearer than in the female; the antennæ not so long as the head and thorax, slightly submoniliform. B.M.

This species is equally abundant with the preceding, and is found in great numbers in the autumn, frequenting various flowers, but particularly thistle-heads. It is readily distinguished from the *S. gibbus* by having its thorax much more finely punctured and by the colour of its wings; its head is not proportionally so wide, and the antennæ of its males are shorter and submoniliform. I have seen a black variety of the male of this species from Paris, but have not found it in England.

### 3. *Sphecodes subquadratus*.

*S. ater*, capite magno subquadrato; abdomine ferrugineo, apice nigro.

*Sphecodes subquadratus*, *Smith, Zool.* iii. 1014. fig. 5 ♂; *Bees Great Brit.* 18.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 235.

*Sichel, Ann. Soc. Ent. Fr.* (1865) 414.

*Thoms. Opusc. Ent.* 98; *Hym. Scand.* ii. 155.

*Sphecodes gibbus*, *Wesm. Obs. Gen. Sphéc.* 5.

*Female.* Length 4–4½ lines.—Head and thorax black, the vertex of the former subquadrate; the head closely punctured; the flagellum of the antennæ, except one or two of the basal joints, rufo-piceous. Thorax: the disk shining and with distant punctures; the wings subhyaline and iridescent, their apical margins slightly clouded; the nervures fusco-ferruginous; the legs sometimes rufo-piceous; the tarsi ferruginous, palest towards their apex. Abdomen shining red, the three apical segments black. B.M.

*Male.* Length 3-3½ lines.—Coloured as the female, with the addition of the base of the abdomen being black. The head slightly subquadrate, and, as well as the thorax, closely punctured; wings hyaline and very faintly clouded at their apex; the antennæ submoniliform.

This species is very local; it has been taken at Bristol, on Lundy Island, at Camberwell, Charlton in Kent, and in Yorkshire. I found a colony at Birch Wood, Kent, unmixed with any other species of bee, both sexes being plentiful. The form of the head readily distinguishes the female: the males approach closely those of *S. gibbus*; but their heads are proportionally narrower, and their antennæ are rather shorter.

#### 4. *Sphécodes ephippius*.

*S. ater*; abdomine rufo, apice pedibusque nigro-piceis; mandibulis, tarsis tibiisque rufescentibus.

*Sphécodes ephippia*, *Smith, Bees Great Brit.* 19.

*Sphécodes ephippius*, *Smith, Entomol.* (1867) 337.

*Schenck, Nass. Bien.* 305.

*Sphex ephippia*, *Linn. Faun. Suec.* 944; *Syst. Nat.* i. 944; *et Cab. Mus. Linn. Soc.*

*Melitta divisa*, *Kirby, Mon. Apum Angl.* ii. 49 ♂.

*Melitta geoffrella*, *Kirby, lib. cit.* ii. 45 ♀.

*Sphécodes geoffrellus*, *St.-Farg. Hym.* ii. 544.

*Wesm. Obs. Gen. Sphéc.* 7.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 194.

*Thoms. Opusc. Ent.* 100; *Hym. Scand.* ii. 159.

*Female.* Length 2½-3 lines.—Head and thorax black, shining, delicately punctured, closely so on the head, but scattered on the disk of the thorax; the flagellum, except a few of the basal joints, fulvous beneath; the wings subhyaline, splendidly iridescent, the nervures and tegulæ rufo-testaceous; the legs fusco-ferruginous, the knees and the tarsi pale ferruginous. B.M.

*Male.* Length 2-2¼ lines.—This sex is coloured the same as the female, but is more strongly punctured on the head and thorax; the antennæ submoniliform, the flagellum fulvous beneath; the abdomen more or less black at the base and apex, having sometimes an immaculate red space between, or one or two transverse black fasciæ. B.M.

The size alone would serve to distinguish this little bee from its congeners; but it is subject to very considerable variety: the female has sometimes the extreme base as well as the apex of the abdomen black, and the head occasionally subquadrate; the legs are sometimes nearly black. The males vary much in the degree of colouring in the legs; specimens occur with them pale testaceous red; the abdomen also varies much in its markings. I formerly

considered it to constitute two species, but I have satisfied myself since that it is only a variable insect. In the Linnæan Cabinet it is the authentic specimen of the *Spheæ ephippia* of Linnæus, one of the varieties of this insect. The *Melitta divisa* of Kirby is a dark example of the male, having the antennæ black, but they are usually more or less fulvous beneath; but in truth it is almost impossible to decide whether the latter variety be not in reality a very minute male of *S. gibbus*. Many of the Kirbyan specimens preserved in the Entomological Society's Museum are now in a very decayed condition.

#### Genus 4. ANDRENA.

*Apis* (pt.), *Linn. Syst. Nat.* i. 953 (1766).

*Andrena* (pt.), *Fabr. Syst. Ent.* 376 (1775).

*Nomada* (pt.), *Fabr. Ent. Syst.* ii. 345 (1793).

*Melitta*, *Kirby, Mon. Apum Angl.* i. 140 (1802).

Head as wide as the thorax, transverse, in the males frequently wider than the thorax; *ocelli* in an isosceles triangle on the vertex; *antennæ* geniculated, filiform, the basal joint of the flagellum longest; the *labium* lanceolate, the *paraglossæ* more than half its length; the *labial palpi* 4-jointed, the basal joint longest, the following joints each decreasing in length; the *maxillary palpi* 6-jointed, the second being the longest. Thorax: the *anterior wings* with one marginal and three submarginal cells; the second submarginal receiving the first recurrent nervure in or near the middle of the cell, the third submarginal cell receiving the second recurrent nervure beyond the middle; the *posterior trochanters* furnished with a long floccous hair, the posterior tibiæ and basal joint of the tarsi with a thick scopa or pollen-brush. Abdomen elongate-ovate, the apical margin of the fifth segment and sides of the sixth with a dense fringe of pubescence, the latter segment having a central naked space: the abdomen of the males usually elongate and lanceolate; their mandibles frequently forcipate.

The bees included in the genus *Andrena* may be called the har-bingers of spring. One of the first to appear is *A. clarkella*: this species has been observed as early as March 4th, before the snow had quite melted, and when unusually warm weather had set in; *A. gwynana* was found at the same time at Hampstead. The usual time when the Andrenidæ make their appearance is April, early or otherwise, according to the suitability of the weather.

This genus is the most numerous of all the Apidæ in species, and also in the numbers of many of them, colonies of thousands upon thousands being occasionally met with; they are all burrowers in the ground, some species preferring banks of light earth, others a stiff clayey soil, whilst some choose hard trodden pathways. A few species, and these usually rare, are almost to be classed among the solitary bees; these I have never found forming colonies, a few burrows scattered at wide distances in a locality being their habit.

The depth of the burrows formed by these bees varies from about 6 to 10 or 12 inches. At the bottom of the burrow is a small oval cell in which the industrious female stores up a small mass of pollen mixed with honey; these little balls of provision for the bee-larva are usually about the size of a garden pea; from the main tunnel short branch-tunnels are excavated, each terminating in a cell similar to that at the end of the main one. When the requisite quantity of food is stored up, an egg is deposited on the mass, on which the larva, when hatched, commences to feed: having consumed it and being now full-grown, it reposes in a lethargic state until the approach of the following spring, or season when it changes to the pupa state, and through that rapidly to the perfect insect. Some species are strictly summer bees, not appearing before the months of June, July, or August; but the economy of these corresponds with that of the earlier species.

These bees are subject to the attacks of parasites. The first to be remarked upon are those bees which compose the genus *Nomada*; they are more popularly known as wasp-bees, since they bear a considerable resemblance to some of the small solitary species of that family. These parasites appear to be upon a perfectly friendly footing with the industrious bees, and are permitted, without let or hindrance, to enter their burrows. It has been advanced as a proof of the ingenuity and artifice necessary to be employed in effecting the deposit of their eggs in the working-bees' nests, that the parasites should bear a close resemblance to the bees upon which they are parasitic. Some instances may undoubtedly be advanced, as *Apathus* and *Bombus*, and also in the different species of *Volucella* which infest the nests of humble-bees; but amongst the solitary bees no such resemblance is required to aid in any necessary deception. It may be remarked that the two cases are not analogous: this is true, and I am not prepared to say that in the case of the *Bombi* and their enemies it, may not be necessary; but as regards solitary bees it certainly is not—colonies of Andrenidæ and their parasites mingle together in perfect harmony, issuing from and entering into the burrows indiscriminately. I have on several occasions watched with much enjoyment a large colony of *Eucera longicornis*, the males occasionally darting forwards with great velocity, then turning sharply round, and, as it were, swimming in circles close to the ground, then darting off again and again in an unceasing round of sportive enjoyment; their industrious partners, whose whole existence appears to be bound up in one unceasing round of labour, would occasionally return home laden with food for their young progeny. Sometimes it would happen that a *Nomada* had previously entered her nest; when such proved to be the case, she would issue from it, and, flying off to a short distance, wait patiently until the parasite came forth, when she would reenter and deposit her burden. It will be observed in this instance that between *Eucera* and *Nomada* no resemblance exists in general appearance, one being several times larger than the other and covered with pubescence of a sombre colour; whereas the parasite is a gaily-coloured insect, destitute of



pubescence, and readily observed from the brightness of its colouring.

To some extent I have observed that a constant connexion between certain species exists, and I have never met with some species of these parasites except in connexion with certain species of *Andrena*; but there are others, as *Nomada ruficornis*, *succincta*, *alternata*, and *lathburiana*, which infest the nests of several species of *Andrena* indiscriminately; the species are *A. tibialis*, *trimmerana*, *afzeliella*, and *fulva*; but the following I have never observed except connected as follows—*Nomada lateralis* and *A. longipes*, *N. baccata* and *A. argentata*, *N. borealis* and *A. clarkella*, *N. germanica* and *A. fulvescens*, and, lastly, *N. sexfasciata* and *Eucera longicornis*. Much further investigation is still necessary before we can arrive at a knowledge of the real nature of the connexion which exists between the bees and their parasites. It has been supposed that the parasitic larva is hatched sooner than that of the rightful owner of the nest, and that it consequently consumes the food, and leaves the larva of the bee to perish; but to this I do not assent. It appears so contrary to all natural laws, that I cannot think it even probable. Nature I have never observed to be thus wasteful of animal life; such a proceeding is unnecessary, and therefore unlikely: where a destruction of animal life is observed, it can usually be traced to some reasonable cause, as the destruction of the larvæ of certain Lepidoptera being a check upon their superabundance. A parallel to this does not appear to me to exist in the case of the bees. I am more inclined to believe that when the parasite has deposited her egg upon the store of pollen, the industrious bee at once deserts it, and proceeds to construct a fresh burrow, and that the parasites which may be observed constantly entering different burrows do so in order that they may find the requisite quantity of food, which will usually be much less than that required for the industrious bee; having found which, they deposit their egg, and probably close up the cell; the nest is then deserted by its legitimate owner.

The Andrenidæ are also subject to the attacks of other enemies, if so they can be called; we have seen that in the first place their food is attacked by *Nomadæ*, we are now to find their larvæ attacked by insects belonging to the order Coleoptera; these belong to the genus *Stylops*, which several distinguished coleopterologists agree in placing amongst the Heteromorous parasitic beetles. These insects were placed in a new order by Mr. Kirby, named Strepsiptera, and as such they are still regarded by some entomologists; we have at present only to do with them as enemies to the bees, and briefly to narrate the manner in which the latter are attacked by them. These insects are diminutive in size, the largest known species not exceeding a quarter of an inch in length: we are now speaking of the winged males; the females are apterous grub-like insects which never leave the bodies of the bees. If the abdomens of a number of Andrenidæ be examined early in the season, it is most probable that the female of *Stylops* will be found; her presence is known by the protrusion of her head and a portion of the thorax between

the abdominal segments on their superior surface, resembling the point of a small bud of a brown colour, or rather a flattened scale. I have several times bred the larvæ of *Stylops* in the following manner:—On finding a bee infested as described, place her in a box 5 or 6 inches square, cover it with gauze, and supply the bee with fresh flowers such as the Andrenidæ frequent; examine the bee every day; and it is most likely that in eight or ten days she will appear as if her abdomen were covered with dust: examine it, and in all probability she will be found to be covered with an innumerable quantity of exceedingly minute animals; these are the larvæ of *Stylops*; by the aid of a magnifying-glass they may be seen to issue from the transverse aperture on the thorax. When the bee re-enters the cell or settles upon flowers, these diminutive creatures will of course occasionally be deposited, and by these means, when other bees visit the flowers, they attach themselves to them and are carried to their nests. Judging from the multitude of larvæ produced by each female *Stylops*, amounting to many hundreds in each case, and the rarity of the perfect insect, the majority must perish, probably in their larval condition. From the fact of seldom more than two *Stylops* being found to infest the same bee, although as many as four have been found, we may suppose that to be the largest number which infests one larva of an *Andrena*; they undergo their changes in the body of the bee, the male, on its final transformation, becoming an active winged insect, the female remaining a mere apod attached for life to the bee which nourished it. A most complete and interesting summary of the observations of entomologists on these parasites will be found in the twentieth volume of the 'Transactions of the Linnean Society,' by Mr. George Newport, who has in this paper entered most minutely into the anatomy, functions, and development of these remarkable parasites, being the most interesting and complete essay on the subject yet written.

There are still other parasites to be noticed which will occasionally be found on the bodies of these bees: one is a small orange-coloured *Pediculus*, which is about  $\frac{1}{10}$  of an inch in length; this is the larva of *Meloë*. I have several times reared these hexapods from the eggs of that beetle. For the most complete account of their history, reference must be made to the twentieth volume of the 'Linnean Transactions,' which contains Mr. George Newport's most interesting memoir on *Meloë cicatricosus*. In this paper it is shown that the larva of the beetle feeds on that of *Anthophora acervorum*; but it remains to be proved that the larva of an *Andrena* can serve as food for the larva of *Meloë*. I am inclined to think this can never be the case, and that the fact of our finding them on these bees is a mere indication of the usual habit of the larvæ of attaching themselves to any insect which comes in their way; for we as constantly find them on Diptera and flower-visiting Coleoptera as upon the Andrenidæ. It has been shown that a larva of *Anthophora* will nourish that of *Meloë*; but so small a larva as that of *Andrena* can, I think, scarcely answer that purpose: I have, however, included them, but merely as supposed parasites on *Andrena*.

We now come to the last supposed parasite on these bees; it is found on their bodies, and exactly resembles in form the larva of *Meloë*, but is of a brown-black colour, and is full twice the size; they attach themselves to the hairy parts of the bees, as the meta-thorax and the sides of the thorax beneath the wings. What these *Pediculi* really are, is at present involved in complete obscurity; Mr. Kirby regarded them as insects in their perfect condition, naming them *Pediculus melittæ*. I have frequently observed these creatures in considerable numbers in the flowers of *Ranunculus acris*, as many as twenty or more in a single flower, about the month of April, and, I think, always before the usual time for meeting with the larvæ of *Meloë*. I have found them on various species of bees, usually on those which are most pubescent, as *Andrena fulva*, *thoracica*, and *nigro-ænea*; also commonly on *Melecta armata*, *Anthophora retusa* and *acervorum*: this circumstance would appear to confirm or indicate a connexion between the insects, and from analogy we might readily conclude that this *Pediculus* must be a parasite on some species of bee; but we have nothing in support of this supposition, and against it we have the following observations:—Mr. Newport has shown that it cannot be the larva of *Meloë cicatricosus*, and, as well as myself, has proved that it cannot be that of *M. violaceus* or of *M. proscarabæus*; and since the other species of *Meloë*, *M. variegatus* and *M. rugosus*, do not occur near London, it appears certain that it cannot be the larva of any species of that genus, unless it be discovered hereafter that the larva of *Meloë* not only increases in size in its hexapod state, but that it also changes from bright orange to black.

Another circumstance which induces me to hesitate in adopting an opinion of the *Pediculus* being a larva at all, is the fact that on opening some cells of *Anthophora retusa*, which I dug up on Hampstead Heath, I found two living specimens of the hexapod in the same cell as the perfect bee: it is certainly possible that they might have subsisted on a portion of the food laid up by *Anthophora*; but here was no change of condition, and how came they into the cell? I am inclined to think that they, being insects in their perfect condition, came there exactly in the same way as we find *Forficulæ*, having forced an entrance, which I did not observe, and that they were in quest of food, seeking what they might devour.

In the determination of the species of the genus *Andrena* much difficulty will be met with, the similarity of the males of many species being so great that nothing short of a long and attentive study of them, combined with out-of-door observations, will enable the student to discover those niceties of distinction which are easily detected by the practised observer; these difficulties are considerably enhanced by the changes in the colour of the pubescence to which they are subject from exposure. The species of the first division, which are usually more or less red, are very inconstant—specimens of the same species from one locality being highly coloured, whilst those from another have all a tendency to a sombre colouring; those species which have fulvous or yellow pubescence are much changed

by exposure to light—so much so, that a bright fulvous insect becomes quite grey or cinereous; it must therefore be borne in mind that the individuals described are only such as are in fine condition.

The genus *Andrena* contains several species which, in theuration of the wings, differ somewhat from that of the type; these will be found to agree with the second type ofuration, in which the first recurrent nervure is received by the second submarginal cell, towards the second transverse cubital nervure, that is to say beyond the middle. The following species belong to it:—*A. pilipes*, *varians*, *helvola*, *fuscata*, *clarkella*, *fulva*, *lapponica*, *smithella*, *denticulata*, and *argentata*.

The geographical distribution of these bees is very extensive; they range throughout Europe, species being found as far north as Lapland: numerous species are known from Africa, principally from Algeria; they are found in the Azores, in Madeira, the Canaries, and Cape-Verd Islands; they also occur in Egypt; Asiatic species have been found in northern India, in China, and Japan; a single species has occurred in New Zealand, and one or two are known from Australia. No species has been found in South America; but they are again met with in Mexico and California; they occur in Vancouver's Island and British Columbia, and are numerous in the United States, where are found the counterparts of several European species, as *A. pilipes*, *A. clarkella*, *A. nitida*, *A. thoracica*, &c.

Div. I. *The abdomen in one or both sexes more or less red.*

### 1. *Andrena hattorfiana*.

*A. atra*, *glabriuscula*; abdomine nigro, cingulo antico rufo, ano scopaque fulvis.

*Andrena hattorfiana*, *Fabr. Syst. Piez.* 325 ♀.

*Spin. Ins. Ligur.* i. 121.

*St.-Farg. Hym.* ii. 254 ♂ ♀.

*Nyland. Notis. wr Sällsk. pro Faun. et Flo. Fenn.* i. 208.

*Smith, Bees Great Brit.* 50.

*Schenck, Nass. Bien.* 234.

*Thoms. Opusc. Ent.* 142; *Hym. Scand.* ii. 72.

*Nomada hattorfiana*, *Fabr. Ent. Syst.* ii. 349.

*Andrena equestris*, *Panz. Faun. Germ.* 46. 17 ♀.

*Melitta lathamana*, *Kirby, Mon. Apum Angl.* ii. 83 ♀.

*Melitta hæmorrhoidalis*, *Kirby, lib. cit.* ii. 141 ♂ ♀ var.

*Andrena hæmorrhoidalis*, *Smith, Zool.* v. 1664.

*Female.* Length 6–8 lines.—Black; head: the face on each side, below the antennæ, with cinereous pubescence; a line of glittering white pile close to the inner margin of the eyes; the flagellum fulvous beneath beyond the third joint. Thorax closely and finely punctured; the sides, beneath, and the legs with a sparing cinereous pubescence. Wings fulvo-hyaline, the tegulæ and nervures rufo-piceous; the scopa on the posterior tibiæ and base of the tarsi pale fulvous; the apical joints of the tarsi ferruginous;

the calcaria pale testaceous. Abdomen ovate and shining; the first, second, and apical margin of the third segment ferruginous; the base of the first segment usually more or less black, the second with a small ovate black spot; the basal margin of the third segment sometimes ferruginous; the apical margins of the third and fourth segments with narrow fasciæ of white pubescence. The apical fimbria fulvous. B.M.

Var.  $\beta$ . The apical margin of the first and the base of the second segment of the abdomen red.

Var.  $\gamma$ . The abdomen entirely black, with the margins of the segments more or less rufo-testaceous.

*Male*. Length 6–7 lines.—Black; the head a little wider than the thorax; the flagellum fulvous beneath beyond the second joint; the clypeus white, with two minute black spots; the anterior margin black, and having a united spot laterally. Thorax: the pubescence pale fulvous, as it is also on the legs; the apical joints of the tarsi rufo-testaceous. Wings as in the female. Abdomen oblong-ovate, its apex acute and clothed with fulvous pubescence; the apical margins of the segments more or less obscurely rufo-testaceous.

Var.  $\beta$ . The basal segment of the abdomen rufo-testaceous. B.M.

This insect is very variable in colouring, apparently being influenced in that respect by the atmosphere. In hot dry summers I have found nearly every female highly coloured; whilst in a cold wet season all have been the black form described by Kirby as a distinct species. The male is found, with the base of the abdomen more or less red, on the Continent; such have been received from Albania and the south of France; but a coloured male has not, to my knowledge, been taken in England. The species has been received from France, Italy, Germany, Albania, Denmark, and Sweden, but is very local in this country; it has been found at Erith, Darenth and Birch Woods, Kent, but most plentifully at Kingsdown, near Walmer Castle; in Devon, at Teignmouth and Dawlish; it has also occurred in South Wales. It is found during July and August, and is partial to the flowers of the wild scabious (*Scabiosa arvensis*).

## 2. *Andrena austriaca*.

*A. atra*, cinereo subvillosa, abdomine cingulo antico rufo, scopa versicolori.

*Andrena austriaca*, Panz. *Faun. Germ.* 53. 19 ♂.

*Andrena rosæ*, Panz. *Faun. Germ.* 74. 10 ♀.

*Spin. Ins. Lig.* i. 192.

*Smith, Zool.* v. 1663; *Bees Great Brit.* 51.

*Schenck, Nass. Bien.* 236.

*Melitta rosæ*, Kirby, *Mon. Apum Angl.* ii. 83 ♀.

*Melitta zonalis*, Kirby, *Mon. Apum Angl.* ii. 87 ♂.

*Female*. Length 5–6 lines.—Black: the flagellum piceous beneath,

the tips of the mandibles ferruginous; the sides of the face, the margin of the vertex, and the cheeks have a pale fulvous pubescence. Thorax: the disk shining and finely punctured, interspersed with a few larger punctures; the sides and the metathorax have a pale fulvous pubescence; the legs have a similar pubescence; the apical joints of the tarsi ferruginous; the wings fulvo-hyaline, the tegulæ rufo-piceous, the nervures ferruginous; the floccus pale fulvous, the scopa of the same colour beneath, above fuscous. Abdomen oblong-ovate, subdepressed; the second segment and apical margin of the first red; the second segment has sometimes a square black spot in the middle; the apical fimbria fusco-ferruginous; beneath, the second segment is red, and the margins of the segments have a pale fulvous fringe. B.M.

Var. *a*. The apical margin of the first and basal margin of the second segments red; the legs dark rufo-piceous.

Var. *β*. A minute red dot on each side of the basal segment and its apical margin red.

Var. *γ*. The apical margins of the three basal segments rufo-testaceous.

*Male*. Length 4 lines.—Black; the antennæ as long as the thorax, the joints of the flagellum subarcuate; the face clothed with a fuscous pubescence. Thorax shining, punctured as in the female; the pubescence and wings also as in that sex; the legs dark rufo-piceous, the claws ferruginous. Abdomen lanceolate, and having a thinly scattered pale fulvous pubescence; the apical margins of the three basal segments more or less red or rufo-piceous; beneath, the second segment is usually red. B.M.

This is a very variable species and also a very local one; it has never occurred in any great numbers. I once took about a dozen at Shirley, near Croydon, in August, settling on the flowers of the common bramble; it has also been taken at Hastings, near Lovers' Seat, at Kingsdown, near Deal, and at Ilfracombe, North Devon, also at Sidmouth, South Devon.

### 3. *Andrena spinigera*.

*A. atra*, pallido villosa, abdominis segmentis tribus basalibus rufis.

*Mas ater*, fulvo-pilosus, thorace fulvescente, abdomine fusco; pedibus rufo-fuscis, pilosis.

*Andrena spinigera*, *Smith*, *Zool.* v. 1669 ♂ (nec ♀); *Bees Great Brit.* 74 (nec ♀).

*Melitta spinigera*, *Kirby*, *Mon. Apum Angl.* ii. 123 ♂, tab. 15. fig. 10.

*Melitta rosæ*, *Kirby*, *lib. cit.* ii. 83, var. *a* ♀.

*Andrena eximia*, *Smith*, *Zool.* v. 1930 ♂; *Bees Great Brit.* 52.

*Schenck*, *Nass. Bien.* 236.

*Female*. Length  $5\frac{1}{2}$  lines.—Black; the face and cheeks have a pale fulvous pubescence; the flagellum fulvo-testaceous beneath, the mandibles ferruginous at the tips; thorax with very fine shallow punctures; the sides and metathorax clothed with pale fulvous

pubescence; wings subhyaline, nervures rufo-testaceous; the legs have a fuscous pubescence above, beneath it is pale fulvous, that on the tarsi beneath ferruginous, the apical joints of the tarsi ferruginous. Abdomen ovate, the three basal segments red; the base of the abdomen, the apical margin of the third segment, and a quadrate spot in the middle black, the three apical segments black, the apical fimbria fusco-ferruginous. B.M.

*Male.* Length 5-5½ lines.—Black; the face densely clothed with sooty black pubescence; the mandibles forcipate, ferruginous at their apex, close to their base on the cheek an acute spine; the antennæ nearly as long as the thorax, the joints subarcuate. The thorax thinly clothed with fulvo-ochraceous pubescence; the wings hyaline, the nervures rufo-testaceous, the apical margins slightly clouded; the legs fusco-ferruginous; the posterior tibiæ and tarsi ferruginous, their pubescence obscure fulvous. Abdomen lanceolate, coloured as in the other sex. B.M.

Var. *α.* The apical margins of the first and second segments of the abdomen red.

Var. *β.* The margins very narrowly rufo-piceous.

Var. *γ.* Abdomen black.

This species appears early in April; it was taken in some abundance in 1858 near Exeter; all the varieties of the male were taken at that time, the highly coloured males being the smallest specimens. It has also been taken at Highgate, Bexley and Birch Wood, Kent, at Esher, and at Pembury, near Tunbridge Wells, at Lewes, and at Hastings, and by Mr. Kirby at Barham, who has, by an oversight, described his insect as being a female; but he has ticketed it male in his collection: the female of his description of *Melitta roseæ* and also the var. *γ* belong to this species; the other varieties are the *A. florea*. Var. *β* is not in the collection.

#### 4. *Andrena decorata*.

*A. atra*; abdomine nigro, segmento primo secundoque marginibus rufis; scopa fulva.

*Andrena decorata*, *Smith*, *Zool.* v. 1667 ♂ ♀; *Bees Great Brit.* 55.

*Female.* Length 6-6½ lines.—Black; the flagellum rufo-piceous beneath; the face clothed with pale fulvous pubescence. Thorax coarsely punctured; the sides of the metathorax have a dense pale fulvous pubescence; the tegulæ rufo-piceous, the nervures pale testaceous; the legs rufo-testaceous, and having a fulvous pubescence, the scopa fulvous. Abdomen: the second segment and the apical margin of the first red, the former having a transverse fuscous stain in the middle, the apical fimbria fuscous. B.M.

Var. *β.* The apical margins of the first and second segments red.

Var. *γ.* The apical margin of the first segment red.

Var. *δ.* The abdomen entirely black.

*Male.* Length 5-5½ lines.—Black; the head rather wider than the

thorax ; the face and sides of the metathorax have a fulvo-ochraceous pubescence ; the antennæ shorter than the thorax, the joints subarcuate ; the wings hyaline, the nervures pale ferruginous, the apical margins faintly clouded ; the tarsi and apex of the tibiæ pale rufo-testaceous. Abdomen lanceolate, the apical margins of the three basal segments red.

This species varies in the male sex as in the female ; but the coloured varieties are much less common. In general appearance it much resembles *A. rosæ*, but its strongly punctured thorax and fulvous scopa distinguish it from that species. It is rare apparently in the home counties, but has been taken on Shirley Common in August, and also at Birch Wood, Kent. Mr. John B. Bridgman found the species plentiful about the end of July and during August, frequenting the flowers of the bramble around Norwich ; he also took it at Fritton, in Suffolk. The male bears a close resemblance to that of *A. bimaculata*, but it is smaller, independent of other differences.

### 5. *Andrena florea*.

*A. atra*, fulvo-cinereo pubescens, abdominis segmentorum marginibus rufo cingulatis.

*Andrena florea*, *Fabr. Ent. Syst.* ii. 308 ♀ ; *Syst. Piez.* 324.

*St.-Farg. Hym.* ii. 259.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 251.

*Smith, Bees Great Brit.* 54.

*Schenck, Nass. Bien.* 236.

*Melitta rosæ, Kirby, Mon. Apum Angl.* ii. 83, var. ♂ & ♀, and the male described.

*Andrena rubricata, Smith, Zool.* v. 1666 ♂ ♀.

*Female.* Length  $6\frac{1}{2}$  lines.—Black ; the face clothed with yellowish brown pubescence ; the flagellum rufo-piceous beneath ; the pubescence on the thorax pale fulvous, fuscous on the disk ; wings subhyaline, their margins faintly clouded, the nervures pale ferruginous ; the legs have a fuscous pubescence above, beneath it is pale fulvous ; that on the basal joint of the tarsi beneath is dark fuscous, the claws ferruginous. Abdomen ovate and shining, delicately punctured, the apical margins of the segments rufo-piceous ; the first and second are usually of the brightest colour ; the apical fimbria fuscous. B.M.

*Male.* Length  $5-5\frac{1}{2}$  lines.—Black ; head wider than the thorax, the pubescence fulvo-cinereous ; the tegulæ rufo-piceous, the wings fulvo-hyaline, the nervures pale ferruginous ; the legs dark rufo-testaceous, their pubescence pale fulvous, the claws ferruginous. Abdomen ovate-lanceolate ; the second segment, the apical margin of the first and basal margin of the third segments red ; the apical margins of the following segments obscurely rufo-testaceous ; the apex fulvous. B.M.

Var. *a.* A fuscous band across the middle of the second segment.



Var.  $\beta$ . The margins only of the first and second segments narrowly red.

Dr. Nylander has compared specimens of this species with the type in the Museum at Kiel; the name given by Fabricius is therefore adopted. The species appears usually about the beginning of June; it frequents by preference the wild briony; it has been taken frequently near Highgate; it is also found at Weybridge, and near Blackwater, Hants, at Bideford and Ilfracombe, North Devon. The male resembles that of *A. rosæ*, but may be known from it by having the joints of the antennæ simple; in *A. rosæ* they are arcuate.

### 6. *Andrena cetii*.

*A. nigra*, cinereo subvillosa, thorace pallide rufescente; abdomine cingulo rufo, segmentis posticis flavo ciliatis.

*Andrena cetii*, *Smith, Zool.* v. 1668; *Bees Great Brit.* 55.

*Thoms. Hym. Scand.* ii. 74.

*Apis cetii*, *Schrank, Ins. Austr.* 405.

*Andrena marginata*, *Fabr. Ent. Syst.* ii. 309; *Syst. Piez.* 326 var.

*Panz. Faun. Germ.* 72. 15.

*St.-Farg. Hym.* ii. 255.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* 251.

*Thoms. Opusc. Ent.* 142.

*Melitta schrankella*, *Kirby, Mon. Apum Angl.* ii. 90.

*Melitta affinis*, *Kirby, lib. cit.* 92 var.

*Andrena frontalis*, *Smith, Zool.* vii. *App.* 59; *Bees Great Brit.* 85 ♂.

*Female.* Length 5 lines.—Black; the face has a thin cinereous pubescence, and a line of silvery pile along the inner margins of the eyes; the flagellum rufo-piceous towards the apex beneath. Thorax thinly clothed with pale ochraceous pubescence; the wings subhyaline, slightly clouded at their apex, the nervures ferruginous; the legs have a short cinereous pubescence, their floccus and scopa beneath are of the same colour, the latter fuscous above. Abdomen oblong-ovate, the basal segment black, except its apical margin, which, as well as the rest of the abdomen, is red. B.M.

Var.  $\alpha$ . The two apical segments fuscous.

Var.  $\beta$ . The three apical segments fuscous.

Var.  $\gamma$ . The three apical segments and a dot on the third fuscous.

Var.  $\delta$ . The three apical segments and a dot on the second and third fuscous.

Var.  $\epsilon$ . Only the margins of three basal segments obscurely red.

*Male.* Length 4 lines.—Fuscous; the face and disk of the thorax have an ochraceous pubescence, the clypeus white and having two black dots; the wings as in the female; the legs rufo-testaceous, their pubescence pale ochraceous. Abdomen lanceolate, the apical margins of the segments obscurely rufo-piceous.

Var.  $\alpha$ . Abdomen black.

This species is local, but plentiful in certain localities; at Kings-

down, near Deal, it has been taken in abundance, all the above varieties being found there. It frequents the wild scabious (*Scabiosa arvensis*); it appears in July and August. Other known localities are Croydon, Dartford, Lewes, Norwich, Parley Heath, Hants, and Coombe Martin, North Devon.

### 7. *Andrena cingulata*.

*A. nigra*, cinereo subpubescens; abdomine glabriusculo, cingulo ferrugineo utrinque puncto nigro.

*Andrena cingulata*, *St.-Farg. Hym.* ii. 257.

*Smith, Zool.* v. 1668; *Bees Great Brit.* 57.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 210.

*Thoms. Opusc. Ent.* 143; *Hym. Scand.* ii. 75.

*Nomada cingulata*, *Fabr. Ent. Syst.* ii. 349; *Syst. Piez.* 394.

*Rossi, Mantis.* 326.

*Apis albilabris*, *Panz. Faun. Germ.* 56. 23 ♂.

*Apis sphegoides*, *Panz. lib. cit.* 56. 24 ♀.

*Meliitta cingulata*, *Kirby, Mon. Apum Angl.* ii. 88.

*Female.* Length  $4\frac{1}{2}$  lines.—Black and shining, the pubescence cinereous; a line of white pile on each side of the face along the inner margin of the eyes; the flagellum rufo-piceous beneath. Thorax: the tegulæ rufo-piceous; the wings subhyaline, faintly clouded at their apical margins, the nervures nigro-piceous; the floccus and scopa beneath white, the latter fulvous above. Abdomen ovate, delicately punctured, the second and third segments and the apical margin of the first red; the second has on each side a minute fuscous dot, the apical fimbria fulvous. B.M.

*Male.*—This sex only differs from the female in having the clypeus white, with two black dots, and the abdomen more convex above. B.M.

This is not an uncommon bee, appearing about the middle of May, and found up to the end of June; it frequents the Germander speedwell and is generally distributed.

### 8. *Andrena ferox*.

*A. nigra*, pallide fulvo villosa, abdomine nitido, tibiis plantisque posticis fulvis.

*Andrena ferox*, *Smith, Zool.* v. 1670 ♂; *Bees Great Brit.* 57.

*Andrena distincta*, *Smith, Zool.* v. 1744 ♀ (nec *Lucas, Expl. Sc. Algér.*).

*Female.* Length 6 lines.—Black; the face thinly clothed with fulvous pubescence; the antennæ nearly as long as the thorax; the clypeus coarsely punctured, and having in the centre a longitudinal shining space. Thorax: the sides have a dense pale fulvous pubescence, the disk nearly naked, having merely a few scattered hairs; the tegulæ rufo-piceous; wings fulvo-hyaline, faintly clouded at their extreme apical margins, the nervures pale ferruginous; the

legs dark rufo-piceous, the posterior tibiæ and all the tarsi pale ferruginous and clothed with fulvous pubescence, the floccus pale fulvous. Abdomen ovate, the apical margins of the segments obscurely rufo-piceous; the apical fimbria fusco-ferruginous. B.M.

*Male.* Length 4-4½ lines.—Black; head subquadrate, much larger than the thorax, sometimes more than twice the size; the mandibles forcipate and armed at their base with an acute spine; the antennæ as long as the thorax; the wings subhyaline, and faintly clouded at their apical margins, the nervures pale rufo-testaceous; the thorax has a little pale fulvous pubescence at the sides; the posterior tibiæ, the anterior and intermediate pairs at their apex, and the tarsi pale rufo-testaceous. Abdomen lanceolate, the apical margin of the first, the basal and apical margins of the second, and the basal margin of the third segments broadly rufo-testaceous; the extreme apex has a fulvous pubescence. B.M.

*Var. a.* The abdomen only having the apical margin of the first and the basal and apical of the second segments rufo-testaceous.

This species was first taken by the late Mr. Thomas Desvignes near Windsor; it has been subsequently found in some abundance near Lea Mills, Bristol, by the late Mr. Walcott, who presented a fine series to the British Museum; it has also been found at Guestling, near Hastings.

Div. II. *The thorax densely pubescent, the abdomen naked, smooth, and shining; without fasciæ of pale pubescence.*

### 9. *Andrena cineraria.*

*A. atra*, albido pubescens; thorace hirsuto, fascia atra; abdomine atro-cærulescente nitido.

*Andrena cineraria*, *Fabr. Ent. Syst.* ii. 329; *Syst. Piez.* 323.

*Spin. Ins. Ligur.* i. 117.

*St.-Farg. Hym.* ii. 238.

*Smith, Zool.* v. 1735; *Bees Great Brit.* 58.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 211.

*Thoms. Opusc. Ent.* 145; *Hym. Scand.* ii. 81.

*Apis cineraria*, *Linn. Syst. Nat.* i. 953, et *Cab. Mus. Linn. Soc.*

*Fabr. Ent. Syst.* ii. 329; *Syst. Piez.* 323.

*Melitta cineraria*, *Kirby, Mon. Apum Angl.* ii. 98.

*Female.* Length 5-7 lines.—Black; the face clothed with white pubescence; that on the thorax is white, having a black band between the wings; the wings subhyaline, their apical margins having a dark fuscous cloud; the pubescence of the legs black, except the fringe on the anterior femora, which is white; abdomen blue-black, smooth and shining; the apical fimbria fuscous. B.M.

*Male.* Length 5-6 lines.—Black; the head and thorax clothed with white pubescence; the wings hyaline, their apical margins faintly clouded; the femora fringed with white pubescence. Abdomen

blue-black, lanceolate, and having the two basal segments clothed with white pubescence, most densely so at the sides. B.M.

This beautiful species appears near London early in April; but I once took it on the 22nd of March, and in Yorkshire I have found it plentiful in July; it frequently burrows in trodden pathways. I never observed any parasite entering its burrows; neither have I observed it attacked by *Stylops*.

#### 10. *Andrena pilipes*.

*A. aterrima*, glabra, abdomine nitido; tibiaram posticarum scopa subtus alba, supra fusca.

*Andrena pilipes*, *Fabr. Ent. Syst.* ii. 312; *Syst. Piez.* 322.

*Rossi, Faun. Etrus.* ii. 98.

*Spin. Ins. Lig.* fasc. iii. 191.

*St.-Farg. Hym.* ii. 236.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 210.

*Smith, Bees Great Brit.* 59.

*Schenck, Nass. Bien.* 237.

*Thoms. Opusc. Ent.* 144; *Hym. Scand.* iii. 79.

*Melitta pilipes*, *Kirby, Mon. Apum Angl.* ii. 96 ♀.

*Melitta pratensis*, *l. c.* ♂.

*Andrena pratensis*, *Thoms. Opusc. Ent.* 146?

*Female.* Length 6–7½ lines.—Black; the pubescence on the head and thorax black; the flagellum nigro-piceous beneath; the wings subfuscous and having a dark cloud at their apical margins, the nervures ferruginous; the floccus on the posterior trochanters of a yellowish white, the scopa silvery white beneath, above fuscous. Abdomen ovate and shining, its apical fimbria sooty black. B.M.

*Male.* Length 5–6 lines.—Very closely resembles the other sex, the pubescence on the thorax inclining to griseous; the abdomen ovate-lanceolate, shining, and having a little sooty pubescence at the apex; legs black; the claws ferruginous. B.M.

This may possibly be the *Apis atra* of Scopoli; but his description is too brief for determination.

This species appears during June and July; it is rather local, but widely distributed. The usual months of its appearance are given; but it has been taken in August and September. It is frequently found on thistles, usually preferring the flowers of that plant. It has been taken at Southend, Darent Wood, and Shirley Common, also at Sidmouth, South Devon, and at Norwich.

#### 11. *Andrena thoracica*.

*A. atra*, villosa, thorace supra hirsuto rufo.

*Andrena thoracica*, *Fabr. Ent. Syst.* ii. 328; *Syst. Piez.* 322.

*Spin. Ins. Ligur.* i. 120.

*St.-Farg. Hym.* ii. 239.

*Smith, Zool.* v. 1735; *Bees Great Brit.* 60.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. ii. 98.*

*Thoms. Opusc. Ent. 146; Hym. Scand. ii. 83.*

*Apis thoracica, Fabr. Ent. Syst. ii. 328; Syst. Piez. 322.*

*Christ. Hym. 178, tab. 14. fig. 6.*

*Melitta thoracica, Kirby, Mon. Apum Angl. ii. 101 ♀.*

*Melitta melanocephala, Kirby, lib. cit. 103, var. ♂.*

*Andrena melanocephala, Thoms. Opusc. Ent. 146?*

*Female.* Length 6–7½ lines.—Black; the disk of the thorax clothed with rufo-fulvous pubescence; wings fusco-hyaline, their apical margins having a dark fuscous cloud; the legs have a black pubescence, the claws ferruginous. Abdomen ovate, shining and delicately punctured, the apical fimbriæ fuscous. B.M.

*Male.* Length 5½–6 lines.—Black; altogether closely resembling the other sex; abdomen elongate-ovate. B.M.

This species appears about the middle of April if the season be mild; but it is usually most abundant in June; I have taken it plentifully in July and August. It is widely distributed, but I have not seen it in the north of England; it has been taken in Kent, Surrey, Hampshire, North and South Devon, also in Norfolk and Suffolk. It is frequently found on thistle-heads.

## 12. *Andrena nitida.*

*A. nigra, nitidiuscula;* thorace hirsutissimo, rufo-fulvo; scopa fusca, subtus griseo-alba; abdomine apice fusco-fimbriato.

*Andrena nitida, Spin. Ins. Ligur. i. 122.*

*St.-Farg. Hym. ii. 237.*

*Smith, Zool. v. 1736; Bees Great Brit. 61.*

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. ii. 253.*

*Apis nitida, Fourc. Ent. Par. no. 2.*

*Melitta nitida, Kirby, Mon. Apum Angl. ii. 104.*

*Andrena consimilis, Smith, Zool. v. 1736, var.*

*Female.* Length 5½–6½ lines.—Black; the pubescence on the clypeus griseous, that on the face and vertex fuscous; the thorax densely clothed above with fulvous pubescence; beneath, as well as the fringe on the femora and floccus on the posterior trochanters, white; the scopa silvery white beneath, dark fuscous above; all the legs have a similar fuscous pubescence above; the wings subhyaline, their apical margins having a slight fuscous cloud, the nervures ferruginous. Abdomen ovate, shining and very delicately punctured at the base; the second and third segments have on each side on their basal margins a patch of white pubescence; sometimes the fourth has a similar spot; the apical fimbria fuscous; beneath, the margins of the segments fringed with white pubescence. B.M.

*Var. a.* The legs nigro-piceous; the posterior tibiæ and all the tarsi ferruginous, the scopa pale fulvous, the apical fimbria of the abdomen fulvous.

*Male.* Length 5-6 lines.—Very closely resembling the female, the pubescence on the face whiter, and the apical joints of flagellum slightly testaceous beneath; thorax as in the female; abdomen more elongate, and having a thin griseous pubescence, and a little fringe of rufo-fusca pubescence at the apex. B.M.

This is one of the early-spring bees, appearing in April, usually about the middle of the month; it commonly frequents the dandelion (*Leontodon taraxacum*). The variety of the female was described as a distinct species some years ago, but is now considered to be only a rare variety. A remarkable hermaphrodite specimen of this species was taken in the Regent's Park, May 1859, the right side of the bee being male and the left female; a figure and description of it was published in 'The Entomologist's Annual.' The variety *A. consimilis* differs greatly from the normal condition of the species: the femora are dark rufo-piceous, the tibiæ and tarsi ferruginous with fulvous pubescence, the apical fimbria being also fulvous. Notwithstanding these differences I consider it a variety. It was captured near London, at Coomb Wood, twenty years ago; and had it been a distinct species others must have been taken. I have seen similar examples in various collections.

### 13. *Andrena vitrea*.

*A. atra*, pallide fulvo villosa, abdomine nitido, scopa fulva.

*Andrena vitrea*, *Smith*, *Zool.* v. 1737 ♀; *Bees Great Brit.* 62; *Entomol. Ann.* 1872, p. 105 ♂ ♀.

*Thoms. Hym. Scand.* ii. 83.

*Andrena pretecta*, *Smith*, *Entomol. Ann.* 1872, p. 106, var. ?

*Female.* Length 6-6½ lines.—Black; the pubescence on the face fuscous intermixed with fulvous; brightest at the sides of the clypeus and on the cheeks. Thorax closely and strongly punctured and thinly clothed above with pale fulvous pubescence, that on the sides and beneath rather paler; the floccus on the posterior trochanters bright pale fulvous; the scopa fulvous, that on the basal joint of the tarsi within ferruginous; wings pale fulvo-hyaline, the nervures pale ferruginous. Abdomen ovate, shining, and with fine shallow punctures, the apical margins of the segments depressed and thinly fringed with pale pubescence; the apical fimbria dark fuscous, nearly black. B.M.

*Male.* Length 4-5 lines.—The general colour of the pubescence on the head and thorax above as in the other sex, that on face being almost black in some examples; the thorax punctured as in the female; the pubescence on the sides of the thorax and that on the legs griseous; that on the posterior plantæ within ferruginous; wings as in the female. Abdomen oblong-ovate, shining, the apex rufo-piceous, and with a thinly scattered griseous pubescence.

After a careful examination of *A. pretecta* I believe it to be a variety of *vitrea*; the thorax is strongly punctured; it differs from

*vitrea* principally in having the fimbria at the apex of the abdomen bright fulvous, and in having a dark margin to the wings. This species appears in July and August, and has only been taken at Windsor and at Sidmouth, South Devon, on the flowers of the bramble, on High Peak, and at Brundall near Norwich.

#### 14. *Andrena albicans*.

*A. nigra*, albicanti subvillosa, thorace anoque ferrugineis hirtis, tibiis posticis fulvis.

*Andrena albicans*, *St.-Farg. Hym.* ii. 242 ♂ ♀.

*Smith, Zool.* v. 1734; *Bees Great Brit.* 62.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 215.

*Schenck, Nass. Bien.* 240.

*Thoms. Hym. Scand.* ii. 76.

*Melitta albicans*, *Kirby, Mon. Apum Angl.* ii. 94.

*Apis hæmorrhoidalis*, *Christ. Hym.* 189, tab. 16. fig. 8 ♀.

*Female.* Length 4–5 lines.—Black; the face with thin cinereous pubescence; a line of white silky pile at the inner margin of the eyes; the clypeus strongly punctured. Thorax clothed above with ferruginous pubescence; wings hyaline, the apical margins slightly clouded; the tegulæ and nervures rufo-testaceous; the pubescence on the metathorax and that beneath cinereous; the intermediate tarsi and posterior tibiæ and tarsi fulvous; their pubescence pale fulvous; the floccus on the posterior trochanters white. Abdomen ovate, slightly shining, and closely punctured; the apical fimbria bright fulvous. B.M.

*Male.* Length  $3\frac{1}{2}$ – $4\frac{1}{2}$  lines.—Closely resembles the female; the pubescence on the face more dense, longer, and inclining to fulvous; the antennæ as long as the thorax; the posterior tibiæ and tarsi rufo-testaceous, the tibiæ having a dark stain beneath; the apical joints of the other tarsi rufo-testaceous. Abdomen oblong-ovate, with the apex fulvous. B.M.

This is perhaps the commonest species found in this country, and also generally distributed throughout Europe. Sir John Richardson found it on the south of Lake Winnipeg. It appears early in April; I have taken it as late as July. It is commonly found on the dandelion. Although so numerous, I have never met with colonies; neither has it been observed to be attacked by *Stylops*.

#### 15. *Andrena similis*.

*A. nigra*, cinerascenti villosa, facie antice albo barbata, tibiis posticis apice tarsisque testaceis.

*Andrena similis*, *Smith, Zool.* vii. *Append. lx*; *Bees Great Brit.* 63.

*Male.* Length 4 lines.—Black; the face and cheeks clothed with long white pubescence, that on the thorax above fulvo-ochraceous; the femora fringed with long white pubescence; the tégulæ rufo-piceous; wings hyaline, iridescent and faintly clouded at their apical margins, the nervures pale ferruginous; the posterior tibiæ and the tarsi rufo-piceous, the former having a black stain beneath, nearly extending to their apex; the claws ferruginous. Abdomen ovate, shining, delicately punctured, and having a thinly scattered short griseous pubescence, the apex fulvous; beneath, the margins of the segments have a narrow white fringe. B.M.

This male closely resembles that of *A. albicans*; but in the finest condition the face is clothed with white, in *A. albicans* it is pale fulvous; the pubescence generally is more inclining to cinereous, the abdomen much more finely punctured, and the second submarginal cell is less narrowed towards the marginal than in *A. albicans*, and the antennæ are shorter than in that species. Some of these differences may appear slight; but by them alone the males of many very distinct species of this genus can be distinguished. The Museum is indebted to Mr. Walcott for specimens of this species captured near Bristol.

Div. III. *The thorax and abdomen densely covered with pubescence.*

#### 16. *Andrena fulva.*

*A. atra*, thorace abdomineque supra hirsutis fulvo-aureis, subtus nigris.

*Andrena fulva*, *St.-Farg.* ii. 245 ♀.

*Smith*, *Zool.* v. 1746; *Bees Great Brit.* 64 ♂ ♀.

*Nyland.* *Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 214.

*Apis fulva*, *Schrank, Enum. Ins. Austr.* 400 ♀.

*Melitta fulva*, *Kirby, Mon. Apum Angl.* ii. 128 ♀.

*Melitta armata*, *Kirby, lib. cit.* 124 ♂.

*Andrena vestita*, *Fabr. Ent. Syst.* ii. 329; *Syst. Piez.* 323.

*Panz. Faun. Germ.* 55. 9.

*Apis vulpina*, *Christ. Hym.* 161, pl. 12. fig. 13.

*Female.* Length  $5\frac{1}{2}$ – $6\frac{1}{2}$  lines.—The pubescence of the thorax above fulvo-ferruginous, that of the abdomen above bright fulvous; the pubescence on the body beneath, legs, and head black; the wings hyaline, their apical margins faintly clouded, the nervures ferruginous. B.M.

*Male.* Length 4– $5\frac{1}{2}$  lines.—Black; the head as wide, sometimes much wider than the thorax; the clypeus with long silvery white pubescence, above which it is slightly fulvous; the mandibles elongate, arcuate, and armed at their base with a short tooth. Thorax above clothed with pale fulvous pubescence; the legs have a fulvous pubescence; the posterior tarsi and apical joints of the anterior and intermediate pairs ferruginous; wings as in the other sex. The abdomen ovate lanceolate, the two basal seg-



ments thinly clothed with long pale fulvous pubescence; the apical margins of the following segments have a long fringe of the same colour at the sides of the abdomen. B.M.

The female of this species is the most beautiful in the genus, and is a most abundant insect, usually appearing with the apple-blossoms, to which it delights to resort; it is particularly abundant on Hampstead Heath, where in 1840 I captured several pairs *in coitu*, since which time I have on more than one occasion detected them in company. The male is so unlike the female that nothing short of such an observation, except finding them in their burrows, could lead any one to suppose that they belonged to the same species. The best time for making such observations appears to be between nine and eleven on fine quiet sunny mornings. The beautiful colouring of *A. fulva* soon fades by exposure to the sun; it is therefore necessary to watch for their first appearance: the female fades to a pale yellow, and is subject to have the pubescence rubbed off; whilst the male becomes entirely of a hoary grey. No examples of this species have been received from Scotland; but it will probably be found there, as it is met with in Denmark, Sweden, Norway, and Finland.

#### 17. *Andrena clarkella*.

*A. atra*, *hirsuta*, thorace pedibusque posticis fulvis.

*Andrena clarkella*, *Smith, Zool.* v. 1774 ♂ ♀; *Bees Great Brit.* 65.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 212.

*Schenck, Nass. Bien.* 237.

*Thoms. Opusc. Ent.* 148; *Hym. Scand.* ii. 89.

*Melitta clarkella*, *Kirby, Mon. Apum Angl.* ii. 130 ♀.

*Andrena dispar*, *Zett. Ins. Lapp.* 460.

*Andrena bicolor*, *St.-Farg. Hym.* ii. 243 (*nec Fabr.*).

*Lucas, Expl. Sc. Algér.* iii. 180.

*Female.* Length 5–6½ lines.—Black; the pubescence black, excepting that on the disk of the thorax, posterior tibiæ and tarsi, and a little at the base of the abdomen, which is fulvous; the wings subhyaline, their apical margins slightly clouded, the nervures ferruginous; the posterior tibiæ and tarsi fulvo-piceous; the intermediate tarsi fulvous beneath. Abdomen ovate, entirely black. B.M.

Var. *α.* The two basal segments fringed with fulvous pubescence.

Var. *β.* All the abdominal segments fringed with fulvous pubescence.

*Male.* Length 4½–5 lines.—Black; the pubescence on the clypeus pale fulvous, above which, as well as along the sides of the face, it is black; the disk of the thorax clothed with fulvo-ochraceous pubescence; on the metathorax and beneath it is pale fulvous; the wings hyaline, iridescent and faintly clouded at their apical margins, the nervures pale ferruginous; the legs have a pale fulvous pubescence; the apex of the posterior tibiæ more or less pale tes-

taceous within. Abdomen ovate-lanceolate, shining, and thinly clothed with long pale fulvo-ochraceous pubescence, the extreme apex pale testaceous. B.M.

In the Catalogue of British Hymenoptera, the name *bicolor* of Fabricius was adopted for this species, as had been done by St.-Fargeau and Lucas; but I feel great pleasure in being able to retain that of *clarkella*, particularly as Mr. Kirby named it in honour of Mr. Bracy Clark. Dr. Nylander having seen a typical specimen of the *A. bicolor* of Fabricius in Sehestedt's Museum, states that it is the insect named *A. aestiva*, and which Mr. Kirby had included in *M. gwynana*, probably considering it a mere variety. On referring to the first description of *A. bicolor* in the 'Systema Entomologiæ,' we find that Fabricius says, "*affinis et succinctæ, at abdomen immaculatum;*" in all his subsequent works, the 'Entomologia Systematica' excepted, he has omitted this observation; from which it appears that *A. clarkella* has no relation to the species described as *A. bicolor*. But Dr. Nylander has set the matter at rest.

No bee is known which has a wider geographical range than *A. clarkella*: it is found in all parts of the United Kingdom, apparently preferring elevated situations; it occurs in France, Germany, Lapland, Finland, Denmark, and Sweden; it has also been found in Algeria; and there is a series of specimens in the British Museum from Nova Scotia.

This bee is usually the first which appears in spring—as early as the 4th of March in 1849; but the weather that season was unusually mild; the general time for its appearance is about the third week of March. I have frequently dug both sexes out of the same burrow, and have more than once observed the sexes *in coitu*, first in 1840. Males are sometimes captured in spring before the snow has quite disappeared.

The female is subject to vary; the second variety is the colour of most of the specimens from Nova Scotia, and appears to be the common northern form of the species.

All the specimens received from Scotland belong to this latter variety.

Div. IV. *Species having a fringe of long pale pubescence on the apical margins of the segments.*

### 18. *Andrena gwynana*.

*A. atra*, villosa; thorace, abdomine antice, scopaque tibiæ posticarum ferrugineis.

*Andrena gwynana*, Smith, Zool. v. 1742; *Bees Great Brit.* 67.

Nylander, *Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 113.

Schenck, *Nuss. Bien.* 243.

*Melitta gwynana*, Kirby, *Mon. Apum Angl.* ii. 120 ♂ ♀.

*Female.* Length 5–5½ lines.—Black; the pubescence on the head black; the thorax clothed above with ferruginous pubescence; the wings subhyaline, their apical margins slightly clouded, the nervures ferruginous; the floccus on the posterior trochanters pale fulvous, the scopa fulvous, the basal joint of the tarsi ferruginous within. Abdomen subovate, the pubescence on the three basal segments ferruginous, their apical margins having a long fringe of the same colour; the apical fimbria sooty black; the segments beneath fringed with black pubescence. B.M.

*Male.* Length 4–4½ lines.—The face clothed with a long dense black pubescence; the antennæ rather shorter than the thorax, which has a dull, pale ferruginous pubescence; the wings subhyaline, iridescent, and slightly clouded at their apical margins; the legs fusco-ferruginous, and having a thin pale ferruginous pubescence; the apical joints of the tarsi ferruginous. Abdomen ovate-lanceolate and having a scattered pale ferruginous pubescence. B.M.

This is a very common species, appearing in April, sometimes as early as the latter part of March; it is found plentifully in Scotland. It closely resembles the next species; but that does not appear before June, usually the latter part of the month, and is found during July and the beginning of August.

### 19. *Andrena bicolor*.

*A. atra*, villosa; thorace, abdominis segmentis primis tribus parce rufo-hirtis; tibiis posticis tarsisque rufis, scopa fulva.

*Andrena bicolor*, *Fabr. Ent. Syst.* ii. 376; *Syst. Piez.* 326.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 253.

*Smith, Bees Great Brit.* 67.

*Thoms. Opus. Ent.* 150; *Hym. Scand.* ii. 95.

*Melitta pilosula*, *Kirby, Mon. Apum Angl.* ii. 164 ♂.

*Andrena æstiva*, *Smith, Zool.* vii. *Append.* 60 ♀.

*Female.* Length 4½–5½ lines.—Black; the face thinly clothed with brown pubescence, the antennæ nigro-piceous beneath; the thorax has a pale ferruginous pubescence, palest at the sides of the meta-thorax and beneath; wings subhyaline, their nervures ferruginous; the legs dark rufo-piceous, the posterior tibiæ and the tarsi ferruginous; the floccus pale fulvous; the scopa fulvous, having a golden lustre. The abdomen ovate, finely punctured; the margins of the basal segments thinly fringed with pale fulvous pubescence; the apical fimbria fusco-ferruginous; the margins of the segments beneath fringed with pale pubescence. B.M.

*Male.* Length 3½–4 lines.—Black; the head rather wider than the thorax, narrowed behind; the face covered with long dark fuscous pubescence. Thorax clothed above with thin pale ferruginous pubescence; on the sides and on the legs it is cinereous; wings

subhyaline, iridescent and slightly clouded at their apical margins, the nervures testaceous; the legs usually dark rufo-piceous, the tarsi ferruginous. Abdomen oblong-ovate, with a thinly scattered pale pubescence; the apex acute and pale testaceous. B.M.

This species is found during July and August. I have usually found it on the flowers of the mallow (*Malva sylvestris*). Closely resembling *A. gwynana*, it is a less bulky insect and less pubescent; its abdomen is more elongate; and the margins of the segments beneath are fringed with pale pubescence, whereas the fringes are black in *A. gwynana*. The male has a more slender form, the legs paler with pale ferruginous tarsi.

## 20. *Andrena helvola*.

*A. nigra*; thorace abdominisque basi fulvo-rufis, hirtis; tibiarum posticarum scopæ flavescente.

*Andrena helvola*, Rossi, *Faun. Etrus.* ii. 97.

*Panz. Faun. Germ.* 97. 19.

*Smüth, Zool.* v. 1742; *Bees Great Brit.* 68 ♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 99.

*Thoms. Hym. Scand.* ii. 91 ♂.

*Apis helvola*, Linn. *Syst. Nat.* i. 955, et *Cab. Mus. Linn. Soc.* ♀.

*Fabr. Ent. Syst.* ii. 310; *Syst. Piez.* 326.

*Spin. Ins. Ligur.* i. 122.

*Melitta helvola*, Kirby, *Mon. Apum Angl.* ii. 119 ♀.

*Melitta angulosa*, Kirby, *lib. cit.* 127 ♂.

*Female.* Length 5–5½ lines.—Black; the pubescence on the clypeus pale fulvous, above and on the sides of the face it is fuscous; the mandibles ferruginous at their apex. Thorax clothed above with rufo-fulvous pubescence, at the sides and beneath it is griseous; the wings hyaline, their apical margins faintly clouded, the tegulæ and nervures ferruginous; the femora beneath fringed with white pubescence, the floccæ white, the scopæ pale fulvous, the apical joints of the tarsi ferruginous. Abdomen subovate, the pubescence at the base fulvous, beyond which it is cinereous; beneath, the margins fringed with cinereous pubescence. B.M.

*Male.* Length 5–5½ lines.—Black; the head wider than the thorax, subquadrate; the clypeus covered with long white pubescence, at the insertion of the antennæ it is pale fulvous; the antennæ nearly as long as the thorax; the mandibles forcipate, subdentate at their base. Thorax thinly clothed above with rufo-fulvous pubescence; the wings hyaline, iridescent, faintly clouded at their apex, the nervures ferruginous, tegulæ rufo-piceous; the tarsi ferruginous. Abdomen shining, ovate-lanceolate, fulvous at the apex. B.M.

This insect is not rare; it appears to be somewhat local, but is scattered all over the kingdom; it is found in the London district, appearing usually at the end of April or the beginning of May; it

has also been found in Scotland. The beauty of its colouring when it first appears soon fades. Its male is the *M. angulosa* of Kirby.

### 21. *Andrena varians*.

*A. atra*, thorace abdominisque basi hirsuto-fulvis, tibiaram posticarum scopa versicolori.

*Andrena varians*, *Smith, Zool.* v. 1741 ♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 213.

*Thoms. Opusc. Ent.* 149; *Hym. Scand.* ii. 92.

*Apis varians*, *Rossi, Mant.* 317.

*Panz. Faun. Germ.* 56. 12 ♀.

*Melitta varians*, *Kirby, Mon. Apum Angl.* ii. 117 ♀.

*Andrena mixta*, *Schenck, Nass. Bien.* 243 ?

*Female.* Length 5–5½ lines.—Black; the pubescence on the head black, that on the clypeus brown. The thorax above clothed with rufo-fulvous pubescence; beneath and on the femora it is pale fulvous; the wings subhyaline, their apical margins slightly clouded, the nervures ferruginous; the floccus cinereous; the scopa fuscous above, and of a silvery whiteness beneath. Abdomen ovate, the pubescence at the base fulvous, posteriorly it is black; beneath, the segments margined with dark brown pubescence. B.M.

*Male.* Length 4–5 lines.—Head wider than the thorax; above, narrowed posteriorly; the face covered with white pubescence, above it is pale fulvous; mandibles forcipate, obsoletely dentate at their base; antennæ as long as the thorax. Thorax thinly clothed above with rufo-fulvous pubescence, paler at the sides and white beneath; wings hyaline, their apical margins slightly clouded, iridescent, with the tegulæ rufo-piceous; the legs with griseous pubescence. Abdomen oblong-ovate, with a little rufo-fulvous pubescence at its base, that at the apex bright pale fulvous. B.M.

This species is found during April, May, and June; it closely resembles *A. helvola*; but the females are readily distinguished. *A. varians* has black pubescence on the abdomen with fulvous at its base; *A. helvola* has whitish pubescence on the four basal segments, that on the apical segments being dark fuscous; it has also some fulvous at the base. The males are very much alike; that of *A. helvola* has at the base of the mandibles an angular projection, forming frequently a short tooth; this is not developed in the male of *A. varians*. The males I have taken *in coitu* are here contrasted.

### 22. *Andrena atriceps*.

*A. nigra*, griseo pubescens; thorace pube rufescente; tibiis posticis fulvis, scopa fulvo-aurea.

*Andrena atriceps*, *Smith, Bees Great Brit.* 70 ♂ ♀.

*Melitta atriceps*, *Kirby, Mon. Apum Angl.* ii. 114 ♂.

*Melitta tibialis*, Kirby, *lib. cit.* 107 ♀.

*Andrena tibialis*, Smith, *Zool.* v. 1737.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 98.

*Thoms. Opusc. Ent.* 144; *Hym. Scand.* ii. 77.

*Female.* Length 6–7 $\frac{1}{4}$  lines.—Black; the clypeus and cheeks clothed with cinereous pubescence; at and above the insertion of the antennæ it is slightly fulvous. Thorax clothed above with rufo-fulvous pubescence, at the sides and beneath it is griseous; the tegulæ rufo-piceous, the wings subhyaline, having frequently a fulvous tinge; their apical margins faintly clouded; the fringe on the femora and the floccus white; the posterior tibiæ and the tarsi rufo-fulvous, the scopa bright fulvous. Abdomen subovate, the apical margins of the segments depressed, shining, covered with a short griseous pubescence, and having a fringe of the same colour on the apical margins of the segments; the apical fimbria fuscous; beneath, the margins are ciliated with white. B.M.

*Male.* Length 5–6 $\frac{1}{2}$  lines.—Black; the face clothed with black or dark brown pubescence, the cheeks have a long beard of pale fulvous pubescence; the antennæ nearly as long as the thorax, the joints of the flagellum subarcuate, the thorax has a rufo-fulvous pubescence; the wings as in the other sex; the tarsi and the apex of the posterior tibiæ rufo-testaceous. Abdomen ovate-lanceolate, shining, and thinly sprinkled with pale fulvous pubescence, the segments having a thin fringe of the same colour; the apex fulvous. B.M.

Var. *a.* The posterior tibiæ rufous half their length, sometimes almost entirely rufous.

This species usually appears early in April, but is not unfrequently found in March; it is generally distributed throughout the United Kingdom. In the neighbourhood of London it is very frequently infested by a species of *Stylops*. On the 5th and 6th of April, 1875, no less than forty-six bees were captured that were stylopized; of these only one female bee developed a male *Stylops*, eighteen males being obtained from male bees; five female bees had each two females of the parasite infesting them; and two males each produced two males of the *Stylops*; all the rest had single parasites in them. It is from the early developed species of Andrenidæ that *Stylops* is to be obtained; those species that appear in June or July are rarely if ever infested.

### 23. *Andrena mouffetella*.

*A. nigra*, pallido pubescens; abdomine piloso, nigro-æneo; thorax rufescenti-piloso; tibiis posticis tarsisque rufis.

*Andrena mouffetella*, Smith, *Zool.* v. 1738; *Bees Great Brit.* 71.

*Melitta mouffetella*, Kirby, *Mon. Apum Angl.* ii. 108.

*Female.* Length 5 $\frac{1}{2}$ –6 lines.—Black; the face below the antennæ with pubescence of a changeable hue, fuscous in one light and

fuscous-cinereous in another, that on the cheeks white. Thorax clothed above with rufo-fulvous pubescence; on the metathorax, on the sides and beneath it is nearly white; the wings hyaline, their apical margins faintly clouded, with the nervures pale ferruginous; the legs have a pale rufous pubescence, the fringe on the femora and the floccus on the posterior trochanters white; the posterior tibiæ, the apical joints of the anterior tarsi, and the intermediate and posterior pairs rufous, the scopa fulvous. Abdomen obscurely nigro-æneous, subovate, convex, and thinly sprinkled with short pale fulvous pubescence, the apical margins of the segments with a whitish fringe, the apical fimbria somewhat fulvous. B.M.

*Male.* Length 5 lines.—The face with pubescence similar to the female, with a little fulvous intermixed at the insertion of the antennæ, which are as long as the thorax, the joints arcuate. Thorax and wings as in the other sex; all the tarsi and the posterior tibiæ ferruginous, usually more or less fuscous at the base, sometimes to more than half their length. B.M.

This must be a very local species: Kirby took it once at Barham, and in his collection there is one female and two males; the Museum collection contains a male from that of Mr. Stephens. I have a female, taken at Aldershot some years ago, that I have considered a variety of the species; this has white pubescence on the face; in other respects it closely resembles it.

#### 24. *Andrena nigro-ænea.*

*A. nigra*, fulvo pubescens; capite anoque pube atra; abdomine subhirsuto, nigro-æneo.

*Andrena nigro-ænea*, *Smith, Zool.* v. 1738; *Bees Great Brit.* 71.

*Schenck, Nass. Bien.* 239.

*Thoms. Opusc. Ent.* ii.; *Hym. Scand.* ii. 84.

*Melitta nigro-ænea*, *Kirby, Mon. Apum Angl.* ii. 109.

*Sowerby, Brit. Miscel.* i. 77, tab. 38.

*Female.* Length 6–6½ lines.—Black; the pubescence on the face dark brown, above the insertion of the antennæ and at the sides it is black; on the cheeks, margin of the vertex, and thorax above the pubescence is fulvous; on the sides and on the femora it is paler; the scopa bright fulvous, the pubescence on the tarsi dark fuscous; the wings subhyaline, their nervures rufo-testaceous. Abdomen nigro-æneous, ovate, and thinly clothed with fulvous pubescence; the margins have a fringe of the same colour; the apical fimbria black. B.M.

*Male.* Length 5–6 lines.—The face clothed with reddish brown pubescence; the antennæ not quite so long as the thorax, the joints subarcuate; the legs and thorax have a fulvous pubescence, not so bright as in the female; the abdomen nigro-æneous, ovate, and thinly covered with fulvous pubescence; towards the apex it is black. B.M.

This species appears in April; it is generally distributed, and has been found both in Scotland and Ireland; it commonly frequents the dandelion (*Leontodon taraxacum*). An additional interest attaches to this bee from the fact of its being the species from which Mr. Kirby first obtained the *Stylops melittæ*; and although it has been found since attacked by that parasite, it is not the species commonly infested. Near London *A. atriceps* and *A. trimmerana* are much more frequently stytopized.

### 25. *Andrena trimmerana*.

*A. nigra*, griseo rufescente pubescens, tibiis posticis scopa versicolori.

*Andrena trimmerana*, *Smith, Zool.* v. 1740; *Bees Great Brit.* 72 ♂ ♀.  
*Nyland. Notis. ur. Sällsk. pro Faun. et Flo. Fenn.* ii. 252.  
*Schenck, Nass. Bien.* 237.  
*Thoms. Hym. Scand.* 85.

*Melitta trimmerana*, *Kirby, Mon. Apum Angl.* ii. 116 ♀.

*Female.* Length  $5\frac{1}{2}$ –6 lines.—Black; the face clothed with dark brown pubescence, at the sides and above the insertion of the antennæ it is black; the antennæ half the length of the thorax, which is clothed above with rufo-fulvous pubescence; the wings hyaline, their apical margins slightly clouded; the legs have a fuscous pubescence above, the femora fringed with pale fulvous; the floccus and the scopa beneath glittering silvery white, the latter dark fuscous above; the apical joints of the tarsi ferruginous. Abdomen ovate, thinly covered with pale fulvous pubescence, the apical fimbria black or dark brown; the margins of the segments beneath testaceous and thinly fringed with pale pubescence. B.M.

*Male.* Length 5–6 lines.—The head wider than the thorax; the mandibles forcipate and subdentate at their base, the tips ferruginous; the face has a reddish brown pubescence at the sides, intermixed with black above the clypeus; the antennæ as long as the thorax, the joints of the flagellum arcuate. Thorax shining, the pubescence on the disk sparing, rufo-fulvous, at the sides and beneath much paler, as well as that on the legs; the apical joints of the tarsi rufo-testaceous. Abdomen shining, lanceolate, and having a tuft of pale ferruginous pubescence on the basal segment, the margins of the first two segments usually slightly depressed; a thin pubescence is scattered over the abdomen, particularly at the sides; the apex rufo-testaceous and having a little fulvous pubescence. B.M.

This is a very well-marked species; the female has unusually long antennæ, and has the scopa on the posterior tibiæ black above and silvery white beneath; the male also has the antennæ longer than is usual in the genus, and has also a tuft of pubescence at the base of the abdomen. It appears in April, and is common in the London



district. It is frequently attacked by a species of *Stylops*, which has been bred from it, and described by Newport in the 'Linnean Transactions,' and named *Stylops aterrima*. Specimens from Loch Rannoch, Perthshire, differ in being much darker-coloured than those described, the pubescence on the face of the males being quite black.

## 26. *Andrena picicornis*.

*A. nigra*, *grisescenti* subvillosa, capite atro, antennis piceis.

*Andrena picicornis*, *Smith*, *Zool.* v. 1745; *Bees Great Brit.* 75 ♂ ♀.  
*Melitta picicornis*, *Kirby*, *Mon. Apum Angl.* ii. 123 ♀.

*Female.* Length  $5\frac{1}{2}$ –6 lines.—Black; the face clothed with black pubescence, that on the margin of the clypeus obscure fulvous; the flagellum rufo-piceous. Thorax thinly clothed above with dark fulvo-ochraceous pubescence, that on the sides of the meta-thorax and beneath paler; wings fulvo-hyaline, the nervures pale ferruginous; the legs rufo-testaceous; the scopa on the posterior tibiæ fulvous; the apical joints of the tarsi feruginous. Abdomen ovate, shining and fuscous, with a thin pale fulvous pubescence; the apical margins of the segments rufo-testaceous; the apical fimbria fuscous. B.M.

*Male.* Length 5 lines.—Closely resembles the female, but more elongate; the face clothed with sooty black pubescence; antennæ shorter than the thorax, the joints of the flagellum subarcuate; the legs rufo-piceous, their pubescence fulvous. Abdomen elongate-ovate and shining; the apical margins of the segments obscurely rufo-testaceous; the three basal ones have a thin pale pubescent fringe, on the fourth and fifth it is longer and more dense; the two apical segments with fuscous pubescence, intermixed with a few fulvous hairs at the apex. B.M.

This is a very local species; the only locality known is the neighbourhood of Brighton, where it was found by the late Mr. Walcott, the exact locality being, I believe, Portslade, towards Shoreham. I have only seen about a dozen specimens, all being attacked by a species of *Stylops*. Taken in June.

## 27. *Andrena bimaculata*.

*A. atra*, pallido fulvo subvillosa, abdomine aliquando cingulo antico ferrugineo, scopa fulva.

*Andrena bimaculata*, *Smith*, *Zool.* v. 1739; *Bees Great Brit.* 76 ♂.  
*Melitta bimaculata*, *Kirby*, *Mon. Apum Angl.* ii. 115 ♂.  
*Andrena conjuncta*, *Smith*, *Zool.* v. 1744; *Bees Great Brit.* 73 ♀.

*Female.* Length 6 lines.—Black; the head in front covered with dark fuscous pubescence, obscurely fulvous at the anterior margin of the clypeus; that on the cheeks pale fulvous; the mandibles

ferruginous at their apex. Thorax closely and rather strongly punctured, the punctures on the disk less dense than at the sides, clothed with pale fulvous pubescence; the wings hyaline, the tegulæ dark rufo-piceous, the nervures pale rufo-testaceous; the femora fringed with pale fulvous pubescence, that on the anterior and intermediate tibiæ above short and fuscous; the floccus on the posterior trochanters pale fulvous, the scopa of the tibiæ fulvous; the basal joint of the posterior tarsi fusco-ferruginous; the claw-joint of all the tarsi rufo-testaceous. Abdomen ovate, the apical margin of the basal segment ferruginous, as are also the sides of the second, which has also sometimes a faint narrow ferruginous margin; the apical margins of the second, third, and fourth segments with a pale marginal fringe, the apical fimbria black.

Var.  $\beta$ . The apical margin of the basal segment only slightly ferruginous.

Var.  $\gamma$ . Abdomen black. (*A. conjunctiva*, Smith.) B.M.

*Male*. Length 5-5½ lines.—In general appearance like var.  $\gamma$  female, more slender and with longer antennæ, the joints arcuate, the general colouring of the pubescence more inclining to griseous than in the female, except that on the head, which is nearly black; occasionally the apical margin of the basal segment is narrowly ferruginous, and the second ventral segment has two red maculæ; these are very inconstant, frequently entirely wanting. B.M.

Mr. T. B. Bridgman, of Norwich, took this species in April, near the city, at Eaton, Blundall, and Mousehold Heath, in plenty; they frequented the blackthorn and willows. The highly coloured varieties were less numerous than the darker ones. I took the female some years ago, but have never found the male; it must be a very local insect.

## 28. *Andrena smithella*.

*A. nigra*, pallido fulvo villosa, abdominis segmentis margine pube albidiore.

*Andrena smithella*, *Smith*, *Zool.* v. 1748; *Bees Great Brit.* 76 ♂ ♀.

*Melitta smithella*, *Kirby*, *Mon. Apum Angl.* ii. 131 ♀.

*Andrena clypeata*, *Smith*, *Bees Great Brit.* 84 ♂.

*Female*. Length 5-6 lines.—Black; the pubescence on the face pale fulvous, a few scattered black hairs on the vertex. Thorax clothed above with rufo-fulvous pubescence; wings hyaline, faintly clouded at their apical margins, the tegulæ and nervures ferruginous; the legs dark rufo-piceous, and with a pale fulvous pubescence; the floccus whitish, the scopa having a silvery whiteness beneath. Abdomen ovate and pubescent, the pubescence fulvous towards the base, beyond which it becomes paler; the apical margins of the second, third, and fourth segments have a narrow whitish fringe; the apical fimbria fusco-ferruginous. B.M.

*Male*. Length 3½ lines.—Black; the head subquadrate, wider than

the thorax, the posterior margin of the vertex deeply emarginate; the mandibles forcipate and with an angular tooth at their base; the face and cheeks with long white pubescence; the joints of the flagellum subarcuate. Thorax with long thin cinereous pubescence, beneath it is white; wings hyaline, the nervures rufo-testaceous. Abdomen oblong-ovate, shining, the apical margins of the segments obscurely rufo-piceous. B.M.

This is a very local species, appearing about the middle of April; it has been found on Wimbledon Common and at Weybridge, also in some abundance at Blundall, near Norwich. It resembles *A. lapponica*; but if the abdomen of the female be viewed sideways, the pubescence will be seen to form suberect bands, the base of the segments being naked.

### 29. *Andrena lapponica*.

*A. nigra*, fulvescenti subpilosa, thorace abdominisque basi fulvescentibus.

*Andrena lapponica*, Zett. *Ins. Lapp.* 460 ♀.

Smith, *Bees Great Brit.* 77 ♂ ♀.

Nyland. *Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 254.

Thoms. *Opusc. Ent.* 150; *Hym. Scand.* ii. 94.

*Andrena apicatus*, Smith, *Zool.* v. 1748 ♀.

*Female.* Length 5–5½ lines.—Black; the face clothed with dull fulvous pubescence, fringed at the margin of the eyes with black hairs, that on the vertex black. Thorax above clothed with dull rufous pubescence; at the sides, beneath, and on the legs it is paler; on the tibiæ above it is short and fuscous, and on the posterior tibiæ beneath bright fulvous; beneath the tarsi it is ferruginous; the wings hyaline, their nervures rufo-testaceous. Abdomen ovate and pubescent, the pubescence fulvous at the base and rather dense; on the third and fourth segments it is shorter and thinner, and black on the two apical segments. B.M.

*Male.* Length 3½–4½ lines.—Black; on the clypeus and cheeks the pubescence is cinereous; on the sides of the face and on the vertex it is black; the mandibles forcipate, with an angular tooth at their base, their tips rufo-piceous; the head wider than the thorax, and emarginate behind. The thorax clothed above with dull fulvous pubescence, beneath and on the legs it is cinereous; the legs obscure rufo-piceous; wings as in the female. Abdomen ovate-lanceolate, shining, and with long pale fulvous pubescence at the base; the apex fulvous. B.M.

This insect was first discovered at Moffat by the Rev. Wm. Little, and subsequently found near Bristol.

30. *Andrena nigriceps*.

*A. atra*, thorace dense fulvo-pubescente, abdomine fasciis quatuor villosis rufescentibus.

*Andrena nigriceps*, *Smith*, *Zool.* v. 1749; *Bees Great Brit.* 78 ♂ ♀.  
*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 99.  
*Thoms. Opusc. Ent.* 147; *Hym. Scand.* ii. 86.  
*Melitta nigriceps*, *Kirby, Mon. Apum Angl.* ii. 134 (nec ♂).

*Female.* Length 5 lines.—Black; the pubescence on the head black; on the posterior margin of the vertex a thin fringe of fulvous pubescence; the flagellum nigro-piceous beneath. Thorax densely clothed with rufo-fulvous pubescence, paler on the metathorax and sides; the tegulæ ferruginous; the wings hyaline, their apical margins faintly clouded, the nervures ferruginous; the legs have a black pubescence, the apical joints of the tarsi rufo-piceous. Abdomen ovate, subdepressed, the four basal segments with a broad fascia of fulvous pubescence; that on the fifth and apical segment is black. B.M.

*Male.* Length 4 lines.—Head, the face densely clothed with black pubescence mixed with a little brown on the vertex; the mandibles fringed with reddish brown pubescence. Thorax closely punctured, and sparingly clothed with reddish brown pubescence, much paler on the metathorax and sides; the legs similarly clothed. Abdomen thinly sprinkled with pale brown hairs, which are most dense on the three basal segments; the apical margins of the second and following segments fringed thinly with pale pubescence. B.M.

This is by no means a common species; it is found during July and August; its known localities are Kingsdown, near Deal; Pakefield, near Lowestoft; Mousehold and other places in the neighbourhood of Norwich; also Barmouth, North Wales, and Ilfracombe, North Devon. There is no specimen of the male described by Mr. Kirby in his type collection; but as he says "taken in April," it is very probable that it did not belong to this species, but was a male of "*bimaculata*" without the red spots.

31. *Andrena simillima*.

*A. atra*, capite pallido-viloso, thorace fulvo, abdomine fasciis quatuor fulvescentibus.

*Andrena simillima*, *Smith, Cat. Hym. Acul. Append.* 122; *Bees Great Brit.* 78 ♂ ♀.

*Female.* Length 5 lines.—Black; the pubescence on the face very pale fulvous, on the vertex fulvous; the clypeus strongly punctured. Thorax clothed above with fulvous pubescence, beneath and on the sides it inclines to cinereous; wings hyaline, the nervures ferruginous; the fringe of the femora beneath and the floccus white; the tibiæ with fuscous pubescence above, that on the tarsi

beneath ferruginous; the apical joints of the tarsi ferruginous. Abdomen oblong-ovate; the first and three following segments fringed with pale yellowish white pubescence; the two apical segments with black pubescence. B.M.

*Male.* Length 4 lines.—Black; the face clothed with pale pubescence; that on the clypeus anteriorly is white, its anterior margin emarginate, the lateral angles produced into sharp teeth; the labrum bidentate; mandibles forcipate, their tips ferruginous; antennæ not quite as long as the thorax. Thorax clothed above thinly with fulvous pubescence, beneath it is white; wings as in the female. Abdomen ovate-lanceolate, the segments thinly fringed with pale pubescence, the apex fulvous. B.M.

This insect is found during July and August, and frequents the common bramble (*Rubus fruticosus*). Found plentifully at Kingsdown, near Deal, at the foot of the chalk cliffs; at Lowestoft, on the common; also at Folkestone, and at Luccombe Chine, Isle of Wight.

### 32. *Andrena pubescens*.

*A. nigra*, pallido subvillosa, thorace fulvo, abdominis segmentis margine albidis, antennis subtus plantisque rufis.

*Andrena pubescens*, *Smith, Bees Great Brit.* 79 ♂ ♀.

*Melitta pubescens*, *Kirby, Mon. Apum Angl.* ii. 141 ♂.

*Melitta fuscipes*, *Kirby, lib. cit.* 136 ♀.

*Andrena fuscipes*, *Smith, Zool.* v. 1751.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 256.

*Schenck, Nass. Bien.* 250.

*Thoms. Opusc. Ent.* 148; *Hym. Scand.* ii. 87.

*Andrena cincta*, *Nyland. lib. cit.* i. 220.

*Female.* Length 5 lines.—Black; the face clothed with pale fulvous pubescence, a line of pale downy pile along the inner margins touching the eyes; the flagellum more or less fulvous beneath. Thorax, the disk clothed with fulvous pubescence, on the sides of the metathorax it is much paler; the tegulæ rufo-testaceous; the wings subhyaline, slightly clouded at their apical margins, the nervures rufo-piceous; the legs rufo-testaceous, having a fuscous pilosity above; the floccus yellowish white; the scopa pale fulvous beneath; the apical joints of the tarsi testaceous. Abdomen subovate, the basal segment covered with pale fulvous pubescence, and the three following segments having a fascia of the same; the apical fimbria rufo-fuscous. B.M.

*Male.* Length 4 lines.—The face has a dense white pubescence; on the thorax it is ochraceous, very pale on the sides and beneath; the wings hyaline and iridescent; legs as in the female; the abdomen lanceolate, and covered with a long, dense, pale yellow pubescence. B.M.

This is a summer insect, and found during July and August. I have always observed it frequenting the purple heath; it is very

common at Weybridge and on all the open commons in Hampshire, occasionally forming large colonies. It is the *M. pubescens* of Kirby, who took it in Suffolk, and considered it a rare species.

### 33. *Andrena tridentata*.

*A. nigra*, cinerascenti villosa, thorace pallide fulvo, abdomine segmentis margine fasciis albidis, antennis subtus tarsisque rufis. *Mas fulvo hirsutus*, labio tridentato.

*Andrena tridentata*, *Smith*, *Zool.* v. 1749 (bidentata misprint); *Bees Great Brit.* 82 ♂ ♀.

*Melitta tridentata*, *Kirby*, *Mon. Apum Angl.* ii. 132 ♂.

*Melitta rufitarsis*, *Kirby*, *lib. cit.* 135 ♀.

*Andrena rufitarsis*, *Smith*, *Zool.* v. 1750 ♀.

*Female.* Length  $4\frac{1}{2}$ –5 lines.—Black; the clypeus strongly punctured; the face clothed with yellowish white pubescence; that on the vertex is more fulvous; the flagellum beyond the third joint bright fulvous. Thorax clothed above with pale fulvous pubescence; that on the sides, beneath, and on the metathorax yellowish white; that on the legs is of the same colour; but on the first joint of the tarsi beneath it is ferruginous; the floccus nearly white; the scopa slightly fulvous; all the tarsi, except their basal joints, pale rufo-testaceous. Abdomen subovate, the segments thickly fringed with yellowish white pubescence, the apex slightly fulvous. B.M.

*Male.* Length  $3\frac{1}{2}$ –4 lines.—Black; the pubescence on the head fulvous, palest on the clypeus and cheeks; the anterior margin of the clypeus with three teeth, the central one large and blunt; the antennæ with the flagellum, except the basal joint, fulvous beneath. Thorax clothed above with dense rufo-fulvous pubescence; the legs as in the female. Abdomen subovate; the margins of the segments fringed with pale fulvous pubescence.

This species appears in July, and is usually found on the flowers of the ragwort; it is local and scarce, but has been taken at Melton, near Woodbridge, Suffolk, at Cromer, Norfolk, at Christchurch, Hants, and also at Norwich. The pubescence is very subject to fade.

### 34. *Andrena angustior*.

*A. nigra*, subvillosa, thorace fulvo-pubescente, pedibus quatuor anticis nigro-piceis, tibiis tarsisque posticis ferrugineis.

*Andrena angustior*, *Smith*, *Zool.* v. 1745; *Bees Great Brit.* 80.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 254.

*Melitta angustior*, *Kirby*, *Mon. Apum Angl.* ii. 122 ♀.

*Andrena lacinia*, *Smith*, *Zool.* v. 1751 ♀.

*Female.* Length  $4\frac{1}{2}$ –5 lines.—Black; the face clothed with obscure fusco-ferruginous pubescence, the flagellum nigro-piceous. Thorax,

the disk thinly clothed with fulvous pubescence; on the metathorax and sides it is much paler, as well as on the femora beneath; tegulæ piceous; wings subhyaline, faintly clouded at their apical margins; the floccus pale yellowish white, the scopa pale fulvous, the posterior tibiæ and tarsi ferruginous. Abdomen ovate, fuscous, the apical margins of the segments sparingly fringed with pale fulvous pubescence; the apical fimbria fuscous. B.M.

*Male.* Length 4 lines.—The face thinly clothed with pale fulvous pubescence; the antennæ half the length of the thorax, the latter having a very pale fulvous pubescence on the disk, on the sides it is white; the wings as in the female; legs nigro-piceous; the apical joints of the anterior and intermediate tarsi and the whole of the posterior pair fulvous. Abdomen elongate lanceolate, shining, and having the apical margins of the segments depressed and thinly fringed with griseous pubescence; the extreme apex ferruginous. B.M.

This species appears usually in May, and is by no means a common insect. It occurs sparingly at Hampstead and Highgate, and is found on dandelions (*Leontodon taraxacum*); it has also been taken at Mousehold, near Norwich.

### 35. *Andrena denticulata*.

*A. atra*, pallide fulvo pilosa, thoracis disco sparsim fulvo-piloso, abdominis segmentis marginibus albidis.

*Andrena denticulata*, *Smith, Bees Great Brit.* 81 ♂ ♀.

*Melitta denticulata*, *Kirby, Mon. Apum Angl.* ii. 133 ♂.

*Melitta listerella*, *Kirby, lib. cit.* 137 ♀.

*Andrena listerella*, *Smith, Zool.* v. 1752.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 219.

*Schenck, Nass. Bien.* 249.

*Thoms. Opusc. Ent.* 148; *Hym. Scand.* ii. 88.

*Female.* Length 5–5½ lines.—Black; the face has a short, pale fulvous pubescence; the flagellum, except the three basal joints, fulvous beneath. Thorax, the disk very sparingly covered with fulvous pubescence, paler at the sides, and very dense at the sides of the metathorax; the tegulæ nigro-piceous; the wings subhyaline, slightly fulvous, the nervures ferruginous, the apical margins clouded; legs nigro-piceous, sometimes rufo-piceous, the femora fringed with pale fulvous pubescence, the floccus dense and of a pale yellow, the scopa and the tarsi beneath bright fulvous; the apical joints of the tarsi ferruginous. Abdomen subovate, slightly depressed, the apical margins of the segments have a fascia of yellowish white pubescence, the apical fimbria fusco-ferruginous. B.M.

*Male.* Length 4 lines.—Black; the face covered with thin ochraceous pubescence; the labrum produced; a minute tooth on each side on the anterior margin of the clypeus; the mandibles forcipate,

armed at their base with a minute tooth, their tips ferruginous; the flagellum fulvo-piceous beneath. Thorax, the pubescence ochraceous; the wings subhyaline; the tarsi bright fulvous beneath, the apical joints of the tarsi rufo-testaceous. Abdomen lanceolate and shining; the three intermediate segments have a narrow white marginal fascia; the apex has a little fusco-ferruginous pubescence. B.M.

This species appears in July and August, and was taken some years ago by Mr. Heysham, near Carlisle, in abundance. I found both sexes on the wild briony, at Southend, and on the same plant at Blackwater, Hants; but the insect must be regarded as a very local one, rarely to be met with.

### 36. *Andrena fucata*.

*A. nigra*, cinerascenti pilosa, thorace rufescenti hirta; pedibus rufo-piceis; scopa fusca, subtus albida.

*Andrena fucata*, *Smith, Zool.* v. 1743; *Bees Great Brit.* 82 ♂ ♀.

*Thoms. Opusc. Ent.* 149; *Hym. Scand.* ii. 93.

*Andrena clypearis*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 215.

*Schenck, Nass. Bien.* 243.

*Female.* Length 5–6 lines.—Black; the face covered with griseous pubescence, that on the vertex fulvous, a line of silvery pile on each side of the face in the depressions close to the margins of the eyes; the clypeus strongly punctured, having a smooth line down the centre, the anterior margin deeply emarginate, and produced on each side into a sharp angle. Thorax thinly clothed with fulvous pubescence, most dense and bright on the scutellum; at the sides of the metathorax it is pale; wings subhyaline, their apical margins clouded, the nervures ferruginous; legs dark fuscous, the floccus white; the scopa obscure fulvous above, beneath silvery; the legs have a scattered pale fulvous pubescence, that on the tarsi beneath ferruginous, their apical joints rufo-testaceous. Abdomen at the base thinly clothed with cinereous pubescence, on the intermediate portion it is fuscous but very sparing, a few scattered cinereous hairs at the sides; on the fifth and apical segments it is fuscous, the margins of the segments obscure testaceous. B.M.

*Male.* Length  $4\frac{1}{2}$  lines.—The face with dense pale fulvous pubescence; the mandibles subdentate at their base or sharply angular; the clypeus emarginate, the angles acute; the joints of the antennæ arcuate. Thorax above with fulvous pubescence, that on the metathorax, the sides, beneath, and on the legs griseous; the tibiæ and tarsi rufo-piceous, the latter pale; wings as in the female. Abdomen ovate-lanceolate, shining; the apex with a little pale fulvous pubescence; the apical margins of the segments obscurely rufo-piceous, brightly so beneath. The colour of the pubescence of the thorax soon fades to pale fulvous in both sexes.



Both sexes of this species were taken in Yorkshire, near Wakefield, in the month of June; it has been taken near Bristol sparingly, but does not appear rare in Scotland. There were specimens in the Shuckardian collection, purchased by Mr. Walcott, of Bristol; but that collection perished in its transit to that place from London. The species has been recently taken at Chobham, in the month of July, by Mr. Edward Saunders.

### 37. *Andrena picipes*.

*A. nigra*, pallido rufescenti villosa, capite pube atra, tibiis posticis scopa fulva.

*Andrena picipes*, *Smith*, *Zool.* v. 1746; *Bees Great Brit.* 83 ♂.

*Melitta picipes*, *Kirby*, *Mon. Apum Angl.* ii. 127 ♂.

*Female.* Length  $5\frac{1}{2}$  lines.—Black; the pubescence on the head sooty black, that on the thorax above pale ferruginous, palest on the metathorax, the sides, and beneath; wings hyaline, faintly clouded and iridescent at their apical margins; the nervures ferruginous; the tegulæ rufo-piceous; the legs dark rufo-piceous, the apical joints of the tarsi ferruginous; the scopa on the posterior tibiæ fulvous; the basal joint of the tarsi rufo-fuscous within. Abdomen ovate and with a fringe of pale fulvous pubescence on the apical margins of the segments; the apical fimbria black.

*Male.* Length 4 lines.—Black; the head wider than the thorax; the face with thin fulvous pubescence; the mandibles forcipate, and ferruginous at their apex; the joints of the antennæ arcuate. Thorax thinly clothed above with fulvous pubescence, with pale on the metathorax, the sides, the legs, and beneath; the legs dark rufo-piceous, with the tarsi pale rufo-testaceous; the wings hyaline and iridescent, the nervures pale rufo-testaceous. Abdomen oblong-ovate, and with a thin pale fulvous pubescence; the apical margins of the segments narrowly pale testaceous.

This species was taken at Portslade, near Shoreham, by Mr. Walcott, I believe in June. The three specimens I have seen are all stylopized. There is no specimen in Kirby's type collection; he described it from one in Drury's cabinet.

Div. V. *Abdomen subpubescent. Males only known.*

### 38. *Andrena clypeata*.

*A. nigra*, hirsutissima, fuscescens, clypeo albo barbato, abdomine pallido-lanato.

*Andrena clypeata*, *Smith*, *Bees Great Brit.* 84 ♂.

*Male.* Length 4 lines.—Black; head as wide as the thorax, covered with long fuscous pubescence, the clypeus having a long white beard; the mandibles forcipate, their tips ferruginous, pro-

duced at their base beneath into a large angular tooth; the antennæ as long as the thorax, the flagellum piceous beneath, the joints subarcuate. Thorax clothed above with long fuscous pubescence; the wings subhyaline, iridescent, faintly clouded at their apex, the nervures pale ferruginous; legs obscure rufo-testaceous, the femora have a long pale pubescence; the apical joints of the tarsi pale rufo-testaceous, the tibiæ and tarsi having a scattered glittering yellowish-white pubescence. Abdomen lanceolate, subpetiolate, shining, and having a loose scattered pale pubescence; the apex has a little glittering yellowish-white pubescence.

This insect was received from Scotland; it is a very distinct and marked species, and easily recognized; only one specimen has occurred.

### 39. *Andrena constricta*.

*A. nigra*, nitida, cinerascenti pilosa, tibiis tarsisque posticis fulvis; abdominis segmentorum trium intermediarum marginibus basi constrictis.

*Andrena constricta*, *Smith, Zool. vii. Append. lix, ♂*; *Bees Great Brit. 84 ♂*.

*Male*. Length 4 lines.—Black; antennæ as long as the thorax, rufo-piceous beneath, the joints subarcuate; the clypeus coarsely punctured, the face having a thin pale yellow pubescence. Thorax punctured and shining, the metathorax having a thin griseous pubescence; the wings subhyaline, having a fulvous tinge, the tegulæ and nervures rufo-testaceous; the legs rufo-testaceous, sprinkled with a pale glittering pubescence; the posterior tibiæ and all the tarsi fulvo-piceous; the tibiæ have a fuscous stain beneath. Abdomen ovate, rather strongly punctured, the margins of the three intermediate segments depressed and rufo-testaceous, the extreme apex fulvo-piceous, and having a glittering pale pubescence.

This species was taken in Scotland, at Kirkpatrick-Juxta. I have seen three specimens of the male, but do not know the other sex.

### 40. *Andrena aprilina*.

*A. nigra*, thorace fulvo-piloso; abdomine nitido, segmentorum marginibus testaceis; tarsis ferrugineis.

*Andrena aprilina*, *Smith, Zool. vi. 2211 ♂*; *Bees Great Brit. 85 ♂*.

*Male*. Length  $4\frac{1}{2}$  lines.—Black; the clypeus clothed with brown pubescence, at the base of the antennæ and on the vertex it is fulvous; the antennæ a little shorter than the thorax, the joints subarcuate. Thorax clothed with fulvous pubescence, sparingly so on the disk, and palest at the sides of the metathorax; the wings subhyaline, their nervures testaceous; the legs have a fulvous pubescence, the tarsi ferruginous. Abdomen oblong-ovate, shining,

the margins of the segments piceous, the second and third depressed; all the margins thinly fringed with fulvous pubescence; the extreme apex covered with fuscous pubescence.

This species is in the collection of Mr. Dale, of Glanvilles Wootton, also in that of Mr. Walcott, of Bristol; taken at Norwich by Mr. T. B. Bridgman.

Div. VI. *The segments of the abdomen having marginal fasciæ.*

A. *The fasciæ concolorous with the pubescence of the thorax.*

#### 41. *Andrena fulvicrus.*

*A. nigra*, pallide fulvo villosa, abdomine fasciis tribus pallidis, tibiarum posticarum scopa fulva.

*Andrena fulvicrus*, *Smith, Zool.* v. 1916; *Bees Great Brit.* 86.

*Schenck, Nass. Bienen.* 249.

*Melitta fulvicrus*, *Kirby, Mon. Apum Angl.* ii. 138 ♂ ♀.

*Melitta contigua*, *Kirby, lib. cit.* 140, var. ♂.

*Andrena articulata*, *Smith, Zool.* v. 1750, var. ♂.

*Female.* Length  $4\frac{1}{2}$ – $5\frac{1}{4}$  lines.—Black; the clypeus clothed with fulvous pubescence, above which it is black. Thorax, the disk thinly clothed with fulvous pubescence, on the sides and metathorax it is paler; wings hyaline, the nervures ferruginous, the tegulæ piceous; the pubescence on the legs rufous, the scopa fulvous, the claws ferruginous, the pubescence on the tarsi beneath ferruginous, the floccus pale fulvous. Abdomen ovate, shining, closely and finely punctured; the margin of the basal segment and those of the three following have a fascia of pale fulvous pubescence, that on the basal segment usually more or less obliterated; the apical fimbria sooty black. B.M.

*Male.* Length  $3\frac{1}{2}$ –5 lines.—Black; the face densely clothed with rufo-fuscous pubescence, usually intermixed with a few fulvous hairs; antennæ half the length of the thorax, the latter clothed with pale fulvous pubescence, palest on the sides and on the legs. Abdomen ovate-lanceolate, closely punctured; the apical margins of the segments, which are slightly depressed, have a fascia of ochraceous pubescence; the entire abdomen has a short scattered pubescence of the same colour; the sixth and apical segments have a little dark fuscous pubescence, the extreme apex ferruginous. B.M.

Var. *α.* Length  $5\frac{1}{4}$  lines.—The flagellum, except the basal joint, rufo-piceous beneath; the mandibles and apical joints of the tarsi ferruginous; the fasciæ of the abdomen white; the abdomen very shining and punctate.

Var. *β.* The entire pubescence white.

This species appears in May, and is common in the London district, but local; occasionally large colonies are to be found: one in Sandown Bay, Isle of Wight, extended along the cliff from thirty

to forty yards; in such situations the species can be found throughout the summer, and up to the end of August. A similar colony has been observed at Ventnor; it is equally numerous at Sidmouth, South Devon. The colour of the pubescence is very subject to bleaching; males are frequently found whose pubescence is white.

#### 42. *Andrena extricata*.

*A. nigra*, grisescenti villosa, abdomine fasciis tribus albis, tibiarium posticarum scopa fulva.

*Andrena extricata*, *Smith, Zool. vii. Append. 59; Bees Great Brit. 87.*

*Female.* Length 5 lines. Black; the face clothed with short pale fulvous pubescence, on the vertex it is fulvous. Thorax clothed with pale fulvous pubescence; that on the legs is of the same colour; the apical joints of the tarsi rufo-piceous, the claws ferruginous, the floccus yellowish white, the scopa fulvous; the wings hyaline, their apical margins faintly clouded, the nervures ferruginous. Abdomen closely punctured, the basal and three following segments have a white marginal fascia, the first more or less obliterated, the apical fimbria fuscous.

*Male.* Length 4 lines.—The face has a bright fulvous pubescence, on the vertex it is fuscous; on the thorax and legs it is pale fulvous, the apical joints of the tarsi ferruginous; the wings hyaline, the nervures pale ferruginous. Abdomen ovate-lanceolate, very glossy; the segments have white marginal fasciæ, the apex fulvous.

Notwithstanding the differences in the colour of the pubescence of this species, particularly that on the face of the male, it is possibly a local variety of *A. fulvicrus*. It has been taken at Weymouth, near Liverpool, and in Yorkshire.

#### 43. *Andrena polita*.

*A. nigra*, fulvo pilosa, thorace rufescenti pilosa, tibiis tarsisque posticis atque abdominis apice fulvis.

*Andrena polita*, *Smith, Zool. v. 1733 ♂ ♀; Bees Great Brit. 87.*

*Female.* Length  $5\frac{1}{2}$  lines.—Black; the face clothed with fulvous pubescence; the flagellum fulvo-piceous beneath. Thorax, the disk clothed with rufo-fulvous pubescence, on the metathorax and sides it is paler; the wings subhyaline, their apical margins slightly clouded and iridescent; the tegulæ rufo-testaceous; the pubescence on the legs fulvous, the scopa bright fulvous, the floccus pale fulvous, the tarsi ferruginous. Abdomen shining, oblong-ovate, closely and very delicately punctured, the apical margins of the segments obscurely rufo-testaceous; the second, third, and fourth segments having a narrow pale fulvous fringe more or less obliterated in the middle; the fifth and apical segments clothed with bright fulvous pubescence.

*Male.* Length 5 lines.—The pubescence on the clypeus white, above which it is pale fulvous; the cheeks have a long beard, and the mandibles a fringe, of white pubescence; the femora have a fringe of the same colour; on the tibiæ and tarsi it is pale fulvous, the apical joints of the latter being pale ferruginous; on the disk of the thorax the pubescence is fulvo-ochraceous; the wings as in the female. Abdomen oblong-ovate, very glossy, the margins of the segments depressed and narrowly rufo-testaceous; the apical segment pale testaceous.

This very distinct species appears in July and August. I only know one locality for it, viz. the chalk-pits at Northfleet, where I have twice taken it. I have seen specimens from Alabama which I cannot separate from it. The female most closely resembles that of *A. fulvescens*; but the longer abdomen, more narrowed both at the base and apex, and its even and delicate close punctuation serve to distinguish it; the male has not the white clypeus as in *A. fulvescens*.

#### 44. *Andrena fulvago*.

*A. nigra*, fulvo pilosa, thorace pube rufa, abdomine punctulato nitido, pedibus posticis anoque fulvis.

*Andrena fulvago*, *St.-Farg. Hym.* ii. 243.

*Smith, Zool.* v. 1732; *Bees Great Brit.* 88 ♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flor. Fenn.* ii. 99.

*Schenck, Nass. Bien.* 241.

*Thoms. Opusc. Ent.* 156; *Hym. Scand.* ii. 110.

*Apis fulvago*, *Christ. Hym.* 189, tab. 16. fig. 7 ♀.

*Melitta fulvago*, *Kirby, Mon. Apum Angl.* ii. 93 ♂ ♀.

*Female.* Length  $4\frac{1}{2}$  lines.—Black; the face thinly clothed with fulvous pubescence; the flagellum, beyond the basal joint, fulvous beneath. Thorax above shining and moderately punctured, thinly clothed with rufo-fulvous pubescence, that on the meta-thorax and beneath is pale; the legs rufo-piceous, the posterior tibiæ and all the tarsi pale ferruginous, the scopa bright fulvous; wings fulvo-hyaline and iridescent, the nervures ferruginous, the tegulæ rufo-piceous. Abdomen ovate, shining, finely and evenly punctured; the apical margins of the segments depressed, slightly rufo-piceous, and with a thin fringe of pale fulvous pubescence, usually much obliterated, particularly off the two basal segments; the apical fimbria bright fulvous. B.M.

*Male.* Length 4 lines.—The face clothed with bright pale fulvous pubescence; the antennæ a little shorter than the thorax, the joints subarcuate; the flagellum rufo-testaceous beneath. The thorax thinly clothed above with fulvous pubescence; the legs coloured as in the female, their pubescence cinereous. Abdomen oblong-ovate, shining, very finely punctured, and thinly sprinkled with short cinereous pubescence, the apex fulvous. B.M.

This is a very local insect; I have not taken it in the immediate neighbourhood of London; but it occurs at Weybridge in June and July, also at Blackwater, Hants, and at Bristol. Mr. Kirby took it plentifully at Barham; it frequents the hawkweed (*Hieracium pilosella*).

#### 45. *Andrena fulvescens*.

*A. nigra*, fulvo pilosa, tibiis tarsisque posticis fulvis, abdomine apice fulvo.

*Andrena fulvescens*, *Smith, Zool. v. 1732; Bees Great Brit. 89 ♂ ♀.*

*Schenck, Nass. Bien. 241.*

*Thoms. Hym. Scand. ii. 111.*

*Andrena cinerascens*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. i. 216.*

*Andrena nasalis*, *Thoms. Opusc. Ent. 156.*

*Female.* Length 5 lines.—Black; the face clothed with short fulvous pubescence; the mandibles ferruginous at their apex; the flagellum rufo-piceous beneath. Thorax clothed above with a thin fulvous pubescence; the wings fulvo-hyaline, the nervures rufo-testaceous; legs obscure rufo-piceous, the posterior tibiæ and tarsi rufo-fulvous, all the claws of the same colour; the pubescence on the legs fulvous, the scopa bright fulvous. Abdomen ovate, shining, and very finely and closely punctured, except on the basal segment, where the punctures are distant; the apical fimbria bright fulvous. B.M.

*Male.* Length 4–4½ lines.—The pubescence griseous, on the vertex and disk of the thorax tinged with ochraceous, that on the clypeus white; the clypeus yellowish white, black at the base forming a semicircular shape which is bisinuate on each side of its margin anteriorly; the wings resembling those of the female, but the nervures and stigma rather darker; the apical joints of the tarsi ferruginous. Abdomen oblong-ovate, the apex testaceous, thinly sprinkled with cinereous pubescence. B.M.

This insect appears in June, and is very local, but forms large colonies, appearing to prefer hard trodden pathways in which to excavate its burrows; it used to be plentiful on Hampstead Heath. I found a very extensive colony near Blackwater, Hants; the swarm hovering over their burrows produced a loud humming; this colony has existed, to my knowledge, about twenty years. The species frequents the hawkweed (*Hieracium pilosella*).

*B. The apical margins of the segments having white fasciæ.*

#### 46. *Andrena bucephala*.

*A. atra*, pallido villosa, thorace fulvo, tarsis omnibus rufis; abdomine ovato, fasciis tribus interruptis albis. *Mas capite magno.*

*Andrena bucephala*, *Steph. Illust. Brit. Ent. Supp.* 17, pl. xliii. f. 4 ♂.  
*Andrena longipes*, *Smith, Zool.* v. 1740 ♂ ♀; *Bees Great Brit.* 90.

*Female.* Length 5–6 lines.—Black; the face thinly clothed with pale fulvous pubescence, below the insertion of the antennæ it is somewhat griseous; antennæ slender, more than half the length of the thorax; the flagellum rufo-piceous beneath. Thorax above clothed with fulvous pubescence, paler on the metathorax and sides; the wings fulvo-hyaline, the nervures and tegulæ pale rufo-testaceous; the legs have a thin fulvous pubescence, the floccus white, the scopa and the pubescence on the tarsi of a golden fulvous, very bright and glittering; the tarsi rufo-fulvous, the posterior tarsi usually of the same colour, but sometimes fusco-ferruginous; the legs more elongate than usual. Abdomen ovate, shining, and convex; the apical margins of the second, third, and fourth segments have a very narrow white marginal fringe, the first two interrupted; the apical fimbria fulvous. B.M.

*Male.* Length 4–6 lines.—The head varying in size, sometimes twice as large as the thorax, the mandibles forcipate; the face has a thinly scattered pale fulvous pubescence; the clypeus shining and finely punctured; the antennæ as long as the thorax. The thorax and wings as in the female; the tarsi and extreme apex of the tibiæ fulvo-ferruginous; the legs elongate as in the other sex. Abdomen lanceolate, much narrowed at the base, naked and shining, the margins of the segments obscurely rufo-piceous. B.M.

This species appears usually about the end of April, and is very local. Some years ago it was abundant near Highgate Archway, where a large colony was established. The ground in which it was formed has long been used in making bricks. The species is now rare. The type of Stephens's *A. bucephala* is in the Museum. It is a large example of my *A. longipes*, which name was used for some years, having been proposed by Shuckard; but as he never described the species, I now adopt the name given by Stephens, who both described and figured the insect. The only other localities for this species, beyond the London district, known to me, are Bristol (where it was taken by Dr. Thwaites) and Chobham Common.

#### 47. *Andrena albicus*.

*A. atra*, cinereo villosa, thorace fulvo; abdomine ovato, pilosulo, fasciis tribus albis.

*Andrena albicus*, *Smith, Zool.* v. 1924; *Bees Great Brit.* 91.

*Schenck, Nass. Bien.* 251.

*Thoms. Opusc. Ent.* 152; *Hym. Scand.* ii. 97.

*Melitta albicus*, *Kirby, Mon. Apum Angl.* ii. 156 ♂ ♀.

*Melitta barbilabris*, *Kirby, lib. cit.* 151 ♂.

*Female.* Length 5–5½ lines.—Black; the face on each side and the vertex have a little pale fulvous pubescence, the channel on each side of the face covered with a fulvous pile; the clypeus closely

punctured; the flagellum obscurely piceous beneath. Thorax, the disk thinly clothed with fulvous pubescence, on the metathorax and sides it is paler; the wings subhyaline, the nervures and tegulæ rufo-testaceous; the legs have a cinereous pubescence, the scopa fuscous above and silvery white beneath, the floccus white. Abdomen ovate, smooth and shining; the second, third, and fourth segments have a narrow white marginal fringe, the first two usually interrupted; the apical fimbria fuscous; beneath, the margins of the apical segments have a narrow white fringe, the segments having some longer scattered silvery pubescence. B.M.

*Male.* Length 4-5 lines.—Black; having a long hoary pubescence on the head, thorax, and legs; that on the disk of the thorax tinged with ochraceous, that on the clypeus being snow-white and glittering, forming a beard, which hides the labrum. Abdomen ovate-lanceolate, having a thinly scattered cinereous pubescence; the margins of the segments depressed; beneath they have a narrow white fringe; a little pale glittering pubescence at the apex. B.M.

This is a very common species, appearing towards the end of April. It forms large colonies, and is found in all parts of the kingdom. It usually frequents a species of hawkweed (*Hieracium pilosellum*). I have received it from Ireland, Wales, and Scotland.

#### 48. *Andrena labialis*.

*A. nigra*, pallide fulvo villosa, abdominis segmentis margine utrinque pallidis. *Mas facie albida*.

*Andrena labialis*, *Smith, Zool.* v. 1921 ♂ ♀; *Bees Great Brit.* 92.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 256.

*Schenck, Nass. Bien.* 251.

*Melitta labialis*, *Kirby, Mon. Apum Angl.* ii. 148 ♂.

*Andrena separata*, *Smith, Zool.* v. 1922 (var. ♀, clypeo albido).

*Female.* Length  $5\frac{1}{2}$ -6 lines.—Black; the face has a pale fulvous pubescence, the clypeus naked and closely and moderately punctured. Thorax strongly punctured, thinly clothed with short fulvous pubescence, at the sides and on the metathorax it is more dense and of a paler colour; the tegulæ pale testaceous; the wings fulvo-hyaline, their nervures ferruginous, faintly clouded at their apical margins; the legs have a short fulvous pubescence; the apical joints of the tarsi ferruginous, the scopa fulvous, the floccus pale fulvous. Abdomen ovate, shining, finely and closely punctured; the three intermediate segments have a narrow fringe of pale fulvous pubescence, the first two usually interrupted, the apical fimbria fulvous. B.M.

*Male.* Length 5-6 lines.—Black; the clypeus and the face on each side pale yellow, the former having a minute angular dot on each side; the face has a pale fulvous pubescence; on the disk of the thorax it is fulvous, paler on the sides and on the legs; wings as in the female. Abdomen ovate-lanceolate, punctured as in the other



sex, and having a pale fulvous fringe on the apical margins of the segments, frequently obliterated on the first, and usually interrupted on the two following; the extreme apex fulvous. B.M.

This species usually appears towards the end of May, and is not scarce round London. I believe it to be local; but it is found occasionally forming large colonies, of which there is one below Southend facing the sea. It is found at and near Norwich, also near Bournemouth, in the Isle of Wight, and at Eastbourne; but I have not seen it from the north of England.

#### 49. *Andrena chrysoceles*.

*A. nigra*, cinereo subpubescens; abdomine nitido, fasciis interruptis albis; ano, tarsi tibiisque posticis testaceis. *Mas* clypeo pallide flavo.

*Andrena chrysoceles*, *Smith, Zool.* v. 1917; *Bees Great Brit.* 93.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 257.

*Schenck, Nass. Bien.* 254.

*Melitta chrysoceles*, *Kirby, Mon. Ap. Angl.* ii. 143 ♂ ♀.

*Female.* Length 4–4½ lines.—Black; the face has a short glittering whitish pubescence, the channels on each side of the face covered with a fulvous pile, the apex of the flagellum fulvo-piceous beneath. Thorax: the disk has a very thin pale fulvous pubescence, and on each side over the tegulæ an abbreviated impressed line; the wings fulvo-hyaline, iridescent, the nervures and tegulæ pale rufo-testaceous; legs nigro-piceous, and having a pale pubescence; all the tarsi and the posterior tibiæ fulvo-testaceous; the floccus and fringe of the femora white, the scopa of a pale golden yellow, very bright and glittering. Abdomen subovate, subdepressed, shining, and very delicately punctured; the apical margins of the three intermediate segments have a very narrow white marginal fringe; the first two usually interrupted; the apical fimbria bright fulvous.

B.M.

*Male.* Length 3½–4 lines.—Head rather wider than the thorax, the clypeus pale yellow, and having on each side a minute black dot; the pubescence on the clypeus silvery white, above and on the vertex very pale fulvous; it is of the same colour on the disk of the thorax; wings and legs as in the other sex, the posterior tibiæ fuscous and pale at the apex. Abdomen lanceolate, shining and delicately punctured; the margins of the segments obscurely rufo-piceous, the intermediate ones having laterally a short fringe of white pubescence, the apex pale testaceous.

B.M.

This species appears in June, and is frequently found on the flowers of Umbelliferae. It is a local insect, but found occasionally in many places near London, frequently at wood-sides. It is by no means a common species.

50. *Andrena coitana*.

*A. atra*, glabriuscula; abdomine nitidissimo, subcuneiformi, segmentis intermediis utrinque albo ciliatis; scopa versicolori. *Mas frontis* angulis clypeoque albis.

*Andrena coitana*, *Smith, Zool.* v. 1919; *Bees Great Brit.* 94.

*Melitta coitana*, *Kirby, Mon. Apum Angl.* ii. 147 ♂.

*Melitta shawella*, *Kirby, lib. cit.* 160 ♀.

*Andrena shawella*, *Thoms. Opusc. Ent.* 152; *Hym. Scand.* ii. 101.

*Andrena nana*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 213.

*Female.* Length 4 lines.—Black; the face nearly naked, having only a few scattered griseous hairs; the lateral channels of the face, which in this species are continued as high as the vertex of the eyes, are slightly curved inwards towards the ocelli, and are clothed with fuscous pile. Thorax shining, and having a few pale hairs at the sides of the metathorax; the disk rather strongly punctured, the metathorax opaque; the tegulæ piceous; the wings subhyaline, the nervures fuscous, the first recurrent nervure received near the apex of the second submarginal cell; the floccus white, the scopa fuscous above, silvery beneath. Abdomen glossy, widest towards the apex, the margins of the intermediate segments slightly depressed, and having a narrow fringe of short white pubescence; the first two widely interrupted; the apical fimbria rufo-fuscous.

B.M.

*Male.*—The clypeus and a small angular spot on each side white, the clypeus having two minute black dots; the antennæ shorter than the thorax, the latter shining and having a very thin cinereous pubescence; wings as in the other sex; the legs have a cinereous pubescence, and the apical joints of the tarsi are rufo-testaceous. Abdomen lanceolate, and having a scattered griseous pubescence, that at the apex pale and glittering.

B.M.

This species is found in August. Mr. Kirby took the female at Barham in September. It is rare in the western counties, but very abundant in the northern ones. In Yorkshire I obtained it in plenty colonizing; here the sexes were dug out of their burrows. It is very abundant in Cumberland, and has been taken at Lower Walmer, near Deal, at Lowestoft, and at Cromer.

51. *Andrena analis*.

*A. nigra*, cinerascenti villosa; abdomine nitido, fasciis interruptis albidis; tarsis tibiisque posticis fulvis.

*Andrena analis*, *Panz. Faun. Germ.* 90. 14 ♂ and 15 ♀.

*Smith, Zool.* v. 1920; *Bees Great Brit.* 95.

*Andrena tarsata*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 223.

*Female.* Length 4 lines.—Black; the face thinly clothed with griseous pubescence, but having a slight fulvous stain on the margin of the clypeus; the flagellum fulvo-piceous towards the apex beneath. Thorax, the pubescence sparing and griseous on the disk, but dense, long, and white at the sides of the metathorax; wings subhyaline and iridescent, the nervures ferruginous; the floccus white, the scopa bright fulvous, the posterior tibiæ and tarsi and the apical joints of the anterior and posterior pairs rufo-fulvous. Abdomen shining, ovate, and having a short white marginal fringe on the apical margins of the segments, that on the first frequently obliterated, and those on the second and third usually widely interrupted; the apical fimbria fuscous. B.M.

*Male.* Length  $3\frac{1}{2}$  lines.—The clypeus white and having three minute fuscous dots placed in a triangle, the anterior dot sometimes nearly obsolete, densely covered with long white pubescence; along the margins of the eyes and at the insertion of the antennæ a little mixture of fuscous pubescence. Thorax shining, and having a thin griseous pubescence, mixed with fuscous hairs at the margin of the scutellum; wings subhyaline, iridescent, the nervures testaceous; the tarsi ferruginous. Abdomen lanceolate, shining, and delicately punctured, the margins of the intermediate segments depressed, smooth, and shining, sometimes having a loose fringe of pale pubescence; the extreme apex ferruginous. B.M.

Taken at Weybridge once in July. Evidently very rare in the west of England, but very abundant in some situations in the north. Several specimens were taken near Wakefield at the beginning of August. Mr. Hardy found the species very common in Penmanshiel Wood, Berwickshire, throwing up its little hillocks at the sides of pathways. It has also been received from Ireland. Fabricius describes an *A. analis* in his 'Systema Piezatorum;' but it cannot be the same species as Panzer's if he described it correctly. He says, "anus rufus;" in the insect described by Panzer we read, "segmentis apice fusciscentibus."

## 52. *Andrena parvula*.

*A. atra*, glabriuscula, cinereo subvillosa; abdomine nitido, subrotundo; scopa tibiarum posticarum argentea.

*Andrena parvula*, *Smith, Zool.* v. 1925; *Bees Great Brit.* 96 ♀ (*var. A. minutula*).

*Nyland, Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 258.

*Schenck, Nass. Bien.* 262.

*Thoms. Opusc. Ent.* 153; *Hym. Scand.* ii. 108.

*Melitta parvula*, *Kirby, Mon. Apum Angl.* ii. 162 ♂ ♀.

*Andrena subopaca*, *Nyland. lib. cit.* i. 221.

*Andrena nigrifrons*, *Smith, Bees Great Brit.* 97 ♂.

*Female.* Length  $3-3\frac{1}{2}$  lines.—Black; the pubescence cinereous; a line of sericeous changeable pile at the inner margin of the eyes;

the face thinly sprinkled with glittering pubescence; the antennæ black, with sometimes the underside of the apical joints rufo-piceous. The thorax above closely and finely punctured, the scutellum less closely so; wings subhyaline, iridescent, and very faintly clouded at their apex; the nervures dark rufo-testaceous; the scopa on the posterior tibiæ cinereous, very bright and glittering. Abdomen short and ovate, widest in the middle; the second and third segments have on their apical margins laterally a fringe of short white pubescence; these are frequently obliterated; the apical fimbria cinereous, at the extreme apex it is more or less ferruginous. B.M.

*Male.* Length  $2\frac{1}{3}$  lines.—Black; the face clothed with black pubescence; the antennæ shorter than the thorax; the mandibles ferruginous at their apex; the wings splendidly iridescent; the pubescence cinereous; the claws ferruginous; the abdomen oblong-ovate; the apical margins of the segments laterally thinly fringed with white pubescence, frequently more or less obliterated. B.M.

This is one of the first bees that appears in spring. Usually males are found towards the end of March; the female appears a few days later. The species is widely distributed. In May the female is frequently found on the germander speedwell.

### 53. *Andrena minutula*.

*A. atra*, cinereo subvillosa, antennis subtus fulvescentibus, abdomine ovato, tibiis posticis scopa argentea.

*Andrena minutula*, *Smith, Zool.* v. 1925; *Bees Great Brit.* 96.  
*Schenck, Nass. Bien.* 263.

*Melitta minutula*, *Kirby, Mon. Apum Angl.* ii. 161 ♂ ♀.

*Female.* Length 3– $3\frac{1}{2}$  lines.—Very closely resembling *A. parvula*, the only differences being that the underside of the flagellum of the antennæ is always more or less rufo-testaceous, its pubescence is more sparing and shorter, its scopa is more white or silvery, and its abdomen more elongate. B.M.

*Male.* Length  $2\frac{1}{2}$ –3 lines.—The entire pubescence cinereous, that on the clypeus very bright and glittering; the flagellum rufo-piceous beneath; the wings subhyaline, splendidly iridescent; the legs have a beautiful glittering pubescence, the calcaria pale testaceous, the apical joints of the tarsi rufo-testaceous. Abdomen subovate, convex, smooth, and shining. B.M.

Var. *α*. The legs rufo-testaceous.

Var. *β*. The posterior tarsi entirely testaceous.

This species appears about the end of June or the beginning of July. Its female is scarcely distinguishable from that of *A. parvula*, whilst its male is abundantly distinct. I formerly united the female with that of *A. parvula*, separating the male of *parvula* as a distinct species, under the name of "*nigrifrons*." Mr. Bridg-

man has fortunately captured the sexes of the two species, each at the different times of their appearance.

#### 54. *Andrena nana*.

*A. atra*, albido villosula; abdomine nitido, punctulato; tibiis posticis scopa argentea.

*Andrena nana*, *Smith, Zool.* v. 1925; *Bees Great Brit.* 97.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 221?

*Schenck, Nass. Bien.* 261.

*Thoms. Hym. Scand.* 104.

*Melitta nana*, *Kirby, Mon. Apum Angl.* ii. 161 ♂ ♀.

*Female.* Length  $3\frac{1}{2}$  lines.—Black; on each side of the face a line of silvery pile along the margins of the eyes. Thorax, a little cinereous pubescence on the metathorax and at the sides; that on the legs is of the same colour; the tegulæ piceous, the wings subhyaline, the nervures ferruginous; the posterior legs have the floccus white, the scopa silvery, bright and glittering; the basal joint of the tarsi slightly fulvous within; the apical joints of the tarsi ferruginous. Abdomen elongate-ovate, shining and delicately punctured; the apical margins of the segments depressed and impunctate; on the apical margins of the three intermediate segments, laterally, a fringe of white pubescence; the apical fimbria white, with more or less of a fulvous tinge; beneath, the margins of the segments thinly ciliated with white hairs. B.M.

*Male.* Length 3 lines.—Black; the antennæ nearly as long as the thorax, the face with long thin white pubescence, the cheeks bearded with the same. The thorax has thin cinereous pubescence, that on its disk is sparing and faintly ochraceous; wings hyaline, splendidly iridescent and slightly clouded at their apex; the apical joints of the tarsi rufo-testaceous. Abdomen oblong-ovate, shining, and with the extreme apex pale testaceous. B.M.

This insect usually appears about the end of May, and is found during June and July. Its female is readily separated from that of the two preceding species by its long and punctured abdomen. Its male could only be confounded with that of *A. minutula*, from which its longer antennæ, the puncturing of its thorax, which is much finer, shallower, and irregularly scattered, separates it; that of *A. minutula* is stronger, deeper, and more regular. The species is generally distributed: I have found it very abundant in Yorkshire.

#### 55. *Andrena argentata*.

*A. atra*, argenteo villosa, thorace pube pallida fulva; abdomine ovato, fasciis tribus albis, in medio vix interruptis.

*Andrena argentata*, *Smith, Zool.* ii. 409, and v. 1920; *Bees Gr. Brit.* 98.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 256.

*Thoms. Hym. Scand.* ii. 99.

*Female.* Length 4 lines.—Head, a line of silvery pile on each side of the face; the face, above the antennæ, longitudinally striate; the clypeus rather strongly punctured; the antennæ nigro-piceous beneath, the cheeks covered with silvery white pubescence. Thorax thinly clothed with pale fulvous pubescence, on the sides of the metathorax and beneath it, is cinereous; the legs have a glittering silvery pubescence; the apical joints of the tarsi ferruginous. Abdomen ovate, shining, and very finely and closely punctured; the apical margins of the three intermediate segments fringed with white pubescence, the first usually interrupted; the apical fimbria fuscous, intermixed with glittering silvery hairs. B.M.

*Male.* Length 3 lines.—The pubescence silvery white, thinly scattered on the disk of the thorax and faintly yellow; the tegulæ fulvo-testaceous; wings hyaline and splendidly iridescent; the apical joints of the tarsi pale rufo-testaceous. Abdomen very glossy and smooth; the basal segment has on each side a short fringe of snow-white pubescence, on the four following the fringe is slightly interrupted.

This species appears towards the end of July. I have always observed it frequenting the purple heath. First taken at Sandhurst, Berks, in August, and in the same month at Weybridge, and very plentifully at Bournemouth.

#### 56. *Andrena dorsata.*

*A. cinereo subvillosa*, thorace fulvo, metathorace utrinque fimbria pallida; abdomine fasciis tribus albis, antica interrupta; plantis tibiisque posticis rufis.

*Andrena dorsata*, *Smith, Zool.* v. 1918; *Bees Great Brit.* 98 ♂ ♀.

*Melitta dorsata*, *Kirby, Mon. Apum Angl.* ii. 144 ♀.

*Melitta nudiuscula*, *Kirby, lib. cit.* 155?

*Melitta lewinella*, *Kirby, lib. cit.* 149 ♂?

*Female.* Length  $4\frac{1}{2}$  lines.—Black; the face has a cinereous pubescence, and on each side a line of fulvous pile as high as the vertex of the eyes; the flagellum sometimes rufo-testaceous towards the apex beneath. Thorax clothed with short fulvous pubescence, thinly scattered on the disk, but dense on the scutellum; the sides of the metathorax have a thick curled fringe of pale fulvous pubescence; the tegulæ ferruginous; the wings subhyaline, the nervures pale ferruginous; the legs rufo-testaceous, the apical joints of the anterior and intermediate tarsi and the posterior tibiæ and tarsi ferruginous, the floccus white, the scopa pale fulvous intermixed with glittering hairs. Abdomen subovate, very glossy, delicately and closely punctured; the three intermediate segments have a narrow white fringe on their apical margins; the first usually, and sometimes the second, interrupted; the apical fimbria fulvous; beneath, the margins of the segments have a long fringe of pale pubescence. B.M.

*Male.* Length 4 lines.—Black; the face with pale fulvous pubescence, on the anterior margin of the clypeus and on the cheeks it is much paler. Thorax, the pubescence on the disk and also on the scutellum fulvous and not very dense; it is much paler on the sides; wings hyaline and iridescent, faintly clouded at their apical margins, the nervures pale ferruginous; the tarsi and tips of the posterior tibiæ pale ferruginous. Abdomen ovate-lanceolate, smooth, and shining, the lateral margins of the second, third, and fourth segments with a narrow fringe of white pubescence. B.M.

This species appears in July, and is taken during August also. The *M. nudiuscula* of Kirby appears to be a very faded and worn specimen of this species. In the observations in the 'Monographia' the tarsi are said to be black; only a portion of the tarsi remains on the type specimen, and it is ferruginous.

This *Andrena* is frequently taken on the flowers of the bramble. I have little doubt of the *M. lewinella* of Kirby being the male of *A. dorsata*, but have not felt inclined to change the name.

#### 57. *Andrena combinata*.

*A. atra*, pallide fulvo villosa, thorace ferrugineo, metathorace utrinque fimbria pallida; abdomine fasciis tribus interruptis albidis.

*Andrena combinata*, *Smith, Zool. v. 1923; Bees Great Brit. 99 (var. A. dorsata).*

*Schenck, Nass. Bien. 256.*

*Apis combinata, Christ. Hym. 187, tab. 15. fig. 9?*

*Melitta combinata, Kirby, Mon. Apum Angl. ii. 153 ♂ ♀.*

*Female.* Length 4–4½ lines.—Black; the face with fulvous pubescence on each side, that on the clypeus being shorter and inclining to cinereous; the cheeks with long pale pubescence; the apical joint of the antennæ usually rufo-piceous beneath, and the mandibles ferruginous at their apex. Thorax with rufous pubescence on the disk, which extends to the postscutellum; the metathorax with dense, incurved, pale fulvous pubescence; the apical joints of the tarsi and all the joints of the posterior pair pale ferruginous; the pubescence on the legs pale and glittering; wings hyaline, faintly clouded at their apex; nervures pale rufo-testaceous. Abdomen subovate, slightly convex, very finely and closely punctured, and shining; the apical margins of the three intermediate segments with narrow white pubescent fasciæ, the first usually, and frequently the second, more or less interrupted; the ventral segments with a long pale marginal fringe.

*Male.*—This sex very closely resembles that of *A. dorsata*, but is to be distinguished from it by having the posterior tibiæ entirely black, and by having only one or two of the apical joints of the anterior and intermediate tarsi pale rufo-testaceous, the posterior

pair being entirely so ; in other respects they resemble each other very closely. B.M.

This insect appears in April, and is frequently taken onallows. It is not common near London. Mr. Bridgman finds it freely near Norwich. To him I am indebted for the sexes and valuable information respecting this insect and the *A. dorsata*. I had at one time considered them to be identical. After an examination of the remains of the types in the Kirbyan Collection, I am of opinion that, under the description of his *M. combinata*, he has included a slight variety of *A. dorsata*. This is the var.  $\beta$ . The type of *combinata* is in very fair condition, and is undoubtedly that now described.

### 58. *Andrena connectens*.

*A. atra*, cinereo subpubescens, thorace fulvo, abdomine convexo, nitido ; pedibus rufo-piceis, tarsis omnibus tibiisque posticis rufis.

*Andrena connectens*, *Smith*, *Zool.* v. 1924 ; *Bees Great Brit.* 100.  
*Melitta connectens*, *Kirby*, *Mon. Apum Angl.* ii. 157 ♀.

*Female.* Length 5 lines.—Black ; at the insertion of the antennæ and sides of the face a long pale fulvous pubescence, very sparing on the clypeus, which is shining and coarsely punctured ; the flagellum fulvous beneath. Thorax, the pubescence on the disk fulvous, most dense on the scutellum ; at the sides of the metathorax a dense fringe of pale pubescence, the disk shining and strongly punctured ; the wings subhyaline, having a fulvous tinge, the nervures and tegulæ pale testaceous ; the legs rufo-testaceous and having a pale glittering pubescence, the floccus white, the scopa silvery. Abdomen subovate, shining, and delicately punctured ; the margins of the segments obscurely rufo-testaceous ; the three intermediate segments have a marginal fringe of yellowish-white pubescence, that on the first usually interrupted ; the apical fimbria pale and glittering, having a fulvous tinge ; beneath, the segments have a long pale marginal fringe. B.M.

The type of this species in the Kirbyan Collection is in a very mutilated state ; it is therefore difficult to arrive at any satisfactory opinion respecting it. It is very like *A. dorsata*, and may be a worn variety of that species. Kirby says that he captured it once at Barham ; and Mr. Trimmer took it near London.

### 59. *Andrena fuscata*.

*A. nigra*, pallide subvillosa, thorace fusco ; abdomine ovato, convexiusculo, segmentorum marginibus albo fasciatis.

*Andrena fuscata*, *Smith*, *Zool.* v. 1925 ; *Bees Great Brit.* 100.  
*Schenck*, *Nass. Bien.* 254.  
*Melitta fuscata*, *Kirby*, *Mon. Apum Angl.* ii. 167 ♀.



*Female.* Length  $4\frac{1}{2}$  lines.—Black; the pubescence on the face short and pale fulvous; the flagellum nigro-piceous towards the apex. Thorax shining and finely punctured; the metathorax opaque; the pubescence on the middle of the disk dark ferruginous, at the sides it is pale fulvous, as well as on the metathorax laterally; the wings hyaline, faintly clouded at their apical margins, the nervures fusco-ferruginous; the legs have a pale pubescence, the floccus nearly white, having an ochraceous tinge, the scopa pale fulvous. Abdomen shining, subovate, and convex, very delicately and closely punctured; the apical margin of the basal segment has on each side a short fringe of white pubescence, the following have a marginal fringe of the same colour, the first usually interrupted; the apical fimbria fulvous. B.M.

This species appears at the same time as *A. afzeliella*, and may possibly be a variety of it, the only describable difference I can detect being its black posterior tibiæ and tarsi. Kirby suggests that it might be mistaken for *A. convexiuscula*; but its abdomen is more cordate and less convex, and its clypeus differently punctured; that of *A. convexiuscula* has the punctures stronger and not so close, and has a central shining smooth line. This insect has a peculiar interest attached to it, being that upon which Kirby found his *Pediculus melittæ*. This hexapod is found upon bees of almost every genus in this country, also occasionally upon wasps and dipterous insects. Kirby, relying upon the figure and description of De Geer, concluded that it was the larva of a species of *Meloë*: this appears to be doubtful. The hexapod is very common about Hampstead; so are *Meloë violaceus* and *M. proscarabæus*. The larvæ of both I have reared from the eggs; and they are bright yellow. *P. melittæ* is always black. There are only the two species of *Meloë* mentioned found at Hampstead. Another circumstance adds to the difficulty. On digging out cells of *Anthophora* I found in one a perfect bee and two or three of Kirby's hexapods. As that author observes, if it were a larva, one would expect it to vary in size; but we know now that the larvæ of *Meloë* only increase in size after they have changed to the apod condition. That it is the larva of some insect is most probable; this, in Kirby's words, "future observation will clear up."

#### 60. *Andrena afzeliella*.

*A. nigra*, pallide fulvo villosa, thorace fusco-ferrugineo; abdomine ovato, fasciis tribus pallidis, anticis interruptis.

*Andrena afzeliella*, *Smith*, *Zool.* v. 1929; *Bees Great Brit.* 101 ♂ ♀.

*Schenck*, *Nass. Bien.* 257.

*Melitta afzeliella*, *Kirby*, *Mon. Apum Angl.* ii. 169 ♀.

*Female.* Length  $4\frac{1}{2}$ –5 lines.—Black; the face with pale fulvous pubescence, that on the clypeus shorter and paler; the flagellum rufo-piceous towards the apex beneath. The thorax closely punctured.

tured, and covered with ferruginous pubescence above, on the sides and on the legs it is paler; the posterior tibiæ and tarsi rufo-fulvous, the apical joints of the anterior and intermediate tarsi ferruginous; the floecus yellowish white, the scopa fulvous; wings subhyaline, faintly clouded at their apical margins, the nervures ferruginous. Abdomen shining, subcordate, convex, and closely and finely punctured; the apical margins of the three intermediate segments with narrow white marginal fasciæ, the first usually interrupted; sometimes a little pubescence on the margin of the first segment; in very recent specimens the fasciæ are yellowish white; the apical fimbria pale fulvous; beneath slightly convex, with the margins of the segments fringed with pale fulvous hairs.

B.M.

*Male.* Length  $3\frac{1}{4}$ –4 lines.—The face with pale fulvous pubescence; the head a little wider than the thorax; the antennæ obscurely rufo-piceous beneath. The disk of the thorax thinly clothed with very pale fulvous pubescence, on the sides and on the legs it is cinereous; wings hyaline and iridescent, faintly clouded at their apical margins. Abdomen oblong-ovate, the margins of the segments slightly depressed, all having narrow white marginal fasciæ, the first and second usually interrupted; the abdomen is very closely covered with fine shallow punctures.

B.M.

This species appears in April; it is widely distributed, and usually very abundant. In Kirby's type collection his var.  $\delta$  is, in my opinion, a specimen of *A. dorsata*. A male is placed with the species, which I believe to be that of *A. convexiuscula*. It should be borne in mind that my descriptions are of very fine fresh examples; the males are very frequently entirely hoary.

This species, and probably some others, occasionally partially reappear late in the autumn. I have observed the same of *Anthophora acervorum*, *Melecta armata*, and *Nomada alternata*.

### 61. *Andrena convexiuscula*.

*A. nigra*, griseo suopubescens; abdomine ovato, convexo, segmentorum marginibus pallidis; tibiis plantisque posticis rufis.

*Andrena convexiuscula*, *Smith*, *Zool.* v. 1927; *Bees Great Brit.* 102

♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fem.* ii. 257.

*Schenck, Nass. Bien.* 255.

*Thoms. Opusc. Ent.* 157; *Hym. Scand.* ii. 106.

*Melitta convexiuscula*, *Kirby, Mon. Apum Angl.* ii. 166 ♀.

*Andrena xanthura*, *Nyland. lib. cit. Supp.* 100.

*Female.* Length 5 lines.—Black; the face covered with short pale fulvous pubescence, that on the clypeus cinereous; the flagellum slightly testaceous near the apex. Thorax very finely punctured and thinly clothed above with fulvous pubescence; on the metathorax and sides it is much paler; the tegulæ piceous; the wings

subhyaline, iridescent, and faintly obscured towards their apical margins, the nervures rufo-testaceous; the intermediate and posterior tarsi, the apical joints of the anterior pair, and the posterior tibiæ pale rufous, the latter having usually a fuscous stain beneath; the floccus white; the scopa of a golden yellow, having in certain lights a glittering silvery brightness. Abdomen ovate, convex, and shining, very delicately and finely punctured, the punctures faintly impressed; the three intermediate segments have on their apical margins a narrow fringe of pale yellow pubescence; the two apical segments have a scattered short rufous pilosity; the apical fimbria is pale fulvous. B.M.

*Male*.—The face clothed with griseous pubescence; the clypeus strongly punctured; the antennæ nearly as long as the thorax, their extreme apex testaceous, the joints subarcuate. Thorax the pubescence griseous, that on the disk has a slight fulvous tinge; the legs covered with pale glittering pubescence, that on the tarsi beneath golden yellow; the apical joints of the anterior and intermediate tarsi, the posterior pair, and the extreme apex of the tibiæ rufo-testaceous; the wings as in the female. Abdomen ovate-lanceolate, punctured and fringed as in the female. B.M.

This species appears about the middle of April, and is found during May and June; it has not occurred, to my knowledge, in the immediate vicinity of London; it is found at Reigate, Weybridge, Farnham, and at Blackwater, and plentiful near Norwich; but it must be regarded as a local insect. Mr. Dale used to take it very plentifully at Glanvilles Wootton, and noticed the remarkable circumstance that a very large majority of the specimens were attacked by *Stylops*.

## 62. *Andrena collinsonana*.

*A. atra*, cinereo subpubescens, thorace grisescente, tibiis posticis scopa argentea, abdomine utrinque fasciis tribus albis.

*Andrena collinsonana*, *Smith, Bees Great Brit.* 104 ♂ ♀.

*Melitta collinsonana*, *Kirby, Mon. Apum Angl.* ii. 153 ♂.

*Melitta digitalis*, *Kirby, lib. cit.* 159 ♀.

*Melitta proxima*, *Kirby, lib. cit.* 146 ♀.

*Andrena proxima*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 258.

*Schenck, Nass. Bien.* 260.

*Thoms. Hym. Scand.* ii. 99.

*Female*. Length  $4\frac{1}{2}$  lines.—Black; the face below the antennæ densely clothed with short cinereous pubescence; on the vertex and disk of the thorax it is faintly ochraceous; the antennæ half the length of the thorax; the thorax strongly and closely punctured on the disk; the sides of the metathorax thickly fringed with cinereous pubescence; the wings subhyaline, having a fulvous tinge towards their apex, the nervures dark fusco-ferruginous; the floccus white; the legs have a silvery pubescence, the scopa of

a silvery brightness, faintly tinged with yellow above; the basal joint of the posterior tarsi sometimes fuscous towards the apex within; the apical joints of all the tarsi ferruginous. Abdomen subovate, shining and convex; the apical margins of the intermediate segments have a lateral white fringe; the apical fimbria rufo-fuscous. B.M.

*Male.* Length  $3\frac{1}{2}$  lines.—The face has cinereous pubescence, the head wider than the thorax, the antennæ nearly as long; the pubescence on the thorax and legs cinereous, faintly tinged with ochraceous on the disk of the former; the wings as in the other sex; the basal joint of the tarsi has a golden pubescence within; their apical joints pale rufo-testaceous. Abdomen ovate-lanceolate, shining, and fringed as in the female; at the apex some bright glittering yellow pubescence; beneath, the segments are fringed with pale golden-yellow pubescence. B.M.

This species appears about the beginning of June. The only known localities are:—Barham, near Norwich; Weybridge; Blackwater, Hants; and Bristol. After carefully examining Kirby's types, I have no hesitation in assigning *M. proxima* and also *M. digitalis* as the females. Kirby, in his remarks on *M. digitalis*, says:—"Those hairs of the scopula on the inside of the posterior planta which are next the tibia are white, while those of the lower half of it, next the digitus, are black;" this appears to be the case if examined by artificial light; but by daylight the hairs are half fulvous and half fusco-ferruginous; they are the same in *M. proxima*. This bee is of a blacker colour than is usual in the genus *Andrena*.

### 63. *Andrena xanthura*.

*A. atra*, pallide villosa; ano, tibiis plantisque posticis rufescentibus; abdomine fasciis subinterruptis albidis.

*Andrena xanthura*, *Smith, Zool.* v. 1928; *Bees Great Brit.* 106.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 257.

*Schenck, Nass. Bien.* 252.

*Thoms. Opusc. Ent.* 143; *Hym. Scand.* ii. 105.

*Melitta xanthura*, *Kirby, Mon. Apum Angl.* ii. 164 ♂ ♀.

*Melitta wilkella*, *Kirby, lib. cit.* 145 ♀.

*Melitta barbatula*, *Kirby, lib. cit.* 152 ♂.

*Female.* Length 5–6 lines.—Black; the face covered with short griseous pubescence; the labrum ciliated with bright golden-yellow hairs; the pubescence on the vertex is sparing and rufo-fulvous; the flagellum, except the two basal joints, piceous beneath. Thorax, the pubescence on the disk rufo-fulvous and sparing, but dense on the sides and on the postscutellum; on the sides of the metathorax it is much paler; the tegulæ rufo-piceous; the wings fulvo-hyaline, faintly clouded at their apical margins; the nervures ferruginous; the pubescence on the thorax beneath and the fringe on the femora griseous; the floccus yellowish white; the posterior

tibiæ and tarsi rufo-testaceous, the anterior and intermediate tarsi more or less obscure; the scopa of a golden yellow. Abdomen oblong-ovate, slightly depressed, shining, very delicately and closely punctured; the apical margins of the three intermediate segments have a narrow fringe of white pubescence, the first and second usually widely interrupted; the apical fimbria bright fulvous; the margins of the segments beneath ciliated with long pale fulvous hairs. B.M.

*Male.* Length  $3\frac{1}{2}$ –5 lines.—The face clothed with cinereous pubescence that is more or less tinted with fulvous, rather paler on the clypeus; the flagellum rufo-testaceous towards the apex beneath, and nearly as long as the thorax; the disk of the thorax has a similar pubescence to the face; on the sides of the metathorax it is much paler, as is also that on the legs; the wings as in the other sex; the tarsi beneath have a golden-yellow pubescence. Abdomen oblong-ovate, convex, slightly shining, very closely and finely punctured; the margins of the segments depressed, the intermediate ones having a narrow fringe of pale pubescence, usually more or less interrupted, the extreme apex with glittering golden-yellow hairs. B.M.

This is a generally distributed species; its pale pubescence is very subject to becoming bleached, particularly in the males, which are not unfrequently entirely hoary: one in this condition is, in my opinion, described by Kirby as his species *M. barbatula*; his species *M. wilkella* is a female of *M. xanthura*. The bee appears about the middle of April, should the season prove mild, but in some years not before the middle of May.

#### Genus 5. CILISSA.

*Andrena* (pt.), *Fabr. Ent. Syst.* ii. 307 (1793).

*Melitta* (pt.), *Kirby, Mon. Apum Angl.* i. 140. t. 3\*\*c. f. 8, 9 (1802).

*Cilissa*, *Leach, Edin. Encycl.* 9 (1812).

*Kirbya*, *St.-Farg. Hym.* ii. 145 (1841).

*Anthophora* (pt.), *Fabr. Syst. Piez.* 374 (1804).

Head transverse, the *ocelli* placed in a curve on the vertex; the flagellum of the antennæ filiform, the apical joint obliquely truncate; the *mentum* obtuse at the base, and acute in the middle at the apex; the *labial palpi* 4-jointed, not quite so long as the labium; the *labium* lanceolate, acute at the apex; the *paraglossæ* minute. The *maxillary palpi* 6-jointed. The wings as in the genus *Andrena* (Plate VII. figs. 1, 2).

The economy of the bees belonging to this genus is the same as that of the genus *Andrena*; two species are found in England, a third in Sweden, and a fourth in the United States. The species are local, and rarely found in any great abundance. The pubescence on the insects of this genus, when viewed under a microscope of moderate power, is seen to be beautifully plumose.

1. *Cilissa hæmorrhoidalis*.

*C. atra*, pallide pubescens, thoracis limbo fulvescente; abdomine ovato, basi retusa, ano fulvo-aureo.

*Cilissa hæmorrhoidalis*, *Leach, Edin. Encycl.* ix. 155.

*Smith, Zool.* vi. 2207; *Bees Great Brit.* 109.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 268.

*Schenck, Nass. Bien.* 210.

*Thoms. Hym. Scand.* ii. 65.

*Andrena hæmorrhoidalis*, *Fabr. Ent. Syst.* ii. 313; *Syst. Piez.* 327 ♀.

*Panz. Faun. Germ.* 65. 20 ♀.

*Zett. Ins. Lapp.* 459.

*Melitta chrysuræ*, *Kirby, Mon. Apum Angl.* ii. 172 ♂ ♀.

*St.-Farg. Hym.* ii. 214.

*Kirbya chrysuræ*, *St.-Farg. lib. cit.* 146.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 246.

*Female.* Length  $5\frac{1}{2}$ –6 lines.—Black; the face clothed with short pale fulvous pubescence; the flagellum, except the extreme base, fulvo-piceous beneath; the margin of the vertex fringed with black pubescence. Thorax, the middle of the disk clothed with black pubescence, around which it is fulvous; on the sides and beneath it is paler; legs dark rufo-piceous, their pubescence short and fulvous, the scopa bright fulvous, the tarsi beneath ferruginous, the apical joint pale rufo-testaceous; wings subhyaline, faintly clouded at their apical margins, the nervures fusco-ferruginous. Abdomen oblong-ovate, subdepressed; at the base a little pale pubescence; the apical margins of the intermediate segments have a very narrow fringe of white pubescence, frequently more or less obliterated; the fifth and sixth segments densely clothed with golden-fulvous pubescence. B.M.

*Male.* Length  $4\frac{1}{2}$ –5 lines.—The face densely clothed with bright pale fulvous pubescence; antennæ, the joints excavated beneath and subdentate at their apex, not quite so long as the thorax. Thorax, the middle of the disk having a thin black pubescence; the rest of the thorax densely clothed with pale fulvous; the legs have a similar clothing; the apical joint of the tarsi ferruginous; wings subhyaline, faintly clouded at their margins; the nervures ferruginous. Abdomen elongate-ovate, convex; the two basal segments have a thin pale pubescence; on the following it is black, intermixed at the sides with pale fulvous hairs; the apex fulvous. B.M.

This insect appears about the middle of July, and is found up to the end of August; it appears to restrict its visits to the flowers of *Campanula rotundifolia* (the common bluebell). It is local, but plentiful in certain localities; it has been found at Shirley, Kingsdown (near Deal), Weybridge, Bournemouth, Bristol, Norwich, &c.

2. *Cilissa leporina*.

*C. atra*, pallide pubescens, antennis subtus pedibusque rufo-tes-  
taceis; abdominis segmentis fasciis tribus angustis pallidis.

*Cilissa leporina*, *Smith, Bees Great Brit.* 110 ♂ ♀.

*Thoms. Hym. Scand.* ii. 66.

*Apis leporina*, *Panz. Faun. Germ.* 63. 21 ♀.

*Anthophora leporina*, *Fabr. Syst. Piez.* 374.

*Melitta tricineta*, *Kirby, Mon. Apum Angl.* ii. 171 ♀.

*St.-Farg. Hym.* ii. 213.

*Cilissa tricineta*, *Leach, Edin. Encycl.* ix. 155.

*Smith, Zool.* vi. 2208.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 267.

*Schenck, Nass. Bien.* 209.

*Thoms. Hym. Scand.* ii. 66.

*Kirbya tricineta*, *St.-Farg. Hym.* ii. 145.

*Nyland. lib. cit.* ii. 102.

*Female.* Length 5 lines.—Black; the face clothed with short pale fulvous pubescence, that on the vertex black; the flagellum, except the basal joint, rufo-piceous beneath. Thorax: in the middle of the disk the pubescence is black, but sparing, surrounding which it is dense and fulvous; at the sides of the metathorax it is paler; the anterior femora, the coxæ, and trochanters are covered beneath with long dense cinereous pubescence; the pubescence on the legs above is pale fulvous, and on the tarsi beneath ferruginous; the legs dark rufo-piceous, the claws pale testaceous; the wings hyaline, their apical margins faintly clouded, the nervures and tegulæ rufo-piceous. Abdomen ovate and shining; the base has a thin pale pubescence; the apical margins of the first and three following segments have a fascia of pale fulvous pubescence; the apical fimbria black. B.M.

*Male.* Length 5 lines.—The face densely clothed with bright pale fulvous pubescence; the flagellum beneath, except the extreme base, fulvo-piceous; the joints submoniliform: the thorax has a fulvous pubescence intermingled with black hairs in the middle of the disk; the wings and legs as in the other sex. Abdomen oblong-ovate; the two basal segments have a thin pale fulvous pubescence; on the other segments it is black, each having a fringe of pale fulvous pubescence; on the apical segment the pubescence is black in the middle, and pale fulvous at the sides. B.M.

This species appears in July, and is frequently found on the white Dutch clover (*Trifolium repens*), also, according to Prof. Schenck, on *Medicago sativa* (the lucerne). It is by no means a common insect, although occasionally it is taken rather freely; it occurs to the south of London, at Gravesend, Greenhithe, and Erith; also Blackwater, Hants; at Deal and at Norwich. I once found a small colony burrowing in sandy soil at Hampstead.

Genus 6. **HALICTUS**, Latr.

- Apis* (pt.), *Linn. Syst. Nat.* i. 953 (1766).  
*Hylæus* (pt.), *Fabr. Syst. Ent.* ii. 302 (1793).  
*Melitta* (pt.), *Kirby, Mon. Apum Angl.* i. 134 (1802).  
*Prosopis* (pt.), *Fabr. Syst. Piez.* 293 (1804).  
*Megilla* (pt.), *Fabr. Syst. Piez.* 328 (1804).  
*Halictus*, *Latr. Hist. Nat.* xiii. 364 (1805).  
*Lasioglossum*, *Curtis, Brit. Ent.* x. 418 (1834).

Head subtriangular, scarcely as wide as the thorax; the *ocelli* in a curve on the vertex; the *antennæ* geniculated, the scape fully half the length of the flagellum, the latter filiform; the *clypeus* more or less produced; the *tongue* acute, as are also the *paraglossæ*, which are about two thirds of the length of the tongue; the *labial palpi* four-jointed, the basal joint as long as the two following, the three apical joints gradually slightly decreasing in length; the *maxillary palpi* 6-jointed, the basal joint shortest, the following joints gradually decreasing in length to the apical one; the labrum of the females transverse, furnished with a carinated appendage in front, densely fringed with pubescence at its margins. Thorax ovate; the anterior wings with one marginal cell, narrowed to and acute at its apex; three submarginal cells, the first as long as the two following united, the second subquadrate and receiving the first recurrent nervure near its apex, the third submarginal narrowed towards the marginal and receiving the second recurrent nervure at about one third of its length from the apex; the posterior legs have a floccus of pubescence on the coxæ and trochanters, and a dense pol-liniferous scopa on the tibiæ. Abdomen ovate, the apical segment with a central longitudinal rima.

The males have the *antennæ* elongate, usually longer than the thorax; the *clypeus* frequently much produced and more or less yellow at the apex; the abdomen cylindric and elongate.

The economy of this genus of Andrenidæ does not appear to have been ascertained previous to my own observations being published in the year 1850: it is so remarkably different from that of all other solitary bees, except of those belonging to the genus *Sphecodes*, that I am surprised it had escaped the researches of my predecessors who, like myself, "have loved to hear the wild bee's hum." It will be observed that the females of *Halictus* and *Sphecodes* make their appearance in June, and are to be found from that time until late in the autumn; but no males of these genera will be observed until long after the appearance of the females. My observations on a colony of *H. morio* will serve as the history of the whole genus, making allowance for the different periods of their appearance. "Early in April the females appeared, and continued in numbers up to the end of June; not a single male was to be found at any time: during the month of July scarcely an individual could be found; a solitary female now and then might be seen, but the spring bees had almost disappeared. About the middle of August the males began to



come forth, and by the end of the month abounded; the females succeeded the males in their appearance about ten or twelve days. These industrious creatures immediately began the tasks assigned to them, burrowing and forming their nests; one of their little tunnels had usually others running into it, so that a single common entrance served as a passage to several cells, in each of which a little ball of pollen was formed and a single egg deposited thereon. The larvæ were ten or twelve days consuming it, by which time they were fully fed; in this state they lay until they changed to the pupa state, when they very shortly became matured." I have reared individuals of *H. rubicundus* from the egg to the perfect insect: on the 15th of July I procured cells containing the pollen-balls with an egg on each; in twelve days the larvæ were full-fed; the change to the pupa state took place about the 25th of August; and during the first week of September the perfect state was acquired. The history of *Halictus*, therefore, is as follows: the males and females appear in the autumn; the latter being impregnated pass the winter in the perfect state, appearing during the following season to perform their economy, as detailed above in the case of *H. morio*. This is the result of my present observations; and I believe it to be the true history of *Halictus*, as well as of *Sphecodes*. Humble-bees and wasps pass the winter months in a torpid state, having been impregnated during the previous autumn; but amongst solitary bees I know of no other genera besides *Halictus* and *Sphecodes* which resemble them in this respect.

Some of the species of *Halictus* are found later in the season than any other of the solitary bees. I have taken them as late as the 14th of October.

The *Halicti* have a wide geographical range: they are found in all parts of Europe, and plentiful in North Africa, some species being found even at the Cape of Good Hope; they are also found in India, China, the islands of the Eastern Archipelago, Australia and New Zealand; and both in North and South America the species are numerous.

The *Halicti* are subject to the attacks of various parasites; species of Stylopidae, belonging to the genera *Elenchus* and *Halictophagus*, infest the bodies of the living bee. The bees are also preyed upon by fossorial insects belonging to the genera *Philanthus* and *Cerceris*, whilst species of *Nomada* and of Chrysididae feed upon their larvæ.

Div. I. *The abdomen of the females having white abdominal fasciæ, usually more or less interrupted.*

### 1. *Halictus rubicundus*.

*H. ater*, rufescenti pubescens, abdomine segmentis margine albis, tarsis tibiisque posticis fulvis.

*Halictus rubicundus*, Nyland. *Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 189.

Smith, *Zool.* vi. 2041; *Bees Great Brit.* 23.

*Schenck, Nass. Bien.* 263.

*Thoms. Opusc. Ent.* 310; *Hym. Scand.* 24.

*Apis rubicundus, Christ. Hym.* 190, tab. 16. fig. 10 ♀.

*Melitta rubicunda, Kirby, Mon. Apum Angl.* ii. 53 ♂ ♀.

*Female.* Length 4-5 lines.—Black; the face thinly clothed with short pale fulvous pubescence; the labrum bearded with golden-yellow hairs; the flagellum slightly nigro-piceous beneath. Thorax: the disk is clothed with fulvo-ferruginous pubescence, on the sides and metathorax it is paler; the tegulæ ferruginous; the wings subhyaline, faintly clouded at their apical margins, the nervures testaceous; the anterior tarsi, the intermediate pair, as well as the tibiæ above, and the posterior tibiæ and tarsi fulvous, their pubescence of a golden yellow; the basal joint of the posterior tarsi has frequently a fuscous stain outside. Abdomen ovate, smooth and shining, having a little pale fulvous pubescence at the base; all the segments have a narrow white fascia on their apical margins, the first and second usually interrupted. B.M.

*Male.*—The apex of the clypeus and the labrum yellow; the antennæ about the length of the head and thorax, fusco-ferruginous beneath; the face has a little griseous pubescence; that on the vertex and disk of the thorax is faintly yellowish; the tibiæ and tarsi yellow, the former having a dark stain in front. Abdomen elongate, the first four segments having a narrow white fascia on their apical margins, the first three interrupted. B.M.

This is probably the most widely distributed species of the genus; it is found in every part of the United Kingdom, and is scattered throughout Europe. Specimens from North America very closely resemble our insect, but are scarcely identical, having the abdomen rather more closely punctured; Mr. Kirby considered them the same. The species is described by Say as *H. parallelus*.

In 1868 I captured two females of this species attacked by *Stylops*. The females appear very early in the spring, and are among the latest of our solitary bees found in autumn; I have taken them as late as the middle of October. I took remarkable varieties of the males on Lundy Island in the month of August, 1869, having the flagellum of the antennæ yellow, with only two or three of the basal joints black above, resembling the male of *quadricinctus*, but having the mandibles simple, and the cheeks convex.

## 2. *Halictus quadricinctus*.

*H. ater, cinereo subpubescens; abdomine convexo, segmentis marginis albis; pedibus anoque pallido villosis.*

*Halictus quadricinctus, Smith, Zool.* vi. 2040; *Bees Great Brit.* 26.

*Nyland. Notis. ur Sällsk. pro Favn. et Flo. Fenn.* 198.

*Thoms. Opusc. Ent.* 310; *Hym. Scand.* ii. 137.

*Hylæus quadricinctus*, *Fabr. Ent. Syst.* ii. 303 ♂ ?

*Schenck, Nass. Bien.* 264.

*Melitta quadricincta*, *Kirby, Mon. Apun Angl.* ii. 51 ♂ ♀.

*Female.* Length  $4\frac{1}{2}$  lines.—Black; the face thinly clothed with pale yellow pubescence, the labrum has a beard of the same colour, the flagellum piceous beneath. Thorax thickly punctured, a thinly scattered ochraceous pubescence on the disk; the sides, the metathorax and beneath, more thickly clothed with pubescence of a lighter colour; the tegulæ piceous; the wings subhyaline, the nervures testaceous; the legs nigro-piceous, their pubescence pale ochraceous, the tarsi pale ferruginous. Abdomen fuscous, convex, ovate, and shining, finely and closely punctured; the apical margins of all the segments have a narrow white fascia, the first usually interrupted; at the apex a little pale ochraceous pubescence, the anal rima slightly ferruginous. B.M.

*Male.* Length 4 lines.—The face clothed with white pubescence, the apex of the clypeus yellow. The mandibles very much dilated at their base; the cheeks concave; the antennæ fulvous, as long as the head and thorax, slightly fuscous towards their base above, the apical joints pellucid. Thorax, the tegulæ testaceous; the wings hyaline; the posterior femora, except at their apex, the intermediate and anterior pairs behind, nigro-piceous, otherwise pale fulvo-testaceous. Abdomen elongate, shining and closely punctured; all the apical margins of the segments have narrow white marginal fasciæ, the first two sometimes interrupted; the two apical segments concave beneath. B.M.

It admits of considerable doubt whether this insect is synonymous with that of Fabricius, who makes no mention of the yellow nasus or dilated mandibles; in fact his description would suit three or four European species. Mr. Kirby, on the authority of Dr. Latham, quotes this bee as a species of the London district; but no one has met with it since to my knowledge. Mr. Dale took the female in the Isle of Portland some years ago, with the exception of which not a single specimen of either sex has been taken for many years. In Mr. Kirby's interleaved copy of the 'Monographia' is a note, "Mas: lectus a me in floribus Agerati apud Blakenham Parvum. (September 7th.)"

The species occurs in North America: there are two examples of the male in the British Museum, which appear to be identical with the British species. The sexes have been received from Sicily and Dalmatia.

### 3. *Halictus xanthopus*.

*H. niger*, rufo pubescens, thorace ferrugineo, abdomine segmentis utrinque basi pallidis, pedibus posticis fulvis.

*Halictus xanthopus*, *Brullé, Expéd. Morée*, iii. 349.

*St.-Farg. Hym.* ii. 273.

*Smith, Zool. vi. 2173; Bees Great Brit. 24.*

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. ii. 238.*

*Thoms. Hym. Scand. ii. 143.*

*Melitta xanthopus, Kirby, Mon. Apum Angl. ii. 78 ♂ ♀.*

*Lasioglossum tricingulum, Curtis, Brit. Ent. x. 448.*

*Hylæus xanthopus, Schenck, Nass. Bien. 281.*

*Female.* Length 5–5½ lines.—Black; the clypeus produced and shining, the tips of the mandibles ferruginous; the disk of the thorax sparingly clothed with rufo-fulvous pubescence, most dense on the postscutellum and in front of the wings; the disk shining, closely and finely punctured; the tegulæ rufo-piceous; the wings faintly fulvo-hyaline, slightly clouded at their apical margins, the nervures pale ferruginous; the legs have a rufo-fulvous pubescence; the posterior tibiæ and tarsi, the intermediate tarsi, and the apical joints of the anterior pair rufo-testaceous. Abdomen ovate, shining and delicately punctured; at the base a little fulvous pubescence; on the basal margins of the second, third, and fourth segments is a fascia of white pubescence, the first and second fasciæ usually much interrupted in the middle; on the sides of the anal rima a little fulvous pubescence. B.M.

*Male.* Length 4½–5 lines.—The clypeus produced as in the other sex, having occasionally an obscure yellow spot at the apex; the antennæ rufo-testaceous beneath. Thorax, its pubescence very thin and usually griseous, but slightly fulvous on the disk in very recent specimens; the wings as in the female; the legs also are similarly coloured; the abdomen elongate-ovate, the bands as in the other sex, but having an additional one on the fifth segment; the apex fringed with some pale yellowish pubescence. B.M.

This species has been quoted by Walckenaer as the *H. fodiens* of Latreille; but the abdominal fasciæ are placed on the basal margins of the segments, whereas Walckenaer's insect has them on the apical margins. The male is the *Lasioglossum tricingulum* of Curtis; the peculiarities in the form of the maxillary lobes, in which it differs from many of the British species, cannot be regarded as of generic value. An examination of a number of species of exotic *Halicti* shows that many and gradual modifications of parts must be admitted, or this extensive genus would have to be split into multitudinous subgenera; at present I prefer separating them into sections: in the last division of the British species are placed such as have the first recurrent nervure uniting with the second transverso-cubical nervure.

This insect is local, and appears to prefer situations on the coast: it is met with plentifully at Brighton, and Ventnor in the Isle of Wight, and has been received from Arundel, Littlehampton, and Hastings; also taken at Kingsdown, near Deal, in August, and at Southend in June.

4. *Halictus leucozonius*.

*H. ater*, cinereo pubescens, abdominis segmentis intermediis basi albis. *Mas* naso porrecto, apice albo.

*Halictus leucozonius*, *St.-Farg. Hym.* ii. 275.

*Smith, Zool.* vi. 2171; *Bees Great Brit.* 25.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 199.

*Thoms. Opusc. Ent.* 308; *Hym. Scand.* ii. 138.

*Apis leucozonias*, *Schrank, Ins. Austr.* 406.

*Rossi, Mantis.* 319.

*Melitta leucozonias*, *Kirby, Mon. Apum Angl.* ii. 76 ♂ ♀.

*Hylæus leucozonius*, *Schenck, Nass. Bien.* 266.

*Female.* Length 4–4½ lines.—Jet-black; the clypeus produced, with the apex rugose; the face on each side has a little cinereous pubescence, the mandibles ferruginous at their apex. Thorax thinly clothed on the disk with pale fulvous pubescence; the metathorax rugose, and having a subdefined space at the base longitudinally rugose; the tegulæ dark rufo-piceous; the wings hyaline, beautifully iridescent, the nervures ferruginous; the legs have a cinereous pubescence, the posterior pair having their scopæ slightly fulvescent; the apical joints of the tarsi ferruginous. Abdomen sub-ovate, shining, closely and finely punctured; the second, third, and fourth segments have on their basal margins a band of short snow-white pubescence, the first band usually interrupted; the apex has a little pale fulvous pubescence. B.M.

*Male.* Length 3–3¾ lines.—Black; the face clothed with white pubescence, the apex of the clypeus white, the mandibles ferruginous at their tips; the thorax punctured as in the female; the wings clear hyaline and splendidly iridescent; the basal joint of the four posterior tarsi white, covered with a white glittering pubescence, the claws ferruginous. Abdomen oblong-ovate, convex above, uniformly punctured, and having a thinly scattered cinereous pubescence; the second and third segments have usually on each side on their basal margins a patch of white pubescence; these are frequently obliterated. B.M.

This is a very abundant species, and found in most parts of the country; in the month of August it occurs in great profusion; and males are sometimes taken as late as the 27th of October. It is very plentiful in the London district, at the Land's End, and at Barmouth, North Wales.

5. *Halictus lugubris*.

*M. ater*, albido subpubescens, abdominis segmentis intermediis basi utrinque plantisque albis, antennis longioribus.

*Halictus lugubris*, *Smith, Zool.* vi. 2169 ♂ only; *Bees Great Brit.* 33 ♂ only.

*Melitta lugubris*, *Kirby, Mon. Apum Angl.* ii. 81 ♂.

This insect, which I formerly regarded as the male of *H. lævigatus*, bears some resemblance to the male of *H. sexnotatus*, as Kirby himself remarked; but its abdomen is more elongate and widest towards its apex; its antennæ are proportionally rather longer, and its clypeus is entirely black. In the Kirbyan collection there is only one specimen, the type; it is much smaller than the male of *H. sexnotatus*; but the males of this genus vary considerably in that respect. I cannot assign it to any species as a variety, having only seen the typical example; but it may be the male of *H. malachurus*.

B.M.

### 6. *Halictus zonulus*.

*H. ater*, pallide rufo pubescens; abdominis segmentis basi sublævibus.  
*Mas* pedibus posticis nigris.

*Halictus zonulus*, *Smith*, *Zool.* vi. 2171; *Bees Great Brit.* 26 ♂ ♀.

*Nyland.* *Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 241.

*Thoms. Hym. Scand.* ii. 139.

*Hylæus zonulus*, *Schenck, Nass. Bien.* 266.

*Female.* Length  $4\frac{1}{2}$ –5 lines.—Jet-black; clypeus moderately produced, ciliated with pale fulvous pubescence; that on the face is ochraceous and thinly scattered; the thorax strongly and closely punctured; the metathorax rugose; the tegulæ nigro-piceous; wings subhyaline, faintly clouded at their apical margins, the nervures ferruginous; the pubescence on the thorax and legs fulvous, brightest on the tarsi and posterior tibiæ. Abdomen subovate, shining, the basal segment very delicately punctured, the other segments finely punctured; on each side of the second and third on their basal margins a little fine white pubescence; sometimes the fourth has one indistinct white band at its base, the apex pale fulvous.

*Male.* Length  $3\frac{3}{4}$ –4 lines.—Black; the face with a short white pubescence; the clypeus slightly produced, and having occasionally a transverse white spot at its apex; the thorax with a thin pale ochraceous pubescence; wings as in the female; the legs black; the claws ferruginous. Abdomen oblong-ovate, margined with white pubescence, as in the female.

B.M.

This insect closely resembles *H. leucozonius*; but the abdomen is less pubescent, and the base more finely punctured; the metathorax is rugose at its base, not irregularly rugose-striate; the male has the posterior tarsi black, its nasus is less produced; the insect is also rather larger.

Taken in August at Plumstead, also at Weybridge; it has also been found at Bristol and in Scotland. Dr. Nylander says it occurs in Denmark and Sweden. Dr. Schenck found it at Nassau.

### 7. *Halictus sexnotatus*.

*H. aterrimus*, pube incana, abdominis segmentis tribus intermediis basi utrinque niveo-albis.

*Halictus sexnotatus*, *Walck. Mém. Halic.* 72.

*St.-Farg. Hym.* ii. 273.

*Smith, Zool.* vi. 2174; *Bees Great Brit.* 28.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 239.

*Thoms. Opusc. Ent.* 308; *Hym. Scand.* ii. 144.

*Melitta sexnotata*, *Kirby, Mon. Apum Angl.* ii. 82, tab. 15. fig. 7 ♀,  
8 ♂.

*Hylæus sexnotatus*, *Schenck, Nass. Bien.* 265.

*Female.* Length 5 lines.—Jet-black; the face has a thin white pubescence; the thorax very closely and finely punctured, and having a thin scattered white pubescence; the wings subhyaline, their apical margins clouded, the nervures nigro-piceous; the scopæ on the posterior tibiæ are slightly fuscous above; the tarsi beneath pale yellow, their apical joints rufo-piceous. Abdomen glossy and very delicately punctured; the base has a little white pubescence; an angular patch of short snow-white pubescence on each side of the basal margins of the second, third, and fourth segments, those on the fourth segment frequently obliterated; beneath, the margins of the segments have a thin fringe of long white pubescence.

B.M.

*Male.* Length 4 lines.—The pubescence as in the female; antennæ shorter than the thorax, the flagellum nigro-piceous beneath; the face covered with short white pubescence, the clypeus having a white spot at its apex. Abdomen elongate-ovate, spotted as in the other sex.

B.M.

This is a species hitherto rare in cabinets. Mr. Kirby took it at Barham; the only locality where it has been recently met with is Weybridge; the female occurs there in June and September, in the lane leading to Byfleet, opposite the wood, about half a mile from the railway station: the male appears in September: they were taken on the flowers of the bramble. Specimens have been captured at Portsmouth. This is the most beautiful species hitherto found in this country; and the exact locality is therefore pointed out.

The species is readily distinguished from all the other British ones by the snow-white spots on the abdomen and its coal-black colour; it is found in France, Germany, and Sweden.

### 8. *Halictus quadrinotatus*.

*H. aterrimus*, cinereo subpubescens, abdominis segmentis duobus intermediis basi utrinque albis.

*Halictus quadrinotatus*, *Smith, Zool.* vi. 2173; *Bees Great Brit.* 29.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 240.

*Thoms. Opusc. Ent.* 308; *Hym. Scand.* ii. 144.

*Melitta quadrinotata*, *Kirby, Mon. Apum Angl.* ii. 79 ♂ ♀.

*Hylæus quadrinotatus*, *Schenck, Nass. Bien.* 266.

*Female.* Length 3–3¼ lines.—Black; head and thorax having a thin cinereous pubescence, closely and rather finely punctured;

the clypeus produced, shining, and having a few large punctures at its apex. Thorax, the tegulæ nigro-piceous; the wings subhyaline and iridescent, their nervures testaceous; the legs have a cinereous pubescence, that on the tarsi beneath fulvous. Abdomen ovate, shining, and very finely punctured, distantly so on the basal segment; the margins of the two basal segments slightly constricted; on the basal margins of the second and third segments laterally a little snow-white pubescence; towards the apex covered with a short pale downy pubescence, the anal rima ferruginous. B.M.

Var.  $\beta$ . The basal segment of the abdomen impunctate, very glossy.

*Male*. Length  $2\frac{1}{2}$ -3 lines.—The antennæ scarcely as long as the thorax; the face has a short hoary pubescence, the apex of the clypeus and the labrum white; the mandibles ferruginous at their tips; the wings hyaline, beautifully iridescent, their nervures testaceous; all the tibiæ at their extreme base and apex, and the tarsi, yellowish-white, the claws ferruginous. B.M.

This is a generally distributed species: it is plentiful in the London district, also in the Isle of Wight, and has been received from Wales and Scotland; it is found also in France, Germany, Sweden, and Denmark. It is sometimes infested by a *Stylops*.

Variety  $\beta$ , of which I have only seen a single specimen, may prove to be a distinct species; it was taken in the Lake-district, and is in the collection of Mr. Benjamin Cooke, of Bowdon, Altrincham.

### 9. *Halictus maculatus*.

*H. ater*; capite vertice crasso, subquadrato; lateribus segmentorum 1-4 utrinque strigis pilosis albis.

*Halictus maculatus*, *Smith, Zool. vi. 2172* ♀; *Bees Great Brit. 29*.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. ii. 241*.

*Halictus interruptus*, *St.-Farg. Hym. ii. 270* (nec *Panz.*).

*Female*. Length 3- $3\frac{1}{2}$  lines.—Black; the face thinly clothed with pale ochraceous pubescence; the clypeus strongly punctured and slightly produced; the flagellum nigro-piceous towards the apex. Thorax, the disk sparingly clothed with pale ochraceous pubescence; the wings fusco-hyaline, the nervures ferruginous; the tegulæ piceous; the posterior tibiæ with pale fulvous pubescence; the apical joints of the tarsi ferruginous. Abdomen shining, oblong-ovate, and finely punctured; a line of snow-white pubescence on the apical margins of the segments laterally; the first has the spots usually more or less obsolete.

*Male*.—The face with short white pubescence; the apex of the clypeus yellowish white; the flagellum fulvous beneath. Thorax, the wings hyaline, the nervures and tegulæ testaceous; the coxæ and femora dark rufo-piceous, the tibiæ and tarsi pale yellow. Abdomen oblong-ovate; a line of white pubescence on each side of the first four segments.

This is a rare and local species, and has only been taken once at



Blackwater, Hants, and once at Weybridge; the male has not been found in England. Professor Schenck has forwarded both sexes from Nassau. He considers the male to be the *H. interruptus* of Panzer; but, in my opinion, it is certainly distinct from the *H. interruptus* described in this work. The male here described is that sent by Professor Schenck.

### 10. *Halictus interruptus*.

*H. ater*; abdomine cylindrico, basi rufa, segmentis margine basi utrinque niveo-albis.

*Halictus interruptus*, *Smith, Zool.* vi. 2167 ♂; *Bees Great Brit.* 43.

*Hylæus interruptus*, *Panz. Faun. Germ.* 55. 4 ♂.

*Andrena interruptus*, *Panz. Krit. Revis.* 196.

*Male.* Length 3 lines.—Black; the face thinly covered with short white pubescence; the apex of the clypeus, the labrum, and mandibles yellow; the flagellum fulvous beneath and fuscous above. Thorax, the mesothorax shining and closely punctured; the metathorax rounded posteriorly and rugulose; wings subhyaline and iridescent; the nervures fusco-ferruginous, the tegulæ testaceous; the base and apex of the tibiæ and also the tarsi yellow. Abdomen oblong, cylindric, shining, and finely punctured; the basal segment red; the second and third segments, and sometimes the fourth, with an interrupted fascia of white pubescence at their basal margins. B.M.

There is a specimen of this insect in the collection of the British Museum; it has the locality Kingsbridge attached, where it was probably taken by Dr. Leach. Professor Schenck believes this to be the male of *H. maculatus*; but on comparing a specimen forwarded by him with the English one, I found them to be distinct.

### 11. *Halictus cylindricus*.

*H. niger*, rufescenti pubescens; abdominis segmentis marginibus fulvis, intermediis basi utrinque pallidis. *Mas* abdominis segmentis anticis rufis, macula media punctisque lateralibus nigris.

*Halictus cylindricus*, *Smith, Bees Great Brit.* 30.

*Thoms. Opus. Ent.* 309; *Hym. Scand.* ii. 140.

*Hylæus cylindricus*, *Fabr. Ent. Syst.* ii. 302; *Syst. Piez.* 319.

*Hylæus abdominalis*, *Panz. Faun. Germ.* 53. 18.

*Schenck, Nass. Bien.* 267.

*Melitta fulvocincta*, *Kirby, Mon. Apum Angl.* ii. 68 ♀.

*Melitta abdominalis*, *Kirby, Mon. Apum Angl.* ii. 73 ♂ var.

*Halictus fulvocinctus*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo.*

*Fenn.* ii. 199.

*Halictus abdominalis*, *Smith, Zool.* vi. 2106.

*Female.* Length 4–4½ lines.—Black; head and thorax closely punctured, the face thinly clothed with short fulvous pubescence; the disk of the thorax is similarly clothed, more densely at the sides;

the metathorax rugose, posteriorly truncate; the enclosed portion at its base has a sharp ridge behind; the wings subhyaline, their apical margins slightly clouded, the nervures ferruginous; the tegulæ piceous; the pubescence on the legs rufo-fulvous, the apical joints of the tarsi ferruginous, and their pubescence beneath ferruginous. Abdomen ovate, shining, and delicately punctured, the margins of the segments pale fulvo-testaceous and densely ciliated with fulvous pubescence; at the base of the second and third segments laterally a line of white pubescence, that on the apex fulvous. B.M.

*Male.* Length  $3\frac{1}{2}$ – $4\frac{1}{2}$  lines.—Head and thorax black; the face is covered with a short white pubescence, above it is pale fulvous; the clypeus produced, the apex yellow; the mandibles ferruginous at their apex, sometimes having a yellow spot about the middle; the antennæ nearly as long as the thorax. Thorax, the disk thinly clothed with pale fulvous pubescence; the tegulæ rufo-piceous and having a yellow spot in front, the wings hyaline, iridescent and faintly clouded at their apical margins; the four posterior tibiæ at their base and apex, and a line on the anterior pair above, yellow; all the tarsi yellow, their apical joints ferruginous. Abdomen oblong-ovate; the three basal segments red, the apical ones black, the extreme base of the first segment and the apical margin of the third black; at the lateral margins of the second and third segments a black dot, and on the basal margins of each laterally a line of white pubescence. B.M.

Var. *a.* A black spot in the centre of the second and third segments.

Var. *β.* A broad fuscous transverse stain on the second and third segments, leaving only the margins red.

Var. *γ.* The apical margins alone red, faintly so in the middle.

*Hylæus cylindricus* of Fabricius is the male, and the oldest name for the species. Mr. Kirby made a distinct species of the male of the description, regarding the dark varieties only as the male; but the sexes have on more occasions than one been observed "*in coitu.*" All these varieties belong to one species; and still more minute ones might be pointed out; but that will be better done by personal observation of the insects themselves. Hundreds of the males may be captured on fine autumnal days, on the ragwort. The species is universally distributed, and has been received from Scotland, Wales, and Ireland; it is found in France, Germany, Austria, Russia, Denmark, Sweden, Finland, and Lapland.

## 12. *Halictus malachurus.*

*H. niger*, griseo subpubescens, abdomine subtomentoso.

*Halictus malachurus*, *Smith*, *Zool.* vi. 2106; *Entom. Ann.* (1869) 77.

*Melitta malachura*, *Kirby*, *Mon. Apum Angl.* ii. 67 ♀.

*Halictus cylindricus*, *Smith*, *Bees Great Brit.* 30, var.

*Hylæus malachurus*, *Schenck*, *Nass. Bien.*

*Femule.* Length 4 lines.—Head, the face thinly clothed with short

griseous pubescence. Thorax closely punctured, the pubescence griseous; wings hyaline and iridescent; faintly clouded at their apical margins, the nervures testaceous, the tegulæ black; the pubescence on the legs pale yellowish white, that on inside of the basal joint of the posterior tarsi fulvous; the metathorax subrotundate. Abdomen oblong-ovate, and, except at the extreme base, covered with a short griseous pile; the apical margins of the segments with fasciæ of faintly yellowish-white decumbent pubescence, that on the basal segment usually obliterated. B.M.

In the 'Bees of Great Britain' I have considered this species a variety of *H. cylindricus*, not having any recent specimens for examination and Kirby's type being in a bad state of preservation. Since that time I have taken the female at Cromer, and find the species to be quite distinct from *H. cylindricus*: it differs from that species in having hoary pubescence, faintly yellowish in very fine examples, the tegulæ of the wings being black, the metathorax less coarsely sculptured at the base, and not having a sharp ridge at the margin of the truncation; and the legs are black, the abdomen being perfectly ovate and the margins of the segments not rufo-testaceous. Prof. Schenck has sent a male he believes to belong to the species; it is covered with pubescence like that on the female, has the apex of the clypeus, the labrum, and mandibles yellowish white; all the tibiæ and tarsi are of the same colour, the tibiæ with a dark stain behind, the antennæ bright fulvous beneath, the tegulæ pale testaceous as well as the nervures of the wings, the latter hyaline and iridescent.

### 13. *Halictus albipes*.

*H. ater*, glabriusculus; abdomine nitidissimo, obovato, segmentis basi albis. *Mas* abdominis segmentis intermediis rufis, punctisque lateralibus nigris, mandibulis labro clypeique apice pallide luteis.

*Halictus albipes*, *Smith, Zool.* vi. 2167; *Bees Great Brit.* 32.

*Hylæus albipes*, *Fabr. Ent. Syst.* ii. 306?

*Schenck, Nass. Bien.* 267.

*Melitta albipes*, *Kirby, Mon. Apum Angl.* ii. 71 ♂.

*Melitta obovata*, *Kirby, Mon. Apum Angl.* ii. 75 ♀.

*Halictus obovatus*, *Nyland. Not. wr Sällsk. pro Faun. et Fl. Fenn.* ii. 244.

*Thoms. Opusc. Ent.* 309; *Hym. Scand.* ii. 141.

*Female.* Length 4 lines.—Black; the face thinly clothed with short griseous pubescence, the flagellum piceous beneath. Thorax very thinly clothed with very pale ochraceous pubescence on the disk, on the sides and beneath it is griseous; the tegulæ piceous; the wings fulvo-hyaline, the nervures testaceous; the metathorax truncate posteriorly, the basal portion not enclosed, but rugose-striate; beyond, slightly roughened; the tibiæ and tarsi have a pale fulvous pubescence, on the latter beneath it is bright fulvous; the apical joints of the tarsi ferruginous. Abdomen ovate, very smooth and shining at the base and in the middle of the segments, the sides

and towards the apex covered with a short pale fulvous pubescence; at the base of the second, third, and fourth segments a thin fascia of white or very pale pubescence. B.M.

*Male.* Length  $3\frac{1}{4}$ –4 lines.—The face covered with short white pubescence; the clypeus at its apex and the labrum and mandibles yellow, the latter black at the base and ferruginous at their apex. Thorax, the tubercles and tegulæ pale yellow in front; the wings hyaline, splendidly iridescent, the nervures ferruginous; the femora at their apex, the tibiæ at their base and apex, and the tarsi yellowish white, the claws ferruginous. Abdomen elongate, widest towards the apex, the three basal segments red; the base and a quadrate patch nearly reaching the apical margin of the first segment, a short transverse patch on the apical margin of the second segment, and a similar one on the third black; beneath, red towards the base; a black dot at the extreme lateral margins of the second and third segments. B.M.

Var.  $\beta$ . The sides and apical margins only red.

Var.  $\gamma$ . The apical margin only of the basal segment red, the two following as in var.  $\beta$ .

The female of this species most closely resembles that of small examples of *H. cylindricus*; but its clypeus is more produced, the pubescence on the body is griseous, that on the legs pale yellow, not fulvous, and the base of the metathorax is much less coarsely sculptured, and the abdomen is obovate slightly narrowed at the base; the species is also smaller. The male has a more elongate head, and the highly coloured specimens have the mandibles more or less yellow; but in small uncoloured ones the mandibles are black.

The species is found in all parts of the United Kingdom. I have found both sexes infested by some species of *Stylops*.

#### 14. *Halictus lævigatus*.

*H. ater*, subpubescens, thorace pube ferruginea vestito; abdomine nitidissimo, segmentis intermediis basi pallescentibus. *Mas niger*; antennis thorace longioribus fulvescentibus, supra subfuscis; abdomine nitido, segmentis intermediis basi albis.

*Halictus lævigatus*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 239.

*Smith, Entomol.* iv. 266 ♂.

*Melitta lævigata*, *Kirby, Mon. Apum Angl.* ii. 75 ♀.

*Melitta fulvicornis*, *Kirby, Mon. Apum Angl.* ii. 67 ♂?

*Halictus fulvicornis*, *Smith, Zool.* vi. 2170 ♂.

*Female.* Length  $4\frac{1}{2}$  lines.—Black; the face thinly clothed with pale fulvous pubescence; the clypeus slightly produced, shining, and having a few large punctures, the mandibles ferruginous at their apex. Thorax shining, the punctures large, scattered on the disk, which is clothed with fulvo-ferruginous pubescence; the tegulæ nigro-piceous; the wings subhyaline, iridescent, the nervures pale ferruginous, the apical margins faintly clouded; the legs have a

bright fulvous pubescence, the claws ferruginous. Abdomen smooth and highly polished; the base has a thin fulvous pubescence; the basal margins of the second, third, and fourth segments have a pale fulvous fascia; the first usually, and the second occasionally, interrupted; the apical segment clothed with similar pubescence. B.M.

*Male.* Length  $3\frac{1}{2}$  lines.—Black, the face anteriorly clothed with short white pubescence; the clypeus white at the apex; the antennæ longer than the thorax, fulvous beneath, and more or less fuscous above. Thorax finely and very closely punctured, the metathorax rugose; the tegulæ rufo-piceous; the wings hyaline, iridescent, the nervures fuscous; the tibiæ at their base and apex, the anterior pair in front, and the tarsi yellow; the anterior tibiæ are sometimes fulvous in front; the claws ferruginous. Abdomen elongate, very smooth and shining, impunctate; the margins of the intermediate segments depressed, and having at their base laterally a little white pubescence. B.M.

This is a scarce species, its known localities being Greenwich and Charlton (Kent), Ventnor (Isle of Wight), and Bristol; it has been received from Scotland. *Halictus fulvicornis* has been taken with it, and from that circumstance is believed to be its male; further evidence being desirable, that name is not adopted for the species.

### 15. *Halictus villosulus.*

*M. ater*, pallido villosulus; abdomine subpubescenti punctulato, segmento lævi nitidissimo. *Mas ater*, albido-villosulus, abdomine subovato; antennis subtus tarsisque rufescentibus.

*Halictus villosulus*, *Smith, Zool.* vi. 2105; *Entomol.* iv. 258.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* 246.

*Melitta villosula*, *Kirby, Mon. Apum Angl.* ii. 62 ♂.

*Melitta punctulata*, *Kirby, Mon. Apum Angl.* ii. 66 ♀.

*Hylæus villosulus*, *Schenck, Nass. Bien.* 289.

*Halictus punctulatus*, *Thoms. Hym. Scand.* ii. 145.

*Female.* Length 4 lines.—Black; the antennæ obscurely fulvous beneath; the clypeus produced and strongly punctured; the head more closely and finely so; mandibles slightly ferruginous at their apex; the pubescence cinereous. Thorax shining and punctured, the punctures distant; the metathorax rugose at the base, posteriorly rotundate; wings subhyaline, iridescent, with the nervures rufo-fuscous; the tegulæ obscure nigro-piceous; the pubescence of the legs pale. Abdomen subovate, shining, the basal segment impunctate, the following segments finely and closely punctured; on the apical margins of the third and fourth segments thinly fringed with cinereous pubescence, the apical segment with pale pubescence. B.M.

*Male.* Length  $2\frac{1}{2}$ –3 lines.—Black; the face with a dense white pubescence; the flagellum rufo-fulvous beneath; the tips of the mandibles ferruginous. Thorax, the disk with scattered punctures,

towards the sides becoming more dense; the wings hyaline and iridescent, the nervures and stigma pale rufo-testaceous. Abdomen subovate, shining and delicately punctured, thinly sprinkled with pale pubescence; a similar pubescence clothes the legs and thorax. B.M.

This is a very common species, found in all parts of the United Kingdom; it has been received from Scotland, Wales, and Ireland.

#### 16. *Halictus subfasciatus*.

*H. ater*, griseo subpubescens; abdomine nitidissimo, segmentis pallido subfasciatis.

*Halictus subfasciatus*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 200.

*Smith, Bees Great Brit.* 41; *Entomol.* iv. 267.

*Female.* Length 3-3 lines.—Black; the flagellum of the antennæ fulvo-piceous beneath towards the apex; the head and thorax finely and very closely punctured. Thorax, the wings hyaline and iridescent, the nervures pale testaceous; the tegulæ rufo-piceous; the metathorax truncate; above with a radiating striation, acutely margined laterally; the pubescence sparse and cinereous, that on the legs short, dense, and slightly yellowish. Abdomen ovate and shining, impunctate, beyond the basal segment with a thin short cinereous pubescence; the apical margins of the second, third, and fourth segments with very thin pubescent fasciæ, which are usually subobsolete. B.M.

*Male.*—Black; the flagellum of the antennæ pale fulvous beneath; the anterior tibiæ and tarsi reddish yellow, and the base of the intermediate and posterior tibiæ yellowish as well as the tarsi.

This species appears to be restricted to the north of England and to Scotland. I discovered it in 1842, at Woolley Edge in Yorkshire, about four miles from Wakefield; since that time it has been received from Scotland; the specimens were identified by Dr. Nylander. The species is found in Sweden, Finland, and Lapland. Dr. Nylander suggests that Kirby's *H. fulvicornis* may prove to be the male; but that insect is the male of *H. levigatus*.

Div. II. *The body more or less metallic.*

#### 17. *Halictus prasinus*.

*H. capite* thoraceque nigro-æneis; abdomine atro, segmentorum marginibus albis.

*Halictus prasinus*, *Smith, Zool.* vi. 2169; *Bees Great Brit.* 33 ♀; *Entomol.* iv. 269 ♀ ♂.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 242.

*Female.* Length  $4\frac{1}{2}$  lines.—Head nigro-æneous, the face thinly clothed with griseous pubescence; the clypeus much produced, and having a few large punctures at the apex; the mandibles ferruginous at their apex. Thorax nigro-æneous, finely and very closely punctured; the tegulæ pale testaceous; the wings fulvo-hyaline, the nervures pale ferruginous; the legs have a yellowish white pubescence, that on the tarsi beneath fulvous. Abdomen ovate, highly polished and finely punctured; on the basal margins of the second and third segments is a fascia of very short yellowish white pubescence; the pubescence is beautifully plumose or pectinate; the apical segments have a scattered short, pale, yellowish pubescence, the sides of the anal rima fulvous. B.M.

*Male.* Length 4 lines.—Head and thorax dark olive-green, abdomen and legs black. The head and thorax closely and finely punctured; the apex of the clypeus white; the face clothed with cinereous pubescence, the cheeks more thinly clothed with the same. Thorax with cinereous pubescence; the anterior tibiæ, the tarsi, the extreme apex of the femora, and the base of the posterior tibiæ pale rufo-testaceous. Abdomen elongate, widest towards the apex, and having a scattered cinereous pubescence; a band of white pubescence at the basal margins of the second and third segments; the apical segment rufo-testaceous. B.M.

This species was plentiful in the month of August at Bournemouth, 1864; also taken at Pool and Christchurch. I know of no other localities in England. It has been taken at Moffat, Scotland.

### 18. *Halictus tumulorum.*

*H. nigro-æneus, pallido subpubescens, abdominis segmentis marginibus pallidis. Mas nigro-æneus, glabriusculus; antennis corpore brevioribus, subtus fulvis; pedibus maxillisque flavescens.*

*Halictus tumulorum, Smith, Entomol. iv. 247.*

*Thoms. Opusc. Ent. 312; Hym. Scand. ii. 148?*

*Apis tumulorum, Linn. Faun. Succ. 419; Syst. Nat. i. 953.*

*Apis flavipes, Fabr. Mantis. i. 305 ♂.*

*Hylæus flavipes, Fabr. Ent. Syst. ii. 305.*

*Apis seladonia, Fabr. Ent. Syst. Supp. 276 ♀.*

*Melitta flavipes, Kirby, Mon. Apum Angl. ii. 55.*

*Halictus flavipes, Smith, Zool. vi. 2042 ♂ ♀; Bees Great Brit. 34.*

*Thoms. Hym. Scand. ii. 149.*

*Halictus seladonius, Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. ii. 247.*

*Female.* Length 3–4 lines.—Nigro-æneous; the flagellum more or less testaceous beneath; the thorax shining and closely punctured; the metathorax sometimes blue-green; the prothorax has an impressed line in the centre passing backwards to the middle of the disk, and on each side there is a shorter one opposite the tegulæ; the tegulæ testaceous; the wings hyaline and iridescent, the nervures pale testaceous; the pubescence of the legs yellowish white,

that on the tarsi beneath golden yellow; the apical joints of the tarsi pale ferruginous. Abdomen ovate, very closely and finely punctured; the apical margins of the segments have pale fasciæ, sometimes white, the first usually interrupted; the sides of the anal rima slightly fulvous. B.M.

*Male.* Length 3-3½ lines.—Brassy green, very closely and finely punctured, the apex of the clypeus, the labrum, and mandibles yellow, the latter ferruginous at their apex; the antennæ longer than the thorax, fulvous beneath and fuscous above, the scape black; the thorax has a central impressed line and a short one over the tegulæ; the tegulæ yellow; the legs sulphur-yellow, the coxæ and trochanters black or rufo-piceous, the anterior coxæ yellow beneath; the tibiæ and femora have some rufous stains; the wings hyaline and iridescent, the nervures testaceous. Abdomen elongate, shining and subclavate, the apex obtusely rounded; the margins of the segments depressed, and having a thinly scattered griseous pubescence, particularly on the sides, B.M.

I have carefully reexamined the type of *A. tumulorum*, having cleaned the specimen; and I find the head and thorax are metallic, the mandibles, clypeus, and labrum yellow; the antennæ pale fulvous beneath, with two or three of the apical joints entirely fuscous, and in other respects agreeing with our insect. Kirby describes the wings as "Alæ fuscescentes;" this arises from the insect being gummed on card and the four wings placed over each other: there are two specimens on the card; in one the brassy colour is now apparent. The species is found in all parts of the United Kingdom, and very abundant in Lundy Island, in the Bristol Channel.

### 19. *Halictus fasciatus*.

*H. nigro-æneus, pallido subpubescens, abdominis segmentis marginibus albis.*

*Halictus fasciatus, Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. i. 275.*

*Smith, Entomol. iv. 248.*

*Female.* Length 4 lines.—Head and thorax brassy green, finely and closely punctured; the clypeus with a bright violet tint; the flagellum pale fulvous beneath. Thorax, the articulations of the legs and the apical joints of the tarsi pale testaceous; the wings hyaline and iridescent, the nervures pale testaceous. Abdomen obscure nigro-æneous, very finely and closely punctured and shining; the apical margins of the segments with white pubescent fasciæ; the sides of the apical rima slightly fulvous. This species is very distinct from *H. gramineus*.

The insect described closely resembles the female of *H. tumulorum*; it appears possible that it may be a variety of that insect. It was taken at Deal in August some years ago.



20. *Halictus gramineus*.

*H. nigro-æneus*, pallido pubescens, abdomine pubescente pulveroso.

*Halictus gramineus*, *Smith, Zool. vii. Append. lviii; Entom. iv. 248; Bees Great Brit. 36 ♂ ♀.*

*Female.* Length  $3\frac{1}{4}$  lines.—Green, finely and closely punctured; the apical joints of the flagellum rufo-testaceous beneath; the head and thorax have a thinly scattered fulvous pubescence, palest on the face; the tegulæ honey-yellow, as well as the extreme base of the wings, which are hyaline and splendidly iridescent, the nervures pale testaceous; the anterior tibiæ, the intermediate and posterior pairs at their base, and all the tarsi testaceous, the claws ferruginous. The abdomen entirely covered with a very short pale fulvous pubescence, slightly intermixed with paler down, or scales, on the margins of the segments, giving them a subfasciate appearance. B.M.

*Male.*—Rather smaller than the female, similarly clothed; the antennæ not so long as the thorax, the flagellum fulvous beneath; the apex of the clypeus, the labrum, and apex of the mandibles yellow. Thorax, the wings as in the female; the tibiæ and tarsi yellow; a ferruginous stain on the anterior tibiæ in front, and also a similar spot on each side of the intermediate and posterior pairs, the claws ferruginous. Abdomen ovate, scarcely longer than in the other sex. B.M.

This may possibly be the *H. vestitus* of St.-Fargeau.

The description of the male of this species will at once show that it cannot be the *Apis tumulorum* of Linnæus, who says, "Antennæ filiformes, corporis fere longitudine." In *H. gramineus* they are about two thirds of the length of the thorax; the typical specimen of *H. tumulorum* in the Linnean Cabinet has three or four of the apical joints of the antennæ black or fuscous. Of this very distinct species two specimens have been taken on Cove Common, Hants; there are several in the collection of the British Museum, believed to be from Devonshire.

21. *Halictus smeathmanellus*.

*H. viridi-æneus*, nitidissimus, abdominis segmentis intermediis basi utrinque tomentosus albis.

*Halictus smeathmanellus*, *Smith, Zool. vi. 2101; Bees Great Brit. 36; Entomol. iv. 268.*

*Nyland. Notis. wr Sällsk. pro Faun. et Flo. Fenn. ii. 247.*

*Thoms. Hym. Scand. ii. 152.*

*Melitta smeathmanella*, *Kirby, Mon. Apum Angl. Append. 375 ♂ ♀.*  
*Hylæus smeathmanellus*, *Schenck, Nass. Bien. 271.*

*Female.* Length  $3-3\frac{1}{2}$  lines.—Bright metallic green; head and thorax closely and finely punctured; the flagellum nigro-piceous beneath, the mandibles ferruginous at their apex; the tegulæ, nervures, and

extreme base of the wings testaceous, the wings hyaline and beautifully iridescent; the legs have a thin cinereous pubescence. Abdomen ovate, impunctate, very glossy, and having a very thinly scattered downy pubescence; the apical margins of the segments slightly testaceous, at the basal margin of the second and third segments laterally a patch of white pubescence; the sides of the apical rima pale fulvous. B.M.

*Male*.—Of the same colour as the female, the apex of the clypeus pale yellow, the antennæ as long as the thorax, the flagellum fulvous beneath, the apex of the mandibles ferruginous. Thorax, the tegulæ piceous; the wings hyaline, splendidly iridescent. Abdomen elongate, widest towards its apex, shining green; at the base of the two intermediate segments sometimes a little short white pubescence. B.M.

This is a local insect, but found occasionally in the London district south of the Thames. Mr. Bridgman found it near Norwich; it also occurs near Lowestoft.

## 22. *Halictus æratus*.

*H. viridi-æneus*, nitidus, abdomine nigro-æneo.

*Halictus æratus*, *Smith*, *Zool.* vi. 2043; *Bees Great Brit.* 37; *Entomol.* 269.

*Melitta ærata*, *Kirby*, *Mon. Apum Angl.* ii. 58.

*Female*. Length  $2\frac{1}{2}$ –3 lines.—Head and thorax brassy green; the flagellum slightly testaceous towards the apex beneath; the thorax shining, the metathorax having at its base a subdefined space, its margin behind ridged, the space longitudinally rugose; the wings subhyaline, splendidly iridescent. The abdomen nigro-æneous, smooth and shining, the apical margins of the segments slightly testaceous; the basal margins of the intermediate segments have sometimes laterally a little short white pubescence, frequently obliterated. B.M.

*Male*. Length 3 lines.—Head and thorax of a bronzed or brassy green; antennæ nearly as long as the thorax, the flagellum fulvous beneath, apex of the clypeus pale yellow; the wings subhyaline, the tegulæ rufo-piceous. Abdomen black, slightly nigro-æneous at the base, which is very glossy; the two intermediate segments, and sometimes the third segment also, have a little white pubescence on each side at the base. B.M.

This species closely resembles *H. morio*; but it differs from that species in the colour and also in the form and sculpture of the metathorax, which is subtruncate, its base is more strongly rugose, it is also concolorous with the mesothorax; the latter is also more strongly punctured, the abdomen being nigro-æneous; the mesothorax is more strongly punctured than in *H. morio*.

It is generally distributed, but not so abundant as *H. morio*.

23. *Halictus morio*.

*H. æneus*, metathorace cærulescente, abdomine nigro.

*Halictus morio*, *St.-Farg. Hym.* ii. 284.

*Smith, Zool.* vi. 2101; *Bees Great Brit.* 38; *Entomol.* iv. 269.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 204.

*Thoms. Opusc. Ent.* 313; *Hym. Scand.* ii. 151.

*Hylæus morio*, *Fabr. Ent. Syst.* ii. 306.

*Schenck, Nass. Bien.* 295.

*Melitta morio*, *Kirby, Mon. Apum Angl.* ii. 60 ♂ ♀.

*Female.* Length 2–2½ lines.—Head and thorax brassy green, finely and closely punctured; antennæ fulvous towards their apex beneath; thorax shining, the metathorax of a blue-green, longitudinally rugose at the base, not enclosed; the wings subhyaline, splendidly iridescent, the nervures testaceous; the tegulæ piceous; the legs have a glittering white pubescence. Abdomen ovate, black, and shining, having a short, scattered, pale pubescence at the sides and towards the apex; the basal lateral margins of the two intermediate segments have sometimes a little short white pubescence, very frequently obliterated. B.M.

*Male.* Length 2½ lines.—Head and thorax coloured as in the female, the clypeus yellow at its apex; the flagellum fulvous beneath. The abdomen elongate, black, the margins of the two basal segments depressed; a little white pubescence on the basal margins of the second and third segments. B.M.

One of the most abundant species of the genus. Its colonies are common in banks, in the mortar of old walls (in the latter situations in streets in the suburbs of London). It appears frequently in April, and is then found frequenting the flowers of the chickweed. Males have been taken at the end of October.

24. *Halictus leucopus*.

*H. viridi-æneus*, abdomine nigro. *Mas* antennis subtus fulvis, abdomine nigro, tarsi albidis.

*Halictus leucopus*, *Smith, Zool.* vi. 2100; *Bees Great Brit.* 39; *Entomol.* vi. 270 ♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 205.

*Thoms. Opusc. Ent.* 313; *Hym. Scand.* ii. 150.

*Melitta leucopus*, *Kirby, Mon. Apum Angl.* ii. 59 ♂.

*Female.* Length 3 lines.—Head and thorax dark green, the clypeus slightly produced; the flagellum testaceous beneath. Thorax shining; the tegulæ testaceous; the wings hyaline, iridescent, the nervures pale testaceous; the legs have a glittering white pubescence, that on the tarsi beneath pale fulvous. Abdomen very glossy at the base, the apical margins of the segments rufo-piceous, and having a scattered pubescence towards the apex; sometimes a

little white pubescence at the lateral basal margins of the second and third segments. B.M.

*Male*.—Head and thorax bright green, the apex of the clypeus, labrum, and mandibles pale yellow; the flagellum pale fulvous beneath. Thorax, the tegulæ rufo-piceous; the wings hyaline, splendidly iridescent; the legs nigro-piceous; all the tarsi and the base of the tibiæ pale yellow, the claws ferruginous. Abdomen black, elongate-ovate, thinly covered with short griseous pubescence; the apical margins of the three basal segments depressed. B.M.

A careful examination of the typical specimen in the Kirbyan collection shows that a few additional points of description are desirable. The legs are not black, but dark brown; the extreme base, as well as the apex, of all the tibiæ is pale testaceous, the tibiæ being lighter-coloured than the femora. The labrum and mandibles are also yellow, the latter being dark at their base. These particulars are not noted in Kirby's description. The female is like *H. æneus*, but has a rounder head, and has the clypeus much less produced, and the thorax is not so finely and closely punctured, and the metathorax is more sharply truncate. My descriptions are from a pair taken *in coitu*. The insect is not so common as any of the other small *Halicti*. It occurs in the London district; and Mr. Bridgman found it near Norwich.

## 25. *Halictus lævis*.

*H. ater*, pallido villosulus, capite thoraceque punctulatis; abdomine lævi, nitidissimo.

*Halictus lævis*, *St.-Farg. Hym.* ii. 277.

*Smith, Zool.* vi. 2104; *Bees Great Brit.* 40; *Entomol.* iv. 265.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 245.

*Thoms. Hym. Scand.* ii. 142.

*Melitta lævis*, *Kirby, Mon. Annum Angl.* ii. 95 ♀.

*Female*. Length  $3\frac{3}{4}$  lines.—Black; the head and thorax closely punctured, the punctures on the thorax strong but not very close; a little scattered fulvous pubescence on the face and disk of the thorax; on the sides of the latter it is more dense; the tegulæ pale testaceous; the wings hyaline, having a slight fulvous tinge, the nervures pale testaceous; the legs rufo-testaceous, their pubescence pale fulvous, that on the tarsi beneath pale fulvous, the tarsi ferruginous; the metathorax rugose. Abdomen ovate, widest towards the apex, very glossy, smooth, and impunctate, the apical segments having a short pale pubescence; beneath, the margins of the segments have a fringe of pale pubescence.

There are two specimens of this species in the Kirbyan collection, the type being in a perfect condition. The abdomen is very smooth and glossy. Even with the aid of a Coddington lens, no punctures

can be seen, except a few very fine ones at the extreme base of the second segment. Schenck says the abdomen has a fine punctation, and that Nylander is mistaken in saying of the abdomen "absque ulla punctura;" but that naturalist had seen the typical specimen, and with myself had carefully examined it. Schenck's *H. lævis* must be a closely allied though different species. The locality given by Mr. Kirby for the species is Nacton, in Suffolk, a village on the Orwell, near Landguard Fort.

### 26. *Halictus longulus*.

*H. niger*, pubescentia rufo-pallida, abdomine elongato-ovato.

*Halictus longulus*, *Bees Great Brit.* 39 ♀; *Entomol.* iv. 265.  
*Hylæus longulus*, *Schenck, Nass. Bien.* 287.

*Female*. Length  $3\frac{1}{2}$ –4 lines.—Head very closely and finely punctured, the clypeus coarsely so; the flagellum fulvo-piceous beneath. Thorax closely but not so finely punctured as the head, subopaque; the metathorax truncate, its base finely rugulose; the wings hyaline, the nervures pale testaceous, the tegulæ rufo-testaceous; the legs with a pale fulvous pubescence, the tips of the claw-joints testaceous, the calcaria pale testaceous. Abdomen elongate, one third longer than the head and thorax, very delicately and closely punctured, the base shining; the margins of the segments depressed, testaceous, and with a short pale downy pubescence; the anal rima fringed with fulvous pubescence; beneath, the segments are fringed with long pale pubescence. B.M.

*Male*. Length 3 lines.—The antennæ longer than the thorax, the flagellum obscurely fulvous beneath; the apex of the clypeus and a spot in the middle of the mandibles pale yellow; the head and thorax closely and finely punctured, subopaque; the metathorax strongly rugulose and truncate; the truncations irregularly transversely striated; wings hyaline and iridescent, nervures and stigma pale testaceous; the base and apex of the tibiæ and the tarsi pale testaceous yellow. Abdomen oblong, smooth, and shining; the apical margins of the two basal segments depressed; a little patch of white pubescence at the basal margins of the second and third segments laterally. B.M.

The Isle of Wight is the only locality I know for this species: in August and September it is not uncommon at Bonchurch, Ventnor, and Freshwater. The species resembles *H. subfasciatus*; but the head is rounder, the abdomen longer, and the thorax more strongly punctured. The male is like that sex of *H. lævigatus*; but its metathorax is more coarsely rugose, and it has a pale spot on the mandibles.

27. *Halictus atricornis*.

*H. niger*, nitidus, pallido villosulus; abdomine lævi, nitidissimo.

*Halictus atricornis*, *Smith, Ent. Ann.* 1870, p. 26 ♂ ♀.

*Female*. Length 3 lines.—Shining black; head very finely and closely punctured, subopaque; the clypeus produced, its apex longitudinally coarsely sculptured. Thorax finely punctured above; the metathorax truncate, its base longitudinally finely rugulose; the tegulæ slightly rufo-piceous at the outer margin; the wings fulvo-hyaline, but clear hyaline at their base; the tibiæ and tarsi with pale glittering pubescence. Abdomen ovate, at the basal margins of the second and third segments very finely punctured; the following segments, as well as the sides of the abdomen, with a thin griseous pubescence, the anal rima slightly fulvous.

*Male*. Length  $2\frac{1}{2}$ – $2\frac{3}{4}$  lines.—The colour and sculpturing as in the female; the antennæ black, and as long as the thorax; the apical margin of the clypeus narrowly yellowish white; the apical joints of the tarsi rufo-testaceous. Abdomen elongate-ovate, smooth, shining, and impunctate.

In its general aspect this species resembles *H. villosulus*; but the puncturing of the thorax and abdomen at once separates it. The male cannot be mistaken for that of the above species, it being very slightly pubescent, and its antennæ black.

28. *Halictus minutus*.

*H. niger*, valde nitidus, antennis subtus fulvescentibus.

*Halictus minutus*, *St.-Farg. Hym.* ii. 277.

*Smith, Zool.* vi. 2102; *Bees Great Brit.* 42; *Entomol.* iv. 267.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 202.

*Thoms. Opusc. Ent.* 311; *Hym. Scand.* ii. 146.

*Melitta minuta*, *Kirby, Mon. Apum Angl.* ii. 61 ♂ ♀.

*Hylæus minutus*, *Schenck, Nass. Bien.* 289.

*Female*. Length  $2\frac{1}{2}$ –3 lines.—Black; head and thorax very finely punctured; the flagellum fulvescent beneath. Thorax glossy, the wings subhyaline and iridescent, the tegulæ and nervures rufo-piceous; the metathorax rounded, subrugose at the base, beyond which is a smooth and shining space; the legs sometimes nigropiceous, thinly sprinkled with cinereous pubescence, the apical joints of the tarsi ferruginous. Abdomen very glossy, ovate, and delicately punctured. B.M.

*Male*. Length  $2\frac{1}{2}$  lines.—The antennæ as long as the thorax, subfulvous beneath, sometimes bright fulvous, the scape black; the face clothed with white pubescence; the apex of the clypeus yellowish white, the mandibles yellowish towards their apex, with the tips

ferruginous; thorax shining, the wings hyaline and iridescent; the apical joints of the tarsi rufo-testaceous; abdomen elongate, the margins of the intermediate segments depressed. B.M.

The female of this species most closely resembles that of *H. villosulus*; but the strongly punctured thorax will at once distinguish the latter from it. The short ovate abdomen separates it from *H. longulus*, and the absence of fasciæ on the segments from *H. subfasciatus*; from *H. nigricornis* it differs in having the flagellum fulvous beneath. It is universally distributed.

### 29. *Halictus nitidiusculus*.

*H. niger*, glabriusculus, antennis subtus fulvis; thorace glabro, punctulato; tegulis testaceis.

*Halictus nitidiusculus*, *Smith, Zool.* vi. 2103; *Bees Great Brit.* 43; *Entomol.* iv. 267 ♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 246.

*Thoms. Opusc. Ent.* 311; *Hym. Scand.* ii. 146.

*Melitta nitidiuscula*, *Kirby, Mon. Apum Angl.* ii. 64 ♂.

*Hylæus nitidiusculus*, *Schenck, Nass. Bien.* 290.

*Female.* Length 2–3 lines.—Black; the flagellum fulvous beneath. Thorax very obscurely nigro-æneous, very finely punctured, the tegulæ and nervures pale testaceous, the legs more or less testaceous, the tarsi rufo-testaceous. Abdomen sometimes rufo-testaceous, seldom black, very delicately punctured, and shining at the base, the margins of the segments slightly testaceous. B.M.

*Male.* Length  $2\frac{1}{4}$ – $2\frac{1}{2}$  lines.—The face has a fine short white pubescence; the flagellum bright fulvous beneath; the clypeus at the apex, the labrum, and mandibles yellowish white. Thorax shining, the metathorax rotundate, finely roughened at the base, beyond which it is smooth and shining; the tegulæ pale, the wings subhyaline and iridescent; the base and apex of the tibiæ and the tarsi pale yellow. Abdomen elongate, shining; the three intermediate segments have beneath, on each side, a floccus of pale hairs. B.M.

The colour of both sexes varies in different examples, the males being most subject to it. The abdomen of the females is sometimes rufo-testaceous, the legs being usually so. The males are frequently entirely of a rufo-testaceous colour, and are readily distinguished from the males of all other British species by the long floccus of hair on the margins of the abdominal segments beneath. This species appears to be more subject to the attack of a species of *Stylops* than any other belonging to this genus, the parasite having been found in both sexes.

30. *Halictus minutissimus*.

*H. ater*, *glabriusculus*; alis hyalinis, iridescentibus; abdomine nitidissimo.

*Halictus minutissimus*, *Smith*, *Zool.* vi. 2103; *Bees Great Brit.* 44; *Entomol.* iv. 268.

*Nyland.* *Notis. ur Sällsk. pro Fann. et Flo. Fenn.* ii. 246.

*Thoms. Opusc. Ent.* 312; *Hym. Scand.* ii. 147.

*Melitta minutissima*, *Kirby*, *Mon. Apum Angl.* ii. 63 ♂ ♀.

*Hylæus minutissimus*, *Schenck*, *Nass. Bien.* 291.

*Female.* Length 2–2½ lines.—Black; head and thorax finely and closely punctured; the tips of the mandibles ferruginous; the metathorax rotundate; the tegulæ piceous; the wings hyaline and iridescent. Abdomen oblong-ovate and shining, very finely punctured beyond the basal segment; the apical margins of the segments sometimes rufo-piceous. B.M.

*Male.* Length 1½–2 lines.—The antennæ fulvous beneath, submoniliform; apex of the clypeus, the labrum, and mandibles yellow, the tips of the latter ferruginous; the wings hyaline and splendidly iridescent; the tarsi rufo-piceous. Abdomen elongate-ovate, smooth, shining, and very closely and finely punctured, the margins of the intermediate segments depressed at their base. B.M.

This species is not uncommon, and appears to be generally distributed. The male is the smallest bee found in this country; the only species that in the male sex sometimes equals it in minuteness of size is *Prosopis varipes*. I possess a female attacked by a *Stylops*.

Genus 7. **DASYPODA.**

*Andrena* (pt.), *Fabr. Ent. Syst.* ii. 307 (1793).

*Apis* (pt.), *Fabr. lib. cit.* 335.

*Melitta* (pt.), *Kirby, Mon. Apum Angl.* i. 140 (1802).

*Dasyпода*, *Latr. Hist. Nat. des Crust. et Ins.* iii. 372 (1802).

*Trachusa*, *Jurine, Hym.* 250 (1807).

The *labial palpi* 4-jointed, placed in a line, the joints subclavate, the basal one longest and stoutest, the apical joint minute; the *labium* elongate-lanceolate, folded when in repose, a little longer than the palpi. The *maxillary palpi* 6-jointed, each joint gradually decreasing in length. The *ocelli* placed in a slight curve on the vertex. The *superior wings* have one marginal and two submarginal cells; the second submarginal receiving the two recurrent nervures, the first just within at the base, the second at a little more than one third from its apex. The posterior tibiæ furnished with a long dense scopa.

This is a genus of small extent. About eight species are known, these being principally European: one is found in Greece, one in Spain, and two in Egypt.



1. *Dasyпода hirtipes*.

*D. atra*, pallide villosa, pedibus posticis fulvo longissime lanatis, abdomine fasciis tribus albidis.

*Dasyпода hirtipes*, *Latr. Hist. Nat.* xiii. 369.

*Fabr. Syst. Piez.* 335.

*St.-Farg. Hym.* ii. 229.

*Smith, Zool.* vi. 2241; *Bees Great Brit.* 112.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 225.

*Schenck, Nass. Bien.* 208.

*Thoms. Hym. Scand.* ii. 63.

*Andrena hirtipes*, *Fabr. Ent. Syst.* ii. 312 ♀.

*Apis hirta*, *Fabr. Ent. Syst.* ii. 335 ♂.

*Andrena plumipes*, *Panz. Faun. Germ.* 46. 16 ♀.

*Apis farfarisequa*, *Panz. lib. cit.* 55. 14 ♂.

*Melitta swammerdamella*, *Kirby, Mon. Apum Angl.* ii. 174 ♂ ♀.

*Dasyпода swammerdamella*, *Curtis, Brit. Ent.* viii. tab. 367 ♂ ♀.

*Trachusa hirtipes*, *Jurine, Hym.* 250.

*Dasyпода plumipes*, *Leach, Edin. Encycl.* ix. 155.

*Swammerdam, Bib. Nat.* tab. 26. fig. 7 ♀.

*Female.* Length 6–7 lines.—Black; the pubescence on the face below the insertion of the antennæ cinereous, above it is black, sparing on the vertex. Thorax, the pubescence on the middle of the disk black surrounded with fulvous, on the sides and beneath it is very pale; beneath, densely clothed with cinereous pubescence; wings hyaline, faintly clouded at their apical margins, the nervures rufo-piceous; the anterior and intermediate tarsi have the basal joint above clothed with fuscous pubescence, beneath it is fulvous; the scopa very long, dense, and bright fulvous. Abdomen sub-ovate, at the base a little cinereous pubescence, the three intermediate segments have a fascia of white pubescence on their apical margins, the first interrupted; the apical fimbria sooty black. B.M.

*Male.* Length 5–6½ lines.—The pubescence on the clypeus, cheeks, thorax beneath, and the fringe of the anterior and intermediate femora white; on the vertex and thorax above it is fulvous; the legs have a long pale fulvous pubescence; the wings subhyaline, the nervures and tegulæ ferruginous; the tarsi have the claw-joint rufo-testaceous. Abdomen ovate lanceolate, the apical margins of the segments testaceous; each segment has a long fringe of pale fulvous pubescence. B.M.

This elegant insect appears at the beginning of August. It frequents the mouse-ear hawkweed. It is local; but occasionally large colonies are found. I have found it at Charlton, Paul's Cray, Gravesend, Southend, Deal, Lowestoft, Yarmouth, Braunton Burrows, Whitesand Bay, Land's End, Littlehampton, and Barmouth, North Wales. The male I once captured at ten o'clock at night flying in Lower Street, Deal.

Genus 8. **MACROPIS.**

*Andrena*, *Latr. Gen. Crust. et Ins.* iv. 150 (1792).

*Megilla* (pt.), *Fabr. Syst. Piez.* 323 (1804).

*Macropis*, *Panz. Faun. Germ.* 107 (1809).

*Scrapter*, *St.-Farg. Hym.* ii. 230 (1841).

Head as wide as the thorax; the *ocelli* in a curve; the *scape* of the antennæ subclavate, the basal joint of the flagellum ovate, the second as long as the two following, and narrowed at its base; the terminal joint obliquely truncated at the apex; the *mentum* narrowed at the base and of the same length as the labium; the *labial palpi* 4-jointed, the basal joint as long as the two following, the apical one shortest; the labium lanceolate, the paraglossæ minute; the *maxillary palpi* 6-jointed, the joints slightly decreasing in length to the apical one, as long as the apical lobe. The *anterior wings* with one marginal and two submarginal cells, the second submarginal receiving the two recurrent nervures; the marginal cell nearly as long as the two submarginals and pointed at its apex. *Thorax* subglobose. *Abdomen* globose. *Posterior legs* with the tibiæ and basal joint of the tarsi dilated, and furnished with a dense pubescent scopa.

*Male*. Posterior femora and tibiæ incrassate. (Pl. VI. figs. 12, 13.)

1. **Macropis labiata.**

*M. nigra*, cinerascenti villosa; tibiis posticis externe albido lanatis; metatarsis externe nigris; abdomine fasciis duabus albidis, prima interrupta. *Mas* facie antice flava.

*Macropis labiata*, *Panz. Faun. Germ.* 107. 16 ♂.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 248.

*Smith, Bees Great. Brit.* 107.

*Schenck, Nass. Bien.* 209 ♂.

*Thoms. Hym. Scand.* ii. 60.

*Megilla labiata*, *Fabr. Syst. Piez.* 333.

*Dufour, Ann. Soc. Ent. Fr.* (1838) vii. 288, tab. 9. fig. 3 ♀,  
3 c head of ♂.

*Megilla fulvipes*, *Fabr. lib. cit.* 332 ♀; *et Mus. Kiel, teste Nylander.*

*Schenck, lib. cit.* 209 ♀.

*Andrena lagopus*, *Latr. Gen. Crust. et Ins.* iv. 151 ♀.

*Scrapter lagopus*, *St.-Farg. Hym.* ii. 261 ♀.

*Female*. Length 4 lines.—Black; the head and thorax closely and strongly punctured; the face with a thin griseous pubescence; the scape fringed within with pale pubescence; the flagellum fulvo-testaceous beneath. Thorax globose; the disk with short thin fuscous pubescence; on the sides and beneath it is griseous; wings subhyaline, the nervures ferruginous, the tegulæ rufo-piceous; the apical joints of the tarsi ferruginous and fringed with fulvous pubescence; on the basal joints as well as on the tibiæ it is rufo-fuscous; the posterior tibiæ densely covered externally with white pubescence, sometimes yellowish; at the apex, as well as on the basal joint of the tarsi, it is dark fuscous; the tarsi ferruginous beneath.

Abdomen smooth, shining, and very delicately punctured, the apical margins of the segments rufo-piceous; the third and fourth with a narrow white pubescent fascia, the third usually interrupted; the apical fimbria fuscous, with a few white hairs at the sides.

*Male.* Length 4 lines.—Head: the antennæ nearly as long as the thorax; the flagellum fulvous beneath, and the scape usually with a yellow spot at the apex in front; the face below the insertion of the antennæ and a spot at the base of the mandibles yellow. Thorax globose, closely punctured, and with a thin pale fulvous pubescence; on the postsentellum and at the sides of the metathorax it is griseous; on the legs it is griseous, but more or less fulvous on the tarsi, their apical joints being rufo-testaceous; the anterior femora in front, as well as the tibiæ, more or less rufo-testaceous; the posterior femora incrassate, the tibiæ being also swollen and somewhat curved; the calcaria pale testaceous; wings as in the female. Abdomen subovate, convex, and shining, finely punctured; the apical margin of the third, fourth, and fifth segments fringed with white pubescence, the third usually interrupted; the apical segment produced into a blunt spine. B.M.

This insect is very rare in this country; and it is a remarkable fact that up to the present time, 1876, only males have been captured. The first recorded was taken by Dr. Leach in Devonshire; many years subsequently a second male was taken by Mr. J. Walton in the New Forest; on the 3rd of July, 1842, Mr. S. Stevens captured the third male at Weybridge; in 1874 Mr. T. B. Bridgman obtained two at Brundall, near Norwich; and in 1876, on the 16th of July, he took seven males at the same locality. These were frequenting *Circium arvense*, the creeping thistle. Léon Dufour records, in the 'Annales de la Société Entomologique de France,' 1838, that the species frequents the flowers of aquatic plants, particularly those of *Alisma plantago*. Professor Schenck took it on flowers of *Rubus cæsius*, the dewberry; it is also said to frequent *Lysimacea*, the loosestrife.

## Fam. 2. APIDÆ, Leach.

### Subfam. I. ANDRENOIDES, Latr.

#### Genus 1. PANURGUS.

- Apis* (pt.), *Scop. Ent. Carn.* 298 (1763).  
*Philanthus* (pt.), *Fabr. Ent. Syst.* ii. 228 (1793).  
*Andrena* (pt.), *Panz. Faun. Germ.* fasc. 69 (1800).  
*Trachusa* (pt.), *Panz. Faun. Germ.* fasc. 96 (1801).  
*Panurgus*, *Panz. Krit. Revis.* 211 (1805).  
*Eriops*, *Klug, Illig. Mag.* vi. (1806).

Head transversely subquadrate; antennæ short, subclavate;

the *labrum* transverse; *mandibles* acute; *ocelli* in a triangle on the vertex; *tongue* acute, a little longer than the mentum; the *para-glossæ* slender, acute, and one third the length of the tongue; *labial palpi* two thirds of the length of the tongue and 4-jointed; the basal joint as long as the three following united; the *maxillary palpi* 6-jointed. Thorax ovate; the *anterior wings* with one marginal cell truncate at its apex, and with two submarginal cells, the second receiving both the recurrent nervures; the posterior tibiæ and first joint of the tarsi with a dense scopa of long pubescence. Abdomen ovate.

Three species of this genus are indigenous to this country: two only have been hitherto recorded; the third is included because among the specimens of the males of *P. calcaratus* in the British Museum one of *P. dentipes* was found with the locality Salisbury attached to it. The genus is one of limited extent, seven species only being at present known; two of the British species occasionally form rather large colonies, both appearing to prefer open commons or trodden pathways in fields; I have never found them in sloping banks. They are preyed upon in the larval state by a dipterous insect (*Miltogramma punctata*); and their nests are also infested by a parasitic bee (*Nomada fabriciana*).

### 1. *Panurgus calcaratus*.

*P. ater*, nitidus, glabriusculus, pedibus posticis fulvo hirsutissimis.  
*Mas* antennis dimidiatim rufis.

*Panurgus calcaratus*, *Smith*, *Zool.* iv. 1452 ♂ ♀; *Bees Great Brit.* 114.

*Thoms. Hym. Scand.* ii. 114.

*Apis calcarata*, *Scop. Ent. Carn.* 301 ♂.

*Philanthus ater*, *Fabr. Ent. Syst.* ii. 292 ♂.

*Apis ursina*, *Kirby, Mon. Apum Angl.* ii. 178 ♀, tab. 16. fig. 1 ♀.

*Apis linnæella*, *Kirby, lib. cit.* 179 ♂, tab. 16. fig. 2 ♂.

*Andrena lobata*, *Panz. Faun. Germ.* 72. 16 ♂.

*Trachusa lobata*, *Panz. lib. cit.* 96. 18.

*Dasygoda lobata*, *Fabr. Syst. Piez.* 336.

*Panurgus lobatus*, *Latr. Encycl. Méth.* viii. 719 ♂ ♀.

*Panz. Krit. Revis.* 210.

*Curtis, Brit. Ent.* iii. 102.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 225.

*Schenck, Nass. Bien.* 206.

*Female.* Length  $3\frac{1}{2}$ –4 lines.—Jet-black, shining, nearly naked; the face has a little black pubescence; the scape pubescent; the flagellum, except two or three of the basal joints, pale testaceous beneath. The disk of the thorax very smooth and shining, the metathorax rounded behind; the wings hyaline, the nervures dark rufo-testaceous; the posterior tibiæ and basal joint of the tarsi have a dense scopa of fulvous pubescence, the calcaria and apical joints of the tarsi ferruginous. Abdomen ovate, the margins of the segments subdepressed, the apical fimbria fuscous. B.M.

*Male.* Length 3–4 lines.—Very closely resembling the female, but having the head larger than the thorax, sometimes half as wide again; the flagellum, except two or three of the basal joints, pale rufo-testaceous; the posterior femora have an obtuse tooth towards their base beneath; the posterior tibiæ clavate, bent inwards; the tibiæ and tarsi have a scattered pale fulvous pubescence; the calcaria and apical joint of the tarsi pale ferruginous. B.M.

This species appears towards the end of June or the beginning of July, is much more local than *P. banksianus*, and frequents the mouse-ear hawkweed (*Hieracium*). It has occurred at Blackheath and at Darenth; it is plentiful on the cliffs at Bournemouth, also at Bonchurch and Luccomb Chine, Isle of Wight; at Budleigh-Salterton, South Devon; and at the Land's End, in Whitesand Bay. At night males may be found enclosed in the petals of the hawkweed near the colonies, usually three or four in a single flower; the females pass the night in their burrows: very large-headed males may be occasionally found.

### 2. *Panurgus dentipes*.

*P. ater*, nitidus, glabriusculus, pedibus posticis fulvo hirsutissimis.

*Panurgus dentipes*, Latr. *Encycl. Méth.* viii. 719 ♂ ♀.

*St.-Farg. Hym.* ii. 224.

*Schenck, Nass. Bien.* 206.

*Female.* Length  $3\frac{1}{2}$  lines.—Black and shining; the pubescence on the head and thorax black; the antennæ black; the legs nigropiceous; the apical joints of the tarsi rufo-piceous; the pubescence on the tibiæ and tarsi thin and fulvous, that on the posterior pair long, dense, and fulvous; wings hyaline, their nervures fuscous. Abdomen ovate, margins of the segments depressed, with the apical fimbria fuscous.

*Male.*—This sex closely resembles the same sex of *P. calcaratus*, but has black antennæ and a blunt spine on the posterior trochanters.

B.M.

Having found this species mixed with *P. calcaratus* in the British collection, I feel obliged to include it among our indigenous bees; future investigation must decide its right to a place in the list. The locality (Salisbury) may be the means of establishing it when that place and neighbourhood are carefully searched.

The female is described from a continental specimen.

### 3. *Panurgus banksianus*.

*P. ater*, nitidus, glabriusculus, pedibus posticis fulvo hirsutissimis.

*Panurgus banksianus*, Smith, *Bees Great Brit.* 115 ♂ ♀.

*Apis banksiana*, Kirby, *Mon. Apum Angl.* ii. 179 ♂.

*Donov. Brit. Ins.* xii. 26, tab. 403. fig. 2.

- Dasygaster ursina*, Latr. *Hist. Nat.* xiii. 370 ♀.  
*Trachusa atra*, Panz. *Faun. Germ.* 94. 19 ♂.  
*Panurgus ater*, Latr. *Encycl. Méth.* viii. 720 ♂ ♀.  
*Spin. Ins. Ligur.* i. 196.  
*St.-Farg. Hym.* ii. 226.  
*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 224.  
*Panurgus ursinus*, Curtis, *Brit. Ent.* iii. tab. 101 ♂.  
*Smith, Zool.* iv. 1451.  
*Thoms. Hym. Scand.* ii. 113.

*Female.* Length  $4\frac{1}{2}$ – $5\frac{1}{4}$  lines.—Black, shining, and nearly naked; the face below the insertion of the antennæ has a short black pubescence, and the sides of the head and cheeks are thinly clothed with long black hairs; the labrum ciliated with bright yellow hairs, the mandibles ferruginous at their apex; the flagellum nigro-piceous beneath. Thorax, the wings subhyaline, the nervures ferruginous; sometimes the wings are slightly fuscous; the tegulæ rufo-testaceous; the femora and anterior tibiæ at their base above have a black pubescence; the intermediate tibiæ, the apex of the anterior pair, and the tarsi have a fulvous pubescence; the posterior tibiæ and basal joint of the tarsi have a dense scopa of long bright fulvous pubescence. Abdomen ovate, the margins of the segments depressed, the apical fimbria fuscous. B.M.

*Male.* Length 5 lines.—Very closely resembling the female; but the head is wider and more pubescent; the tibiæ and tarsi have a thin fulvous pubescence, the apical joints of the latter rufo-testaceous; the apex of the abdomen bilobate, the lobes ferruginous. B.M.

This insect appears towards the end of June, and is very abundant in some localities; a large colony existed on Hampstead Heath for many years. Common at Bournemouth in July and August, on Parley Heath and at Christchurch, Hants, at Sidmouth, Budleigh-Salterton, &c. It has not to my knowledge been found in Scotland; but I have taken it in North Wales, at Barmouth.

## Subfam. II. CUCULINÆ, Latr.

### A. *With three submarginal cells.*

#### Genus 2. **NOMADA.**

*Apis* (pt.), *Linn. Syst. Nat.* i. 953 (1766).  
*Nomada* (pt.), *Fabr. Syst. Ent.* 388 (1775).

Head transverse; *ocelli* in a triangle on the vertex; *antennæ* geniculated, filiform; *mandibles* with their apex subacute; the *labrum* transverse, its anterior margin rounded; the *tongue* long and acute; the *paraglossæ* slender, and about one fourth of the length of the tongue; the *labial palpi* 4-jointed, a little shorter than the

labium, the basal joint as long as the other joints united; the second about one fifth of the length of the basal joint; the two following short, the apical one shortest. The *maxillary palpi* 6-jointed, the basal joint short and subclavate, the second longest, the third a little shorter than the second, decreasing in length to the apical joint. Thorax ovate; the *scutellum* more or less distinctly bituberculate; the *anterior wings* with one marginal and three submarginal cells, the first as long as the two following united, the latter receiving each a recurrent nervure about its centre; the *legs* simple in both sexes. Abdomen ovate, its apex truncate in the females, and acute in the males.

The bees belonging to this genus are popularly known by the name of Wasp-bees, from their close resemblance in their gay colouring to the smaller species of Vespidae; they are, however, true bees, and constitute the most beautiful of all the genera found in this country. Notwithstanding the generally received history of their economy, we shall search in vain for much precise information. In the 'Entomological Magazine' we learn that they deposit their eggs in the nests of other bees at the time when the working bees deposit theirs, and that when hatched the larva, being stronger and larger than the rightful possessor of the cell, consumes the food of its companion and starves it to death: all this, however, is mere conjecture; the larva of these parasites must always be smaller than that of the working bee. No one appears to know any thing beyond the mere fact of their entering the burrows of Andrenidae and Apidae, and of their being found in the cells of the working bees in their perfect condition. It is most probable that they deposit an egg on the provision laid up by the working bee, that they close up the cell, and that the working bee, finding an egg deposited, commences a fresh cell for her own progeny. My reason for thinking it probable that the parasite closes the cell, is that I have frequently captured *Nomadae* and *Melectae* with masses of clay attached to their posterior tibiae; and in the well-known genus of exotic parasitic bees, *Crocisa*, specimens are of frequent occurrence which have masses of clay or mixed earth on their tibiae; this, however, requires, and is deserving of, further investigation. I have found several of the species in the cells of Andrenidae; these will be mentioned under the respective species. One instance which throws some light upon the economy of the genus may be recorded here. Some years ago, in the month of June, I met with a large colony of *Eucera longicornis*, and observed great numbers of *Nomada seafasciata* flying about amongst the bees, and occasionally entering into and issuing from their burrows. In the beginning of April of the following year I visited the locality for the purpose of obtaining males of the *Nomada*, as very few were found when the colony was first discovered: the cells of *Eucera* were found at about the depth of eight inches in a stiff clayey soil; of these a considerable number were obtained. On examination, many of the bees were found to be in the pupa state, some far advanced towards their perfect condition, others

still larvæ; on opening one cell it was found to contain two specimens of *Nomada sexfasciata*. Since the former visit I have on several occasions obtained the cells of *Eucera*, and have endeavoured to find the larva of *Nomada*, but in vain. Perfect individuals of *N. sexfasciata* have been found in the cells of *Eucera* on several occasions, usually two in each cell, and once a pair of *N. alternata*.

Although observation has proved that some species of *Nomada* are constant in their parasitism on one particular species of bee, others have been obtained from nests of as many as two or even three distinct species of Andrenidæ, also of *Halicti*. *Nomada sexfasciata* is the parasite exclusively of *Eucera longicornis*, *N. borealis* of *Andrena clarkella*, *N. fabriciana* of *Panurgus banksianus*, *N. bacata* of *A. argentata*, *N. ochrostoma* of *A. labialis*, *N. lateralis* of *A. longipes*, and *N. germanica* of *A. fulvescens*; whilst *N. varia* is the parasite of *Halictis cylindricus*, *N. solidaginis* of *H. leucozonius*; all these are constant, as a rule, in their attacks; whilst *N. ruficornis* attacks various species, but has been found usually most numerous where colonies of *Andrena trimmerana* were established. However, observation has shown that many species will attach themselves to any species of bee which furnishes a suitable provision for its larva.

This genus of bees is of wide geographical distribution, although it is almost exclusively confined to countries north of the Equator; only three exceptions to this are at present known, one being a species from Brazil, and two from the Eastern Archipelago, one from the Island of Timor, and the other from Ceram. The greatest number of the species are of Europe and North America; of the former upwards of fifty are described, and about thirty from the latter. The general catalogue issued by the British Museum in 1854 enumerates eighty-eight described species; since that time the additions made from all countries will increase that number to about one hundred. The additions that may be expected from North India, North China, and Japan will no doubt greatly increase the species of the genus. All our British species emit, when taken, most agreeable odours, in some species it being of a balmy sweetness, whilst a few have a more pungent scent. This peculiarity is observable in some of the genera of Andrenidæ, *Prosopis* being a genus the species of which are strongly aromatic.

### 1. *Nomada ruficornis*.

*N. ferruginea*, thorace lineis tribus longitudinalibus atris, abdomine maculis fasciisque flavis.

*Nomada ruficornis*, *Fabr. Ent. Syst.* ii. 347; *Syst. Piez.* 390 ♀.

*Rossi, Faun. Etrus.* ii. 112.

*Panz. Faun. Germ.* 55. 18.

*Latr. Hist. Nat.* xiv. 50.

*Schäff. Germ. Zeits.* i. 279.

*St.-Farg. Hym.* ii. 498.

*Smith, Zool.* ii. 596 ♂ ♀; *Bees Great Brit.* 118.



*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. i. 180.*

*Schenck, Nass. Bien. 183.*

*Thoms. Opusc. Ent. 96; Hym. Scand. ii. 189.*

*Apis ruficornis, Linn. Syst. Nat. i. 958; et Cab. Mus. Linn. Soc. ♀.*

*Kirby, Mon. Apum Angl. ii. 210 ♀.*

*Nomada flava, Panz. Faun. Germ. 53. 21 ♂.*

*Fabr. Syst. Piez. 391.*

*St.-Farg. Hym. ii. 488.*

*Lucas, Expl. Sc. Algér. iii. 221.*

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. i. 179.*

*Schenck, Nass. Bien. 187.*

*Apis flava, Kirby, lib. cit. 186 ♂.*

*Apis leucophthalma, Kirby, lib. cit. 197 var. ♂.*

*Female.* Length 3–5 lines.—Head and thorax black, the clypeus and a spot above it, a line encircling the eyes, the labrum, mandibles, and antennæ rufous; the scape has sometimes a black line at the sides. Thorax—the collar, tubercles, and a large patch on the sides beneath the wings, an epaulet over the tegulæ, the scutellum, two minute spots beneath uniting with a larger patch on each side of the metathorax, two broad stripes on the disk, the tegulæ and legs rufous; the femora more or less black at the base beneath; the coxæ and trochanters also sometimes stained; the wings fusco-hyaline and having a dark narrow fuscous cloud at their apical margins, and a more or less defined hyaline spot beyond the third submarginal cell. Abdomen rufous, the base and the apical margins of the segments more or less black, the second segment having on each side a large angular yellow macula, the two following a broad fascia, and the fifth a large quadrate spot, yellow; beneath sometimes obscurely variegated with yellow-testaceous bands or spots. B.M.

*Male.* Length 3–5 lines.—Black; the scape in front, the clypeus, the face on each side, the labrum, and mandibles yellow; the latter ferruginous at their tips; the flagellum ferruginous, four or five of the basal joints above, as well as the scape above, black. Thorax black; the tubercles, two spots on the scutellum, and the legs rufous; the coxæ, except at the apex, black; the trochanters behind, the anterior and intermediate femora beneath at the base, and the posterior pair, except a line above, black; sometimes a black line on the tibiæ behind. Abdomen rufous, the base black, the second and following segments having a broad yellow band; the apical margins of the segments rufo-piceous; beneath, the second and following segments have a transverse broad yellow macula; sometimes entirely rufous beneath, or varied with indistinct fuscous bands and yellow spots; the yellow bands on the abdomen above are frequently much attenuated in the middle, one or two of the apical ones being sometimes interrupted. B.M.

Var.  $\beta$  of Kirby is a dark variety that has two yellow spots on the third ventral segment; var.  $\gamma$  is a female of *N. ochrostoma*; and var.  $\delta$  is a small variety of the same. This is the most variable species in the genus in coloration, and also in size; the latter

differences are common among all parasitic insects as a rule. This arises, no doubt, from the amount of food consumed by the larva. It is not an uncommon circumstance to find two *Nomada* in a single cell of the bee upon which it is parasitic; in such cases one or both are usually small examples. Var.  $\beta$  of Kirby is by no means common. The larger the specimens the lighter is the general coloration; the smaller and darker specimens have the metathorax entirely black, the red markings on that part of the thorax being very inconstant; in the males it is always black: this sex has sometimes two red spots on the scutellum; but they are frequently obsolete; small males have the scape occasionally quite black, or with only a minute yellow spot in front. This species is parasitic on several species of *Andrena*, frequently so on *A. trimmerana*, *A. atriceps*, *A. fulva*, and *A. nigro-cænea*.

## 2. *Nomada borealis*.

*N. atra*, clypei margine rufo, thorace toto nigro; abdominis segmento secundo macula marginali triangulari flava, reliquis luteo fasciatis.

*Nomada borealis*, Zett. *Ins. Lapp.* 470 ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 181.

*Smith, Bees Great Brit.* 123 ♂ ♀.

*Schenk, Nass. Bien.* 185.

*Thoms. Hym. Scand.* ii. 192.

*Nomada inquilina*, *Smith, Zool.* ii. 605.

*Female.* Length 4-5 lines.—Head and thorax black; the margin of the clypeus, the labrum, mandibles, and a spot at the vertex of the eyes ferruginous; the flagellum beneath, the apex of the joints above, and the extreme base and apex of the scape beneath ferruginous, the third joint sometimes entirely so; the labrum has a minute tooth in the middle. Thorax: the tegulæ, tubercles, and two spots on the scutellum, frequently united, are ferruginous; the coxæ and femora black, their extreme apex ferruginous; the tibiæ and tarsi ferruginous, the anterior tibiæ having a black spot behind. Abdomen ferruginous, the base black; the second segment has a large ovate macula, pointed within, the third a smaller spot, or sometimes a narrow transverse line, the fourth a broader fascia with a minute spot beyond its termination laterally, and the fifth a quadrate macula, yellow; the basal segment has usually a minute black dot on each side, its apical margin, as well as those of the three following segments, nigro-piceous. B.M.

Var.  $\beta$ . The femora more or less ferruginous in front and at their apex.

*Male.* Length 4 lines.—Head and thorax black, the anterior margin of the clypeus narrowly yellow; the labrum and mandibles yellow, the latter ferruginous at their tips; the face thinly covered with silvery white pubescence; the antennæ black, the flagellum rufo-testaceous beneath. Thorax thinly covered with griseous pu-

bescence; the wings subhyaline, faintly clouded at their apical margins, the nervures and tegulæ rufo-testaceous; legs black, the anterior and intermediate femora above, the tibiæ, and tarsi ferruginous; the anterior and intermediate pairs have a black stain behind. Abdomen obscure ferruginous, the base black, sometimes two yellow or ferruginous spots on the basal segment, the second having a broad transverse yellow fascia, attenuated in the middle and usually interrupted; the four following segments have each a narrow transverse fascia, the first two usually slightly interrupted, but frequently the fasciæ are entire: beneath obscure rufo-piceous; sometimes the third and fourth segments have an obscure transverse yellow stripe, but are usually immaculate. B.M.

This species is the parasite of *Andrena clarkella*. It has been taken with that bee as early as the 10th of April, on Hampstead Heath; it has also been found at Leominster, at Newcastle, and at Carlisle. Specimens have been received from Dr. Nylander under the name of *N. borealis* of Zetterstedt. It appears to be extremely local, and probably at no time abundant.

### 3. *Nomada signata*.

*N. atra*, thorace lineis quatuor longitudinalibus ferrugineis, abdomine rufo fasciisque flavis ornato.

*Nomada signata*, *Jurine, Hym. tab. 10. gen. 31 ♀.*

*Smith, Zool. ii. 602 ♂ ♀; Bees Great Brit. 125.*

*Thoms. Hym. Scand. ii. 191.*

*Female.* Length 4-5 lines.—Head and thorax black, the clypeus anteriorly, a spot above it, the orbits of the eyes, the antennæ, labrum, and mandibles ferruginous; the scape has a black line outside. Thorax—the collar, tubercles, a large patch on the breast on each side, a minute dot under the wings, four abbreviated longitudinal stripes on the disk, and the scutellum ferruginous; wings subhyaline, their apical margins having a dark fuscous cloud; the tegulæ ferruginous; the legs ferruginous, the base of the femora black; the metathorax variegated on each side with irregular yellow stripes or spots. Abdomen ferruginous, the first segment black at its base and having a broad, irregularly waved fascia, sometimes interrupted; the following segments have a broad yellow band, leaving a narrow rufo-piceous border on the apical margins; the second, third, and fourth segments beneath have a transverse broad yellow stripe; the stripes frequently obscure. B.M.

*Male.* Length 4-5 lines.—This sex closely resembles the female, but differs in having the labrum, margin of the clypeus, and the mandibles yellow; the antennæ fuscous above; the clypeus has a silvery pubescence; the thorax black, the tubercles yellow, the tegulæ and two dots on the scutellum ferruginous; the basal segment of the abdomen has sometimes an obscure yellow fascia, but it is usually obliterated and there are merely two black dots. B.M.

This species appears about the end of April, and was very abundant on Hampstead Heath some years ago; it is also found at Highgate. It is considered by some Hymenopterologists to be a variety of *N. ruficornis*. This I believe to be an erroneous opinion: it is very constant in its coloration, the stripes on the disk of the thorax being narrow and always ferruginous, those on the metathorax being yellow; and the yellow bands on the abdomen are never interrupted. It is said to be parasitic on *Andrena smithella* in Denmark; it cannot be so at Hampstead, that species not having occurred there, whilst the *Nomada* is very plentiful where *A. fulva* is also abundant.

#### 4. *Nomada lateralis*.

*N. atra*, thorace rufo obscure quadrilineato; abdomine rufo, segmento secundo macula magna utrinque laterali, reliquis margine postico pallide flavescentibus.

*Nomada lateralis*, *Panz. Faun. Germ.* 96. 20 ♂, 21 ♀.

*Schäff. Germ. Zeits.* i. 277 ♀.

*Smith, Zool.* ii. 601; *Bees Great Brit.* 120.

*Schenck, Nass. Bien.* 390.

*Nomada melanosoma*, *Schäff. lib. cit.* 280 ♂.

*Female.* Length 3–4 lines.—Head and thorax black; the mandibles, labrum, clypeus, and a minute spot above, also a line encircling the eyes, and the antennæ red; the latter are longer than the thorax, and have the scape fuscous above. Thorax—the collar, tubercles, a large macula on the breast, the tegulæ, and scutellum red; the mesothorax with four somewhat obscure longitudinal red lines; the femora, tibiæ, and tarsi red; the posterior tibiæ usually more or less black at their apex within, and the femora also usually black at their base beneath, the posterior pair black within, except at their apex; the coxæ and trochanters red at their apex. Abdomen rufous, the base black, the second segment with a large, subovate yellow macula on each side, the third with usually a lateral yellow macula, the fourth with a transverse subinterrupted fascia, and the fifth with a square yellow macula; the margins of the ventral segments slightly piceous.

*Male.* Length  $3\frac{3}{4}$ – $4\frac{1}{2}$  lines.—Head and thorax black; the labrum and clypeus with silvery white pubescence; the clypeus anteriorly, the face on each side, and a narrow line at the margin of the eyes as high as the insertion of the antennæ, the labrum, and mandibles yellow, the tips of the latter ferruginous; the scape yellow in front; the flagellum rufous, with three or four of the basal joints fuscous above. Thorax above with a thin ochraceous pubescence, that on the sides, the metathorax, and beneath white; the legs red, the coxæ, trochanters, and femora beneath, and also a spot on the tibiæ behind black. Abdomen as in the female, but with the spots on the third segment larger; beneath the segments have a more or less distinct yellow transverse stripe, usually attenuated or interrupted in the middle.

In small examples of the female the stripes on the thorax are sometimes quite obliterated, and the scutellum has only two minute red spots; the yellow markings on the abdomen also become more or less obsolete. The species is parasitic on *Andrena bucephala*. It has not to my knowledge been found in company with any other insect. A large colony of the *Andrena* formerly existed near Highgate Archway, where the *Nomada* was very abundant.

### 5. *Nomada bridgmaniana*.

*N. atra*; labio, clypei margine antico, mandibulis antennisque ferrugineis; scutello punctis duobus tegulisque ferrugineis; abdomine ferrugineo, maculis duabus rotundatis flavis notato. *Mas* clypei margine antico, labio mandibulisque flavis; abdomine ferrugineo, flavo fasciato.

*Female*. Length  $3\frac{1}{2}$ –4 lines.—Black; the mandibles, labrum, anterior margin of the clypeus, and the flagellum ferruginous; two black spots on the clypeus and three or four of the basal joints of the flagellum black, or fuscous above. Thorax, the tubercles bright yellow; two ferruginous ovate spots on the scutellum; wings subhyaline, the nervures fusco-ferruginous, the tegulæ light ferruginous; the anterior legs with the apex of the femora, the tibiæ, and tarsi ferruginous, the tibiæ with a black stain behind; the intermediate and posterior legs with the extreme apex of the femora, the base and apex of the tibiæ, and the tarsi ferruginous; the basal joint of the posterior pair black. Abdomen, the base black and a narrow black line at the apical margin of the first segment, and a transverse narrow fuscous fascia a little before the apical margin of the three following segments; an ovate yellow spot on each side of the second segment. B.M.

Var.  $\beta$ . A more or less distinct double lunate yellow spot in the middle of the fifth segment.

Var.  $\gamma$ . A very minute yellow spot on each side of the third segment.

Var.  $\delta$ . The spots on the scutellum yellowish.

*Male*. Length 4 lines.—Black; the flagellum ferruginous and more or less black or fuscous above; the face anteriorly margined with yellow, from which a narrow yellow line runs up to the margin of the eyes as high as the insertion of the antennæ; the labrum and mandibles yellow. Thorax with a thin hoary pubescence; the posterior margin of the tubercles yellow, as well as the outer margin of the tegulæ; the anterior legs of a reddish yellow in front, all the tarsi more or less ferruginous, their basal joint stained more or less black above. Abdomen ferruginous, with the base black; a narrow yellow interrupted band on the first segment in the middle; the two following have broader bands at their basal margins, the first and sometimes the second also interrupted in the middle, towards which they are slightly attenuated; the three following segments have narrow yellow bands. B.M.

Var.  $\beta$ . The yellow spots on the first segment obsolete, those on the fourth and fifth much interrupted, forming a series of spots. The fascia on the ventral segments vary in being one, two, or three.

This appears to be an undescribed species; it was discovered by Mr. Bridgman in the spring of 1875, when only a few specimens were taken and submitted to me for examination. At first sight the insect appeared possibly to be a variety of *Nomada lateralis*; but on examination and comparison marked specific differences presented themselves. In *N. lateralis* the antennæ are longer than the thorax; in the new species they are scarcely as long; the latter has also yellow tubercles, no longitudinal ferruginous stripes on the mesothorax, and only two spots on the scutellum; *N. lateralis* has red tubercles, red lines on the thorax, and the scutellum is entirely red. It also somewhat resembles *N. fabriciana*; but its red labrum and mandibles, together with its yellow tubercles and its not having the subapical joints of its antennæ black above, separate it from that species\*. The specimens I have received were captured at Brundall, near Norwich, at the beginning of May this season; but last year they appeared about the middle of April.

#### 6. *Nomada ochrostoma*.

*N. atra*; labio, clypeo facieique lateribus ferrugineis, thorace lineis tribus longitudinalibus atris, scutello rufo, abdomine flavo-maculato.

*Nomada ochrostoma*, *Schäff. Germ. Zeits.* i. 280 ♂.

*Smith, Zool.* ii. 596; *Bees Great Brit.* 122 ♂ ♀.

*Apis ochrostoma*, *Kirby, Mon. Apum Angl.* ii. 209 ♂.

*Apis hillana*, *Kirby, lib. cit.* 208 var. ♂.

*Nomada vidua*, *Smith, Zool.* ii. 602 ♀.

*Nomada punctiscuta*, *Thoms. Hym. Scand.* ii. 193.

*Female.* Length 4-4½ lines.—Head and thorax black, the labrum, mandibles, clypeus, orbits of the eyes, and a line passing behind the ocelli ferruginous; the antennæ ferruginous; the scape usually more or less black above. Thorax—the collar, tubercles, a large patch beneath the wings, a smaller ovate spot on the breast beneath, two longitudinal stripes on the disk of the thorax, an epaulet over the tegulæ, reaching the scutellum and the postscutellum, red; the wings subhyaline, the apical margins having a dark fuscous cloud, and a pale macula beyond the third submarginal cell; the legs red; the coxæ, trochanters, and femora beneath black. Abdomen ferruginous, black at the base; the second segment has on each side a large rounded macula, the third a minute spot, the fourth an interrupted transverse band, and the fifth a square patch of yellowish white; the margins of the segments usually dark rufopiceous: beneath immaculate. B.M.

\* The male closely resembles some varieties of *N. ruficornis*; but the scape of its antennæ is entirely black.

*Male.* Length 4 lines.—Head and thorax black; the face clothed with silvery pubescence, the clypeus, labrum, and mandibles yellow, the latter ferruginous at their tips; the scape black, having sometimes a ferruginous line within; the flagellum ferruginous, more or less black towards the base above. Thorax—the collar, tubercles, tegulæ, and two spots on the scutellum, frequently united, red; the legs red; the coxæ and trochanters black, except their extreme apex; the anterior and intermediate femora black at their base beneath, the posterior pair black beneath, except their extreme apex. Abdomen ferruginous, black at the base, the second segment has on each side a large rounded macula, the third a smaller spot or line, the fourth a short stripe and usually a minute dot outside, the fifth a transverse interrupted stripe, the sixth a broader uninterrupted one, yellowish white; beneath, a minute yellow spot at the apex.

B.M.

Small specimens of the male have usually the scape, coxæ, and trochanters entirely black.

This species appears in May and is a parasite of *Andrena labialis*; it is widely distributed, but somewhat local. Kirby's var.  $\gamma$  of his *Apis ruficornis* is a female of this species.

### 7. *Nomada lathburiana.*

*N. atra*, scutello punctis duobus flavescentibus; abdomine ferrugineo, fasciis flavis, medio attenuatis.

*Nomada lathburiana*, *Smith, Bees Great Brit.* 125.

*Apis lathburiana*, *Kirby, Mon. Apum Angl.* ii. 183 ♂.

*Apis rufiventris*, *Kirby, lib. cit.* 187 ♀.

*Nomada rufiventris*, *Smith, Zool.* ii. 590.

*Thoms. Hym. Scand.* ii. 184.

*Nomada marshamella*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 177.

*Female.* Length 4–5½ lines.—Head and thorax black, the clypeus and a spot above it, the orbits of the eyes, the labrum, mandibles, and antennæ ferruginous, the scape black above. Thorax, the tubercles and two spots on the scutellum yellow; a stripe down the breast in front and the legs ferruginous; the coxæ more or less fuscous, and the posterior femora and sometimes the tibiæ having a black stain beneath; the wings subhyaline, their apical margins having a fuscous cloud, the tegulæ reddish yellow. Abdomen ferruginous, the base black; the apical margins of the first and three following segments rufo-fuscous; the basal margins bright yellow, attenuated in the middle, the fifth entirely yellow; beneath ferruginous, the apical margins of the segments more or less black.

B.M.

*Male.* Length 4–5 lines.—Head and thorax black; the scape of the antennæ in front, the face below their insertion, the orbits of the eyes, interrupted at their vertex, yellow; the labrum and

mandibles yellow; the flagellum ferruginous, three or four of the basal segments black above. Thorax—the tubercles, tegulæ, and two minute dots on the scutellum yellow; the latter sometimes obsolete; the anterior legs yellow, the intermediate and posterior pairs ferruginous, their coxæ and femora black beneath, the knees and the intermediate tibiæ and tarsi yellow, the latter stained with ferruginous. Abdomen as in the other sex, the yellow bands being brighter and rather broader. The wings are nearly hyaline, their apical margins faintly clouded, the nervures pale testaceous. B.M.

This beautiful species is very local, but widely spread, having been received from Scotland; it is not rare to the north of London about Hampstead and Highgate; it has been observed about the burrows of *Andrena labialis*, and also those of *A. rufa*. It is probably one of those bees that are parasitic on various species.

### 8. *Nomada armata*.

*N. atra*; scutello punctis duobus, linea transversa subtus, antennis pedibusque ferrugineis; abdomine rufo, segmentis intermediis maculis flavis.

*Nomada armata*, *Schäff. Germ. Zeits.* i. 279 ♂.

*Smith, Zool.* vii. *Append.* 41; *Bees Great Brit.* 130 ♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 232.

*Thoms. Opusc. Ent.* 94; *Hym. Scand.* ii. 199.

*Nomada kirbyella*, *Steph. Illus. Brit. Ent. Supp.* pl. xliii. fig. 1 ♂.

*Nomada cincticornis*, *Nyland. lib. cit.* 182 ♀.

*Female.* Length  $5\frac{1}{2}$  lines.—Head and thorax black; the anterior margin of the clypeus, the mandibles and antennæ, and sometimes a minute dot above the eyes ferruginous; the scape fuscous; the flagellum has the eighth and three following joints fuscous, the apical joint ferruginous; a minute acute tooth in the centre of the labrum. Thorax—a narrow line on the collar, the tubercles, the tegulæ, two spots on the scutellum, and the postscutellum ferruginous; a patch beneath the wings and the margin of the meta-thorax fringed with silvery white pubescence; the legs ferruginous, the coxæ and trochanters, except their extreme apex, and all the femora towards their base beneath, black; the basal joint of the posterior tarsi fuscous on the outside. Abdomen ferruginous, the base black; the second segment has on each side an ovate yellow macula, and the third and fourth segments a short transverse yellow line on each side at their basal margins. B.M.

*Male.* Length  $5\frac{1}{2}$  lines.—Head and thorax black, the flagellum ferruginous, its two apical joints having a black spot above; the mandibles yellow, their tips ferruginous; the labrum armed with a sharp tooth in the middle; the face covered with silvery white pubescence. Thorax—the pubescence on the disk yellowish, that on the sides and beneath hoary; the tubercles, tegulæ, tibiæ, and tarsi ferruginous; the femora at their apex above ferruginous;



the wings subhyaline, and having a fuscous cloud at their apical margins. Abdomen ferruginous, its base black; the second segment has on each side a large ovate yellow macula, and the following segments a yellow line at their basal margins; the fifth and sixth have sometimes a transverse band; beneath, the intermediate segments have sometimes a transverse interrupted yellow line, and the three apical ones a central black dot. B.M.

In August 1860 I took five specimens of this local insect; it frequented the flowers of the wild scabious (*Scabiosa arvensis*) in company with *Andrena hattorfiana*, on which insect it is probably parasitic, as I have since observed them in company. It was first taken in this country, I believe, by Dr. Leach in Devonshire, where it has since been found by Mr. Parfitt near Exeter, and by myself at Woollacombe sands, near Morthoe, North Devon. This is the largest species of *Nomada* found in this country.

### 9. *Nomada varia*.

*N. atra*, scutello sulphureo; abdomine flavo, basi ferruginea, fasciis quatuor nigris.

*Nomada varia*, *Panz. Faun. Germ.* 55. 20 ♂.

*Spin. Ins. Ligur.* i. 152.

*St.-Farg. Hym.* ii. 489, tab. 24. fig. 3 ♀, 4 ♂.

*Smith, Bees Great Brit.* 126 ♂ ♀.

*Apis varia*, *Kirby, Mon. Apum Angl.* ii. 185 ♂.

*Nomada fucata*, *Panz. lib. cit.* 55. 19 ♀.

*Fabr. Syst. Piez.* 390.

*Spin. Ins. Ligur.* i. 151.

*Schäff. Germ. Zeits.* i. 284.

*Smith, Zool.* i. 593.

*Schenck, Nass. Bien.* 188.

*Apis fucata*, *Kirby, Mon. Apum Angl.* ii. 195.

*Normada zonata*, *St.-Farg. Hym.* ii. 491 ♀.

*Female.* Length 4-4½ lines.—Black; the clypeus and a spot above it, the inner orbits of the eyes, the labrum, mandibles, and antennæ rufous. Thorax—the collar on each side, the tubercles, tegulæ, and scutellum sulphur-yellow; sometimes a minute dot on the postscutellum; wings testaceo-hyaline, very faintly clouded at their margins, the nervures ferruginous; legs rufous, the coxæ, the intermediate and posterior trochanters, and the extreme base of the femora beneath black. Abdomen—the basal segment ferruginous, the rest yellow; the extreme base and apical margin of the first and the apical margins of the three following segments black. B.M.

Var.  $\beta$ . The apical margin of the basal segment rufo-piceous.

Var.  $\gamma$ . The second segment ferruginous in the middle.

*Male.* Length 4-4½ lines.—Head and thorax black; the scape in front, the clypeus and a spot above it, the face on each side, the labrum, and mandibles yellow, the latter rufo-piceous at their apex;

the flagellum ferruginous, a black dot on four or five of the middle joints, and sometimes a narrow black line on the scape behind. Thorax—the collar on each side, the tubercles, a line on the breast in front, the tegulæ, scutellum, and sometimes a minute dot beneath it yellow; wings as in the female; the coxæ and trochanters black, the anterior pair yellow in front; femora ferruginous, their extreme base black beneath; the knees and all the tibiæ and tarsi yellow, and more or less stained with ferruginous. Abdomen as in the female; in rare instances there is an interrupted yellow line on the first segment. B.M.

This is a very local insect; it appears in July and is the parasite of *Halictus rubicundus* and *H. leucozonius*. It is also said to infest colonies of *Andrena fulvicrus*. It has been found near Darenth, and very abundantly at Eastbourne and in Sandown Bay, Isle of Wight; it has also been taken at Kemp Town, Brighton.

### 10. *Nomada baccata*.

*N. ferruginea*, capite thoraceque nigro variegatis, abdominis segmentis albo maculatis.

*Nomada baccata*, *Smith, Zool.* ii. 604 ♂ ♀; *Bees Great Brit.* 121; *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 230.  
*Nomada læta*, *Thoms. Opusc. Ent.* 98; *Hym. Scand.* ii. 188.

*Female.* Length 3 lines.—Head, the ocelli enclosed in a transverse black macula; in front of the anterior ocellus a black macula descends to the insertion of the antennæ, and from each an abbreviated black line passes down to the base of the clypeus; the cheeks black. Thorax—three longitudinal black lines on the mesothorax, and a central one runs down the metathorax; an oblique black stripe runs from the posterior wings to the coxæ of the intermediate legs; the posterior legs have sometimes their base more or less black beneath; wings subhyaline, iridescent, with their apical margins slightly clouded. Abdomen—at the base above an irregular transverse black line, frequently forming the letter M; the second segment has, on each side, a large subovate white macula, somewhat pointed inwardly; the third segment a smaller macula laterally, the fourth a transverse line, slightly interrupted in the middle, and the fifth a large square white macula. B.M.

*Male.* Length  $2\frac{1}{2}$ –3 lines.—Head and thorax black; the clypeus, labrum, mandibles, and scape in front white; the scape black behind; the flagellum red, the joints having a fuscous line above, darkest towards their base; the head and thorax above have a thin hoary pubescence; on the thorax beneath it is shorter but more dense; two spots on the scutellum and the tegulæ rufo-testaceous; the legs of a paler red than in the other sex; wings as in the female. Abdomen pale rufous, the extreme base black; two minute white spots on the first segment, frequently obliterated; the second has two large spots as in the female, the following segments have elon-

gated white spots on each side, those on the fifth uniting, the sixth has a transverse macula; beneath, a transverse white line on the third and fourth segments in the middle, but frequently immaculate. B.M.

This species is parasitic on *Andrena argentata*, and appears in August; it was first discovered at Sandhurst, and has since been taken at Weybridge in some numbers, and very abundantly at Bournemouth. Dr. Nylander says it is found both in Denmark and Sweden. Thomson thinks it may be the *albo guttata* of Herrich-Schäffer; but if his description is correct, it certainly cannot be. I have never seen a continental specimen.

### 11. *Nomada xanthosticta*.

*N. atra*, annis subtus scutellique punctis ferrugineis; abdomine rufo, segmentis secundo et tertio maculis duabus flavis.

*Nomada xanthosticta*, *Smith, Zool. ii. 600; Bees Great Brit. 128 ♀.*  
*Schenck, Nass. Bien. 191.*

*Apis xanthosticta, Kirby, Mon. Apum Angl. ii. 212 ♀.*

*Nomada mistura, Smith, Bees Great Brit. 133 ♂.*

*Female.* Length 2–3 $\frac{1}{4}$  lines.—Head and thorax black; the flagellum beneath, the mandibles, and the labrum ferruginous, the latter obscurely so, sometimes black, the scape black. Thorax: the tegulæ ferruginous, the tubercles yellow, the scutellum having sometimes two minute obscure ferruginous spots; wings subhyaline, their apical margins having a fuscous cloud, the nervures fusco-ferruginous; the legs ferruginous, the coxæ, the trochanters, the femora beneath, the tibiæ above, and the basal joints of the posterior tarsi above fuscous. Abdomen ferruginous, the extreme base black, the apical margins of the first and second segments faintly rufo-piceous, the apical margin of the third and the basal margin of the fourth narrowly rufo-piceous; the second and third segments have on each side a round yellow macula, that on the latter minute; the fifth with a square white macula; beneath immaculate. B.M.

*Male.* Length 3 lines.—Black; the anterior margin of the clypeus narrowly, and the mandibles, yellowish red, the tips of the latter rufo-piceous; the flagellum ferruginous, usually more or less fuscous above; the face with short, thin, griseous pubescence. Thorax above with thin short fulvous pubescence, on the metathorax, the sides, and beneath it is griseous; wings subhyaline, iridescent, clouded at their apical margins, the nervures ferruginous; the tips of the femora, the anterior tibiæ, the base and apex of intermediate and posterior pairs, and all the tarsi rufo-testaceous; a dark stain on the anterior tibiæ behind. Abdomen: the apical margins of the segments more or less distinctly ferruginous, the second and third segments have, laterally, an oblong white macula, the first largest, sometimes there is also a minute macula on the fourth, and

also, occasionally, on the fifth; the fifth segment with a transverse white line. B.M.

This is a rare species; it appears in July. What bee it is parasitic upon is not known; but I once took two or three females in Fern Wood, near Ilfracombe, within a few yards of a colony of *Halictus minutus*. It was first discovered by the Rev. Mr. Rudd, at Yarm, Yorkshire; Mr. Bridgman has taken it near Norwich.

## 12. *Nomada furva*.

*N. atra*, scutello rufo-bimaculato, abdomine rufo-cincto. *Mas* abdomine flavo-maculato.

*Nomada furva*, *Panz. Faun. Germ.* 55. 23 ♂.

*St.-Farg. Hym.* ii. 495 ♂ ♀.

*Smith, Zool.* ii. 599; *Bees Great Brit.* 132.

*Apis rufo-cincta*, *Kirby, Mon. Ap. Angl.* ii. 216 ♀ var.

*Apis sheppardana*, *Kirby, lib. cit.* 217 ♀.

*Nomada minuta*, *Fabr. Syst. Piez.* 394.

*Schüff. Germ. Zeits.* i. 278.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 184.

*Schenck, Nass. Bien.* 195.

*Thoms. Opusc. Ent.* 94; *Hym. Scand.* ii. 203.

*Nomada dalii*, *Curtis, Brit. Ent.* ix. tab. 419 ♂.

*Female.* Length 2 lines.—Head and thorax black, the anterior margin of the clypeus, the labrum, mandibles, and orbits of the eyes ferruginous; the antennæ ferruginous beneath, the apical joint entirely so. Thorax—the collar, tubercles, tegulæ, a large lunate spot beneath the wings and a dot above uniting with it, a spot behind the wings, two larger ones on the scutellum, and the post-scutellum ferruginous; the wings subhyaline, and having a dark fuscous cloud at their apical margins; the legs rufo-piceous, the apex of the joints and the tarsi ferruginous. Abdomen rufo-piceous, the first and second segments having a ferruginous band, the apex ferruginous; the band on the basal segment having two black dots; sometimes a pale spot on the second and third segments laterally. (*A. rufocincta*, Kirby.) B.M.

Var. *β.* The basal segment only having an obscure ferruginous band. (*A. sheppardana*, Kirby.)

*Male.* Length 2 lines.—Head and thorax black; the margin of the clypeus narrowly, the labrum, and a spot on the mandibles towards their apex reddish yellow; two fuscous spots on the labrum; the tips of the mandibles ferruginous; the tips of the scape beneath and the flagellum beneath reddish yellow, the apical joint entirely so; a minute yellow spot at the vertex of the eyes. Thorax—the tubercles and tegulæ ferruginous; the sides of the metathorax have a little silvery pubescence; the legs rufo-piceous, their joints pale, as well as the anterior femora and tibiæ in front; wings as in the female. Abdomen black, the basal segment having two minute dots about the middle, the second a line or dot on each side, and

the third having sometimes a narrow line on each side at its basal margin yellow; beneath, immaculate. B.M.

This is the smallest species of the genus known; Fabricius appears to have thought himself justified in consequence in giving it a characteristic name, at the same time quoting Panzer's name, which has the priority and must be retained. This little bee is parasitic upon *Halictus morio*, and probably also upon *H. minutus*; Mr. G. Newport found numbers in the cells of one of the species of *Colletes*.

### 13. *Nomada flavoguttata*.

*N. atra*, antennis scutellique punctis duobus ferrugineis; abdomine rufo, segmentis duobus et tertii maculis lateralibus flavis.

*Nomada flavoguttata*, *Smith, Zool.* ii. 598 ♂ ♀; *Bees Great Brit.* 128  
*Schenck, Nass. Bien.* 389.

*Apis flavoguttata*, *Kirby, Mon. Apum Angl.* ii. 215 ♂.

*Female.* Length  $2\frac{1}{2}$ –3 lines.—Head and thorax black, the anterior margin of the clypeus, the face on each side, the orbits of the eyes, the labrum, mandibles, and flagellum ferruginous, the latter fuscous above. Thorax—the collar, tubercles, a spot beneath the wings, a larger one on the breast, two on the scutellum, and the postscutellum ferruginous; two obscure ferruginous abbreviated lines on the disk; wings subhyaline, iridescent, and having a dark cloud at their apical margins; the coxæ, trochanters, base of the anterior and intermediate femora, and the posterior pair beneath black; the tibiæ, tarsi, and femora above ferruginous. Abdomen ferruginous, the base black; the second and third segments have on each side a round yellow macula, the second pair smallest; the margins of the segments rufo-piceous. B.M.

Var.  $\beta$ . The legs almost entirely ferruginous.

Var.  $\gamma$ . The spots on the abdomen almost or entirely obliterated.

Var.  $\delta$ . The lines on the disk of the thorax obsolete.

Var.  $\epsilon$ . The spots on the scutellum united.

*Male.* Length 2– $2\frac{1}{2}$  lines.—The anterior margin of the clypeus and the mandibles yellow, the latter ferruginous at their tips; the antennæ ferruginous beneath, above black; the face has a silvery pubescence. Thorax black; the tibiæ, tarsi, and femora in front ferruginous, the rest black; the thorax has a hoary pubescence; wings clearer than in the other sex. Abdomen as in the female.

B.M.

Var.  $\beta$ . The posterior tibiæ and tarsi fuscous above, and the intermediate and anterior pairs stained behind.

This distinct species is mixed up with *Nomada furva* by continental authors; Nylander supposed the male described by Kirby to be that of *N. furva*; and subsequent authors have adopted this erroneous opinion. The species is larger and perfectly distinct, is not rare, and is widely distributed; but I do not know upon what bee it is

parasitic; I have found it flying about a bank in which was a colony of *Colletes fodiens*.

#### 14. *Nomada roberjeotiana*.

*N. atra*, scutello, pedibus antennisque ferrugineis; abdomine ferrugineo, apice albo, segmentis secundo tertioque macula laterali alba.

*Nomada roberjeotiana*, *Panz. Faun. Germ.* 72. 18 ♂, 19 ♀.

*Fabr. Syst. Piez.* 391.

*Schäff. Germ. Zeits.* i. 283.

*Smith, Zool.* ii. 603.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fem.* i. 178.

*Schenck, Nass. Bien.* 189.

*Thoms. Opusc. Ent.* 92; *Hym. Scand.* ii. 205.

*Nomada neglecta*, *Schäff. lib. cit.* 283 ♂.

*Female.* Length 3 lines.—Head and thorax black, the anterior margin of the clypeus, the labrum, and mandibles ferruginous. Thorax—the collar, tubercles, tegulæ, scutellum, and postscutellum ferruginous; the wings subhyaline, their apical margins clouded, the nervures dark ferruginous, becoming bright red near the base of the wings; the legs ferruginous, the coxæ and trochanters, except their extreme apex, and the femora beneath black. Abdomen ferruginous, the base black; the third and following segments rufo-piceous, the second having at its basal margin laterally a rufo-piceous spot; the basal margin of the third segment is ferruginous in the middle; the second segment has on each side a transverse cream-coloured oval macula, the third a narrower and more elongate one; the fifth has a square spot of the same colour; beneath, immaculate. B.M.

*Male.* Length 3 lines.—Head and thorax black, the anterior margin of the clypeus, the labrum, mandibles, and scape in front yellow; the flagellum ferruginous. Thorax—the collar, tubercles, and scutellum yellow; wings and legs as in the female. Abdomen ferruginous, with the extreme base black; the second segment has on each side an ovate white macula; the following segments are rufo-piceous; and the third segment has laterally an oblong white spot, the fourth a narrow interrupted fascia, and the fifth is almost entirely white. B.M.

The male described is a highly coloured example; the spotting of the abdomen varies greatly; and the scutellum is sometimes more or less ferruginous, and, in small specimens, occasionally black. The species is very local and rare; it was first discovered near Blackwater, Hants, where a few specimens were taken; it has subsequently been found more plentifully near Carlisle. It frequents the ragwort (*Senecio jacobæa*), and is found in July and August.

15. *Nomada rubra*.

*N. atra*, mandibulis flavis, thorace ferrugineo variegato; abdomine ferrugineo, immaculato.

*Nomada rubra*, *Smith, Zool. vii. Append. 41 ♀*; *Bees Great Brit. 131*.

*Female*. Length  $4\frac{1}{2}$  lines.—Ferruginous; the mandibles yellow; a spot at the base of the antennæ, the tips of the scape above, and the cheeks black, a line behind the eyes ferruginous. Thorax, the tubercles yellow; the disk and the metathorax black; a line over the tegulæ, the scutellum, and the postscutellum ferruginous; the sides of the metathorax and the posterior coxæ, which are black, clothed with silvery pubescence; the abdomen ferruginous, immaculate, the apical segment fringed with silvery pubescence. B.M.

In this species the tips of the posterior femora are produced above into a blunt spinose process; it is unique in the collection of the British Museum, and is supposed to have been captured in Devonshire at Kingsbridge. I have not seen it in any continental collection. It is quite distinct from *N. rufa* of Rossi.

16. *Nomada fabriciana*.

*N. atra*; antennis rufis, nigro annulatis; abdomine ferrugineo, maculis duabus flavis. *Mas* abdomine ferrugineo, maculis quatuor flavis.

*Nomada fabriciana*, *Fabr. Ent. Syst. ii. 348*; *Syst. Piez. 393 ♀*.

*Spin. Ins. Ligur. i. 152*.

*Schäff. Germ. Zeits. i. 277.*"

*Smith, Zool. ii. 598*; *Bees Great Brit. 133 ♂ ♀*.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. i. 183*.

*Schenck, Nass. Bien. 389*.

*Thoms. Opusc. Ent. 94*; *Hym. Scand. ii. 201*.

*Apis fabriciana*, *Linn. Syst. Nat. i. 955 ♀*.

*Rossi, Faun. Etrus. Mant. no. 324*.

*Apis fabriciella*, *Kirby, Mon. Apum Angl. ii. 213, tab. 16. fig. 3 ♀*.

*Apis quadrinotata*, *Kirby, lib. cit. 214 ♂*.

*Nomada quadrinotata*, *St.-Farg. Hym. ii. 494*.

*Female*. Length  $3\frac{1}{2}$ –5 lines.—Head and thorax black; the antennæ rufous, the scape, basal joint of the flagellum above, and four or five joints towards the apex black, the apical one red; the apex of the mandibles ferruginous; the face and cheeks have a silvery pubescence. Thorax—the tegulæ, tibiæ in front, the femora at their apex in front, and the apical joints of the tarsi ferruginous. Abdomen ferruginous, the base black; the second segment has on each side an ovate macula, and the third a minute one, yellow; the margins of the apical segments piceous. B.M.

Var.  $\beta$ . The third segment immaculate.

Var.  $\gamma$ . The spot on the second segment minute, that on the third obsolete.

Var.  $\delta$ . All the spots obsolete, and the margins of all the segments nigro-piceous.

*Male*. Length  $3\frac{1}{2}$ –4 lines.—Head and thorax black, having a thinly scattered hoary pubescence; the face clothed with silvery pubescence; the antennæ obscurely rufo-piceous beneath; the anterior and intermediate femora at their apex in front, their tibiæ in front, and the tarsi ferruginous; the basal joints of the latter black or fuscous above. Abdomen ferruginous, the base black; the second and third segments have on each side a round yellow macula, the latter pair smallest. B.M.

This species of *Nomada* is the parasite of *Panurgus banksianus*, and is always to be found with colonies of that insect during the months of June and July. Kirby suspected that his *A. quadrinotata* was the male of this species; but the insect was not found commonly at Barham. At Hampstead it has occurred in great abundance. It is local, but widely distributed; it has been found at Bournemouth, Ventnor (Isle of Wight), Sidmouth, in all the home counties, and in Yorkshire.

### 17. *Nomada germanica*.

*N. atra*; antennis, pedibus abdomineque ferrugineis, maculis atris.

*Nomada germanica*, *Panz. Faun. Germ.* 72. 17 ♀.

*Fabr. Syst. Piez.* 394.

*Schäff. Germ. Zeits.* i. 276.

*St.-Farg. Hym.* ii. 477.

*Smith, Bees Great Brit.* 134 ♂ ♀.

*Apis ferruginata*, *Kirby, Mon. Apum Angl.* ii. 218 ♂, tab. 16. fig. 4 ♂.

*Nomada ferruginata*, *Schäff. Germ. Zeits.* i. 275.

*Brullé, Expéd. Sc. de Morée*, iii. 346.

*Smith, Zool.* ii. 600.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 183.

*Thoms. Opusc. Ent.* 94; *Hym. Scand.* ii. 201.

*Nomada stigma*, *Fabr. Syst. Piez.* 393.

*Nomada atrata*, *Smith, Bees Great Brit.* 135 ♂ var.

*Female*. Length 4 lines.—Head and thorax black; the mandibles and antennæ ferruginous, the latter more or less fuscous above; the labrum has a minute acute tooth in the middle. Thorax—the collar on each side, the tegulæ, two spots on the scutellum, and the postscutellum ferruginous; the wings subhyaline, and having a dark fuscous cloud on their apical margins; the legs ferruginous, the femora beneath more or less black towards their base; the tibiæ have a black spot near their apex; the basal joint of the posterior tarsi black; a short silvery-white pubescence on the sides of the metathorax and beneath. Abdomen ferruginous, the base black; a black spot at the basal margins of the second and third segments laterally; the fourth and fifth have a black band, the latter usually interrupted, sometimes obsolete; beneath, having a row of black transverse spots down the middle. B.M.



*Male*.—Very similar to the other sex, but differs in having a more dense silvery pubescence on the face, the sides of the thorax, and also on the sides of the abdomen, and in having the scutellum black; two or three of the basal joints of the flagellum are swollen and thicker than the apical joints. . B.M.

This species is parasitic upon *Andrena fulvescens*, and sparingly found in the London district. At Hawley, near Blackwater, it was found in immense numbers, frequenting a large colony of the *A. fulvescens*; it is also plentiful at Bournemouth.

Although *N. atrata* has been taken at Arundel, and one or two at Kingsdown, near Deal, unaccompanied by other normal examples of *N. germanica*, I believe it is a rare and remarkable variety of the male of that species. It has also been taken at Red Hill, near Reigate.

### 18. *Nomada solidaginis*.

*N. atra*, antennis basi ferrugineis; scutello abdominisque maculis fasciisque flavis, segmento primo immaculato.

*Nomada solidaginis*, *Panz. Faun. Germ.* 72. 21 ♂.

*Spin. Ins. Ligur.* i. 152.

*Schäff. Germ. Zeits.* i. 284.

*St.-Farg. Hym.* ii. 472.

*Smith, Zool.* ii. 595; *Bees Great Brit.* 136.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 176.

*Schenck, Nass. Bien.* 183.

*Thoms. Opusc. Ent.* 93; *Hym. Scand.* ii. 172.

*Apis solidaginis*, *Kirby, Mon. Apum Angl.* ii. 204.

*Apis picta*, *Kirby, lib. cit.* 206 var.

*Apis rufopicta*, *Kirby, lib. cit.* 207 var.

*Female*. Length  $2\frac{1}{2}$ –4 lines.—Head and thorax black; the clypeus and a narrow line on each side touching the eyes, the labrum, and mandibles yellow, the tips of the latter ferruginous; the scape and the base of the flagellum ferruginous in front. Thorax—the collar, tubercles, a lunate patch on the breast, the tegulæ, and scutellum yellow; the legs ferruginous, the posterior femora having a dark stain at their base within; the wings fulvo-hyaline, faintly clouded at their apical margins. Abdomen: the second and third segments have a large yellow macula, acute within; the fourth has a fascia and the fifth segment is entirely of the same colour; the base of the latter sometimes black; the intermediate segments beneath have transverse yellow fasciæ, sometimes interrupted. B.M.

Var.  $\beta$ . Abdomen rufous, similarly maculated to the former (*A. rufopicta*, Kirby).

Var.  $\gamma$ . Abdomen rufous, the fascia on the fourth segment widely interrupted (*A. picta*, Kirby).

*Male*. Length  $2\frac{3}{4}$ –4 lines.—Black; the clypeus, sides of the face, the labrum, mandibles, and the scape in front yellow; the face has a silvery white pubescence; the flagellum rufo-testaceous beneath,

Thorax—the collar, tubercles, a lunate spot beneath them, the tegulæ, and scutellum yellow; the legs pale ferruginous, the anterior and posterior coxæ yellow in front, the intermediate pair have usually a minute spot at the sides and another on the pectus in front of each; the posterior femora black at their base, the anterior and posterior pairs usually rufo-testaceous, but sometimes black, the tibiæ and tarsi varied with yellow; the wings subhyaline, their apical margins faintly clouded. Abdomen: the second and third segments have on each side a large transverse macula, pointed within; the fourth and fifth a transverse fascia, attenuated in the middle, the sixth an entire broad yellow one. B.M.

Var.  $\beta$ . The band on the fourth segment interrupted.

Var.  $\gamma$ . The basal segment having two minute yellow dots.

Var.  $\delta$ . Margins of the segments of the abdomen rufo-piceous.

This is the most variable species of the genus, both in size and coloration; it is the parasite of *Halictus leucozonius*, and probably also of *H. cylindricus*. It is found in considerable numbers on wild thyme and on the ragwort (*Senecio jacobææ*) in July and August, and sometimes also as late as September. The male seldom varies in its colouring, a red variety being a great rarity, whilst the female runs into endless variations of colour and size.

### 19. *Nomada jacobææ*.

*N.* *atra*, pedibus ferrugineis, scutelli punctis duobus abdominisque maculis fasciisque flavis.

*Nomada jacobææ*, *Panz. Faun. Germ.* 72. 20 ♂.

*Schüff. Germ. Zeits.* i. 286 ♂ ♀.

*St.-Farg. Hym.* ii. 479.

*Smith, Zool.* ii. 594; *Bees Great Brit.* 137.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 175.

*Schenck, Nass. Bien.* 181.

*Thoms. Opusc. Ent.* 92; *Hym. Scand.* ii. 173.

*Apis jacobææ*, *Kirby, Mon. Apum Angl.* ii. 201.

*Apis flavopicta*, *Kirby, lib. cit.* 202.

*Female.* Length 4–4½ lines.—Black; the anterior margin of the clypeus, the labrum, and mandibles yellow; the tips of the mandibles and the margin of the clypeus narrowly ferruginous; the labrum has a minute tooth in the middle; the scape and the base of the flagellum ferruginous beneath. Thorax: the collar, tubercles, a spot on the breast, the tegulæ, and two spots on the scutellum are yellow; the wings subhyaline, their margins clouded; the legs ferruginous, varied with yellow; the coxæ and trochanters black, their tips ferruginous; the intermediate and posterior coxæ yellow in front. Abdomen: the first segment has a subinterrupted fascia, the second a large macula on each side, acute within, the third a narrow line on each side, and the following segment a broad fascia, yellow; the apical segment yellow. B.M.

*Male*.—This sex closely resembles the female; but the clypeus is usually more yellow, and the scape yellow in front, the clypeus covered with silvery pubescence; the abdomen has its bands frequently more interrupted.

B.M.

Var.  $\beta$ . Abdomen having all the bands, except the apical one, interrupted. This is probably the *Nomada interrupta* of Panzer.

This species is at times very plentiful in certain localities, but it is a local insect; it usually appears in July, and is found in August and September. I once found it entering the burrows of *Andrena fulvicrus*, in August, at Sidmouth; but I suspect it is usually parasitic upon species of *Halicti*. Kirby describes an insect which he took in spring on the flowers of the gooseberry; unfortunately only a portion of his type remains. *N. jacobææ* he could not have found at the time he mentions: I believe his insect to be a male of *N. succincta*; it is certainly a larger bee than *N. jacobææ*. Kirby's *A. flavopicta* is undoubtedly the female of Panzer's insect. This bee is frequently found on the ragwort; but it also frequents the *Scabiosa arvensis*, on which flower I took it at Lundy Island.

## 20. *Nomada lineola*.

*N. atra*, *antennis ferrugineis, scutello punctis duobus flavis, abdominis basi ferrugineo maculata fasciisque flavis variegata, labio subcornuto.*

*Nomada lineola, Panz. Faun. Germ. 53. 23 ♀.*

*St.-Farg. Hym. ii. 486.*

*Smith, Bees Great Brit. 138 ♂ ♀.*

*Schenck, Nass. Bien. 177.*

*Thoms. Opusc. Ent. 97; Hym. Scand. ii. 177.*

*Apis cornigera, Kirby, Mon. Apum Angl. ii. 190, var. ♀.*

*Apis subcornuta, Kirby, lib. cit. 192, var. ♀.*

*Apis capræ, Kirby, lib. cit. 193, var. ♀.*

*Apis lineola, Kirby, lib. cit. 194 ♀.*

*Apis sexcincta, Kirby, lib. cit. 198 ♂.*

*Nomada subcornuta, Thoms. Hym. Scand. ii. 180.*

*Nomada cornigera, Thoms. lib. cit. ii. 181.*

*Female.* Length 4–6 lines.—Black; a line along the lower portion of the inner orbits of the eyes, the anterior margin of the clypeus, the labrum, mandibles, and antennæ ferruginous; the scape has sometimes a yellow stain beneath, and the flagellum is slightly fuscous towards the apex. Thorax—the collar, tubercles, tegulæ, and two spots on the scutellum yellow; the legs ferruginous, the knees stained with yellow; the femora at their base beneath and the coxæ and trochanters more or less black; the posterior femora black within; the breast has a ferruginous spot on each side; the wings subhyaline, their apical margins clouded, the nervures ferruginous. Abdomen—the basal segment having a ferruginous fascia, the second a large yellow macula on each side, acute within, the third

a narrower macula, the fourth a transverse fascia, the fifth, except its extreme base, yellow; beneath ferruginous, the apical margins of the segments black, the fourth having a central yellow spot, sometimes the third also. B.M.

Var.  $\beta$ . The basal segment of the abdomen having two ferruginous spots, which are sometimes united.

Var.  $\gamma$ . The anterior margin of the united spots on the basal segment yellow; beneath variegated with yellow.

Var.  $\delta$ . The ferruginous fascia having two yellow spots.

Var.  $\epsilon$ . The ferruginous fascia having a transverse subinterrupted yellow line.

Var.  $\zeta$ . The tegulæ more or less ferruginous, the red fascia obscure and having two black dots.

*Male*. Length 4–5 lines.—Black; the face has a silvery-white pubescence, that on the vertex and disk of the thorax pale fulvous; the scape in front, the anterior margin of the clypeus, the labrum, and mandibles yellow; the flagellum ferruginous, three or four of the basal joints fuscous above. Thorax—the tubercles and tegulæ, also sometimes two minute dots on the scutellum, yellow; beneath, as well as the coxæ and femora, covered with a hoary pubescence; the femora, tibiæ, and tarsi ferruginous, the former black at their base beneath, and the posterior pair also black within; wings as in the other sex. Abdomen—the three basal segments having interrupted yellow fasciæ, the three apical fasciæ uninterrupted, the seventh segment yellow; the fascia on the fourth segment attenuated in the middle; the three basal segments have the lateral yellow stripes more or less pointed within; beneath, the segments have transverse broad yellow stripes. B.M.

Var.  $\beta$ . The apical margin of the basal segment of the abdomen ferruginous, and having two yellow spots.

This insect appears in May, and is generally distributed. The female varies greatly both in coloration and size: the male seldom varies; it closely resembles the same sex of *N. alternata*, but it has the legs variegated with yellow, and the tegulæ of the wings bright yellow. On examining Kirby's type specimens it becomes perfectly obvious that his *Apis capræ* and *A. subcornuta* are only small varieties of *N. lineola*; the names *N. cornuta* and *N. subcornuta* were ill chosen, as the horn on the lip is common to so many species.

## 21. *Nomada sexfasciata*.

*N. atra*, scutello punctis duobus, abdominis segmentis tribus basilibus flavo maculatis, segmentis alteris flavo fasciatis. *Mus* pedibus flavis.

*Nomada sexfasciata*, *Panz. Faun. Germ.* 62. 18 ♂.

*Schäff. Germ. Zeits.* i. 285.

*St.-Farg. Hym.* ii. 471.

*Lucas, Expl. Sc. Algér.* iii. 218.

*Smith, Zool.* ii. 593; *Bees Great Brit.* 141.

*Schenck, Nass. Bien.* 180.

*Thoms. Opusc. Ent.* 79; *Hym. Scand.* ii. 182.

*Apis schæfferella, Kirby, Mon. Apum Angl.* ii. 199 ♀.

*Apis connexa, Kirby, lib. cit.* 199 ♂.

*Female.* Length 6 lines.—Black; the anterior angles of the face, the margin of the clypeus, the labrum, and mandibles yellow; the antennæ ferruginous, the scape more or less black behind. Thorax—the tubercles, tegulæ, and two spots on the scutellum yellow; the disk slightly and the metathorax more densely covered with pale fulvous pubescence; wings subhyaline, the apical margins having a fuscous cloud, the nervures ferruginous; the legs ferruginous, the tibiæ yellowish towards their base, the coxæ and trochanters black. Abdomen—the three basal segments having on each side a yellow spot, those on the second and third segments pointed within; the fourth and fifth have interrupted fasciæ; beneath, the third and fourth segments have a transverse yellow dash. B.M.

*Male.* Length 6 lines.—Closely resembling the other sex, but having those parts of the mouth yellow which are ferruginous in the female; the scape yellow in front, black behind, and five or six of the basal joints of the flagellum black above. Thorax thinly clothed above with hoary pubescence, beneath more densely so, the legs yellow, and having in parts faint ferruginous stains; the femora beneath more or less black, the posterior pair black within. Abdomen variegated with yellow fasciæ as in the other sex, but the fasciæ not quite so widely interrupted. B.M.

Var.  $\beta$ . The basal segment of the abdomen immaculate.

This insect appears about the middle of May, and is always found where colonies of *Eucera longicornis* exist. It was formerly very abundant about Highgate Archway, but is now scarce near London, a colony of *Eucera* having been destroyed and the ground built upon; it is found at Southgate, and very abundant below Southend. It has not been received from the north of England or from Ireland.

## 22. *Nomada alternata.*

*N. atra*, antennis tegulisque ferrugineis, scutelli punctis abdominisque fasciis flavis, tribus anticis interruptis.

*Nomada alternata, Smith, Bees Great Brit.* 140.

*Apis alternata, Kirby, Mon. Ap. Angl.* ii. 182 ♂.

*Apis marshamella, Kirby, lib. cit.* 188 ♀.

*Nomada marshamella, Schöff. Germ. Zeits.* i. 285.

*Smith, Zool.* ii. 590 ♂ ♀.

*Schenck, Nass. Bien.* 175.

*Thoms. Hym. Scand.* ii. 176.

*Female.* Length 4–5 lines.—Black; the anterior margin of the cly-

peus, the labrum, mandibles, and antennæ ferruginous. Thorax—the collar on each side, the tubercles, and two spots on the scutellum yellow; the tegulæ and legs ferruginous; the coxæ and femora towards their base black; the wings subhyaline, their apical margins clouded, the nervures ferruginous. Abdomen—two minute spots on the basal segments, an interrupted fascia on the two following, on the fourth an entire fascia, and on the fifth a large quadrate spot yellow; there is usually a minute spot on each side of the quadrate one; beneath, the third and fourth segments have usually a yellow fascia, and the second sometimes two minute yellow dots. B.M.

Var.  $\beta$ . The basal segment of the abdomen immaculate, and the spots on the scutellum reddish yellow.

*Male*. Length  $3\frac{1}{2}$ –5 lines.—This sex very closely resembles the female, but has the scape in front, the anterior margin of the clypeus, the labrum, and mandibles yellow; the face has also a silvery-white pubescence; the tubercles yellow; the tegulæ ferruginous, sometimes dashed with yellow; the wings and legs as in the other sex; the fasciæ on the abdomen are broader, the first three subinterrupted; beneath, the second and three following segments have broad yellow fasciæ, the first usually interrupted, the apical segment yellow. B.M.

Var.  $\beta$ . The basal segment of the abdomen immaculate.

Var.  $\gamma$ . Two minute spots on the scutellum.

This species is found throughout the United Kingdom, and one of the most abundant; it appears early in the season, frequently in the first week in April. One peculiarity is connected with it: during a very fine autumn a few make their appearance. I have taken it on the 10th and 15th of September on Shirley Common; one or two of the spring species of *Andrenidæ* also appear in such seasons. This *Nomada* is parasitic on *Andrena nigro-cænea* and also on *A. atriceps*; I have also observed it in the burrows of *Eucera longicornis*. Kirby does not appear to have found the species at Barham, or he would probably have united the sexes. It will be observed that continental authors adopt the name given by Kirby to the female; this is contrary to an almost general system adopted in other orders of insects. The male is described as the fifth species, the female as the tenth in the ‘*Monographia Apum Angliæ*.’

### 23. *Nomada succincta*

*N. atra*, tegulis, tuberculis scutellique punctis duobus flavis, abdomine fasciis flavis nigrisque alternis ornato.

*Nomada succincta*, *Panz. Faun. Germ.* 55. 21 ♂.

*Schäff. Germ. Zeits.* i. 287.

*St.-Farg. Hym.* ii. 469.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 175.

*Smith, Bees Great Brit.* 142.

*Schenck, Nass. Bien.* 173.

*Thoms. Opusc. Ent.* 97; *Hym. Scand.* ii. 174.

*Apis goodeniana, Kirby, Mon. Apum Angl.* ii. 180 ♂ ♀.

*Nomada goodeniana, Smith, Zool.* ii. 589.

*Female.* Length 4-5 lines.—Black; the anterior margin of the clypeus, the labrum, mandibles, and antennæ ferruginous; the inner orbits of the eyes, as high as the insertion of the antennæ, yellow. Thorax—the collar, tubercles, tegulæ, two spots on the scutellum, one on the postscutellum, and a dot on each side of the metathorax yellow; the legs ferruginous; the coxæ, trochanters, and femora beneath at their base black, the posterior pair also more or less black within; the wings fulvo-hyaline, their nervures pale ferruginous. Abdomen—each segment having a yellow fascia, the first usually interrupted, the two following attenuated in the middle. B.M.

*Male.*—Very closely resembling the female, but having the clypeus anteriorly, the sides of the face, the scape in front, the labrum, and mandibles yellow; the latter ferruginous at their tips; the scape black above, and the four or five basal joints of the flagellum black above; the head and thorax have a thin hoary pubescence; the anterior coxæ and the tibiæ in front, and a spot on each side of the breast in front, yellow; an interrupted line on the collar, the tegulæ, and two spots on the scutellum yellow; wings subhyaline, the nervures pale ferruginous, the apical margins faintly clouded as in the other sex; the abdomen as in the female. B.M.

This species is abundant in all parts of the country, and appears in April. It is not subject to vary greatly, but the females sometimes have an uninterrupted yellow band on the basal segment of the abdomen, and the two minute yellow spots on the metathorax are occasionally obsolete. An entire fascia on the basal segment of the abdomen is sometimes found in the males.

### Genus 3. EPEOLUS.

*Apis* (pt.), *Linn. Syst. Nat.* i. 953 (1766).

*Nomada* (pt.), *Fabr. Ent. Syst.* ii. 345 (1793).

*Epeolus, Latr. Hist. Nat. des Crust. et Ins.* iii. 375 (1802).

Head transverse, the *ocelli* placed in a curve on the vertex; the *labrum* transverse-ovate, the anterior margin subemarginate, with a minute tooth in the centre of the emargination, the angles produced; in the middle, two minute teeth placed in a line with the angles of the emargination. The *labial palpi* 4-jointed, about one fifth shorter than the labium; the two basal joints elongate, the first joint one third longer than the second, the two apical joints minute, placed at the apex of the second joint; the *paraglossæ* short and lanceolate. The *maxillary palpi* 1-jointed, the joint ovate and minute. The *superior wings* having one marginal and three submarginal cells,

the marginal cell elongate-ovate, slightly narrowed towards the apex; the first submarginal cell nearly as long as the two following, the second much narrowed towards the marginal, and receiving the first recurrent nervure a little beyond the middle; the second submarginal also much narrowed towards the marginal cell, and receiving the second recurrent nervure a little beyond the middle. The legs have the calcaria and claws simple. Abdomen oblong-cordate.

The genus *Epeolus* is geographically widely distributed, being found in all the quarters of the globe. Only two species are known that are Asiatic; two or three have been found in Africa; and about six in South America. The metropolis of the genus will probably prove to be North America; at least twelve are described from that country at present, and a greater number will shortly be added to the list by Mr. Cresson. In this country only a single species has been discovered, *Epeolus variegatus*. It is parasitic upon *Colletes daviesana*, *C. fodiens*, and, I believe, also upon *C. marginata*: I took a number in company with that insect, all being of a smaller size than those found with the other two species of the genus.

### 1. *Epeolus variegatus*.

*E. niger*, thorace abdomineque albido variegatis, pedibus ferrugineis.

*Epeolus variegatus*, *Latr. Hist. Nat. des Inst.* xiv. 49.

*Fabr. Syst. Piez.* 388 ♂.

*Jurine, Hym.* 226, *Supp.* pl. 14. fig. ♀.

*Curtis, Brit. Ent.* ii. 516.

*St.-Farg. Hym.* ii. 462, tab. 17. fig. 5 ♀, 6 ♂.

*Guér. Icon. Règ. Anim.* 454, tab. 74. fig. 1

*Smith, Zool.* iii. 1150; *Bees Great Brit.* 143 ♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 174.

*Gerst. Stett. ent. Zeit.* 1869, 156.

*Schenck, Nass. Bien.* 173.

*Thoms. Opusc. Ent.* 90; *Hym. Scand.* ii. 213.

*Apis variegata*, *Linn. Syst. Nat.* i. 957 ♂.

*Kirby, Mon. Apum Angl.* ii. 222, tab. 16. fig. 6 ♀.

*Nomada crucigera*, *Panz. Faun. Germ.* 61. 20 ♂.

*Female.* Length  $3\frac{1}{2}$ –4 lines.—Black; the face clothed with short silvery-white pubescence, the labrum and mandibles ferruginous, the former having usually a dark stain on each side at the base; the flagellum ferruginous at the extreme base beneath; the collar covered with yellowish-white pubescence, and two abbreviated lines emanating from it in the middle; the scutellum, tubercles, tegulæ, and legs ferruginous; a large patch of short white pubescence beneath the wings, and a spot behind the tegulæ; the sides and base of the metathorax variegated with white pubescence; on each side of the scutellum a broad angular tooth which is sometimes ferruginous; the wings subhyaline, their margins faintly clouded. Abdomen—an interrupted white band at the basal and apical margins of the first segment, uniting laterally; the second, third, and fourth



segments have on each side a broad line of white pubescence, that on the third and fourth attenuated in the middle or interrupted; the fifth has a spot in the middle and another on each side; beneath, ferruginous towards the base, and the margins of the three apical segments with bands of white pubescence. B.M.

Var.  $\beta$ . The femora more or less rufo-testaceous.

Var.  $\gamma$ . The basal abdominal band entire.

*Male*.—This sex only differs from the female in having the labrum usually and the scutellum always black; the coxæ, trochanters, and base of the femora are usually black. B.M.

This very prettily coloured bee is local, being only found in localities where species of *Colletes* have established colonies; it is a summer insect, being frequently found on the ragwort (*Senecio jacobææ*), and also on the mouse-ear hawkweed (*Hieracium pilosellum*), in July and August. It has not been taken in the immediate neighbourhood of London, but is common in the lanes of Kent, Surrey, and Hampshire; it has also been taken at Barmouth in Wales, and is common in parts of Suffolk and Norfolk; it has not been received from Scotland or Ireland.

#### Genus 4. MELECTA.

*Apis* (pt.), *Scop. Ann. Hist. Nat.* iv. (1770).

*Centris* (pt.), *Fabr. Syst. Piez.* 354 (1804).

*Melecta*, *Latr. Hist. Nat.* xiv. 48 (1805).

*Crocisa* (pt.), *Jurine, Hym.* 239 (1807).

*Symmorpha*, *Klug, Illig. Mag.* vi. (1807).

Head transverse, narrower than the thorax; *ocelli* in a slight curve on the vertex; *antennæ* geniculated, the *flagellum* filiform, with the basal joint clavate; the *labial palpi* 4-jointed, the basal joint thrice the length of the second, the two apical joints minute, and placed at the side and near the apex of the second joint; the *maxillary palpi* 5-jointed, the basal joint short and ovate, the three following joints of nearly equal length. Thorax subglobose, the *scutellum* bidentate; the *anterior wings* with one elongate marginal cell, rounded at its apex, and three submarginal cells; the second submarginal much narrowed towards the marginal, and receiving the first recurrent nervure a little beyond the middle; the third submarginal larger than the second, and receiving the second recurrent nervure in the middle; the third transverse cubital nervure much curved towards the apex of the wing. Abdomen conical, truncate at the base.

The genus *Melecta* contains, at present, a small number of species, not more than twenty being known, the majority being European; one species comes from Algeria, and four from Chili; none have yet been found in North America. In this country we have two species, both being handsome insects, and both parasites on species of the genus *Anthophora*, from the cells of which they have been

frequently bred. The *Melectæ* are frequently infested by the larvæ of *Meloë*; on one occasion *M. armata* was found close to burrows of *Anthophora*, so covered with these larvæ that the bee was completely coated over with them and unable to take flight. It is quite probable that the larvæ of the beetle are as often carried into the burrows by the parasite as by the working bee.

### 1. *Melecta luctuosa*.

*M. aterrima*, albido villosa, abdominis segmentis utrinque puncto subquadrato niveo ornatis.

*Melecta luctuosa*, *Smith, Bees Great Brit.* 155 ♂ ♀.

*Schenck, Nass. Bien.* 172.

*Thoms. Hym. Scand.* ii. 208.

*Apis luctuosa*, *Scop. Ann. Hist. Nat.* iv. 9.

*Schrank, Ins. Austr.* 404.

*Rossi, Faun. Etrus.* ii. 105.

*Apis truncata*, *Fabr. Ent. Syst.* ii. 337.

*Panz. Faun. Germ.* 35. 23 ♀.

*Melecta punctata*, *Latr. Hist. Nat. Ins.* xiv. 48.

*Spin. Ins. Ligur.* i. 153.

*Brullé, Expéd. Sc. de Morée*, 342.

*Blanch. Hist. Nat. Ins.* 411.

*St.-Farg. Hym.* ii. 441.

*Symmorpha punctata*, *Klug, Illig. Mag.* vi. 227.

*Melecta atropos*, *Newm. Ent. Mag.* ii. 514 ♂.

*Melecta lachesis*, *Newm. lib. cit.* 514 ♀.

*Female.* Length 5–6 lines.—Jet-black, shining; the pubescence snow-white, and the margin of the vertex fringed with white. Thorax clothed before the insertion of the wings with white pubescence, behind with black; a spot beneath the wings and another behind their insertion of white pubescence; a white pubescent spot at the base of all the tibiæ above and another on the apical joint of the posterior tarsi; the wings fusco-hyaline, their nervures black. Abdomen—a tuft of white pubescence on each side of the basal segment above, and a quadrate spot on each side of the three following. B.M.

*Male.*—This sex only differs in having a white fringe on the anterior and intermediate femora, and two additional white spots on the fifth abdominal segment. B.M.

This bee is parasitic on *Anthophora retusa*; it is not usually found so early in the season as the *Melecta armata*. I have never found it with *A. acervorum*. It is not uncommon on Hampstead Heath in May, but is a local insect. Dr. Nylander has examined the Fabrician type in the Museum at Stockholm, and informs us that it is identical with this species.

2. *Melecta armata*.

*M. atra*, cinereo villosa, abdominis segmentis utrinque puncto ovato albo ornatis.

*Melecta armata*, *St.-Farg. Hym.* ii. 444 ♂ ♀.

*Smith, Bees Great Brit.* 156.

*Andrena armata*, *Panz. Faun. Germ.* 70. 22 ♀.

*Apis punctata*, *Kirby, Mon. Apum Angl.* ii. 219 ♂ ♀.

*Melecta punctata*, *Curtis, Brit. Ent.* 125, tab. 125 ♂.

*Smith, Zool.* iii. 1148.

*Schenck, Nass. Bien.* 172.

*Melecta alecto*, *Newm. Ent. Mag.* ii. 513 ♂.

*Melecta clotho*, *tisiphone et magæra*, *lib. cit.* 513 ♀.

*Female.* Length 6–7 lines.—Black; the face and vertex clothed with long cinereous pubescence, that on the clypeus brightest; the labrum and cheeks have a black pubescence. Thorax: the disk has the pubescence cinereous, that on the scutellum is black, and on each side is a tuft of white; the wings subhyaline, their margins fuscous; the intermediate and posterior tibiæ have a white patch at their base. Abdomen smooth and shining, a tuft of white pubescence on each side at the base; the second segment has a similar tuft, and sometimes a round spot within; the third and fourth have on each side a minute round spot of white pubescence.

B.M.

Var.  $\beta$ . Black; the pubescence black, intermixed on the face, thorax anteriorly, and on the metathorax laterally with cinereous; an obscure cinereous spot at the base of the intermediate and posterior tibiæ; the abdomen obscurely cinereous at the base, the third and fourth segments have on each side a minute white spot. (*magæra*, *Newm.*)

Var.  $\gamma$ . The pubescence black, except a few cinereous hairs on each side of the metathorax and abdomen at its base; a minute cinereous spot sometimes on each side of the third segment. (*tisiphone*, *Newm.*)

*Male.* Length 6–7 lines.—Black; the face has the pubescence cinereous; that on the thorax is of the same colour; the scutellum bidentate and covered with black pubescence, the intermediate tibiæ above and the posterior pair at their base have a short white pubescence. Abdomen—the base thinly clothed with cinereous pubescence, and having on each side a tuft of nearly white pubescence, a similar tuft on the second, and two minute white spots on each of the following segments placed laterally; and sometimes the fifth segment is also spotted.

B.M.

The female of this species is subject to great variation in the colour of its pubescence, and Newman gave specific names to some of these varieties. The sexes are not subject to great difference in size; but occasionally, as in almost all species of parasitic Apidæ, very small starved examples are taken; one of such only measuring four lines

is in my possession. The species is parasitic upon *Anthophora acervorum*; *Chrysis ignita* has also been reared from the cells of that bee. I have never taken either of the species of *Melecta* on a flower.

### B. With two submarginal cells.

#### Genus 5. STELIS.

*Apis* (pt.), *Kirby, Mon. Apum Angl.* i. 154 (1802).

*Megilla* (pt.), *Fabr. Syst. Piez.* 328 (1804).

*Megachile* (pt.), *Latr. Hist. Nat.* xiv. 51 (1805).

*Stelis*, *Panz. Krit. Revis.* ii. (1806).

*Gyrodroma*, *Klug, Illig. Mag.* vi. (1807).

Head transverse, the *ocelli* in a triangle on the vertex; *antennæ* filiform and geniculated; the *labial palpi* 4-jointed, the two basal joints elongate, the first about two thirds of the length of the second, which tapers to an acute point near the apex; the third and fourth minute joints are articulated; the *maxillary palpi* 2-jointed, the joints minute. Thorax subglobose; the *scutellum* slightly produced; the *anterior wings* with one marginal and two submarginal cells, the marginal cell as long as the two submarginals united, its apex rounded; the submarginal cells of nearly equal length, the second receiving the first recurrent nervure a little within; the second recurrent nervure nearly uniting with the second transverso-cubital nervure, or passing very little beyond. Abdomen oblong, truncate at the base.

The number of species at present known is twelve; six are found in Europe, one in Siberia, two in India, one in North China, and two in the United States; others will doubtless be found in the latter country. The British species are widely distributed, extending northwards to Denmark, Sweden, and Finland; they are parasitic on different species of bees belonging to the genus *Osmia*.

#### 1. *Stelis aterrima*.

*S. nigra*, punctulatissima, scutello bidentato, abdominis segmentis marginibus decoloratis.

*Stelis aterrima*, *Latr. Gen. Crust. et Ins.* iv. 163.

*St.-Farg. Hym.* ii. 527 ♀.

*Smith, Zool.* iii. 1154. ♂ ♀; *Bees Great Brit.* 151 ♂ ♀.

*Nylund. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 275.

*Schenck, Nass. Bien.* 350.

*Thoms. Hym. Scand.* ii. 265.

*Apis aterrima*, *Panz. Faun. Germ.* 56. 15.

*Megilla aterrima*, *Fabr. Syst. Piez.* 331.

*Apis punctulatissima*, *Kirby, Mon. Apum Angl.* ii. 231, tab. 16. fig. 9 ♀.

*Megachile punctulatissima*, *Latr. Hist. Nat.* xiv. 54.

*Trachusa aterrima*, *Jurine, Hym.* 253.

*Female.* Length 4 lines.—Black; the head and thorax strongly and closely punctured; the sides of the face with cinereous pubescence. Thorax wider than the head, and with a little cinereous pubescence on each side of the metathorax; the scutellum rounded behind, and armed laterally with a short stout tooth; wings fusco-hyaline, with a darker stain in the marginal cell, palest at their base. Abdomen shining, incurved, and more finely punctured than the thorax; the margins of the segments testaceous, the apical segment subangulate. B.M.

*Male.*—Usually rather smaller than the female, but closely resembling it; the apical margin of the terminal segment rounded. B.M.

This is a very local insect; it is parasitic on *Osmia fulviventris*, and probably also on *O. aurulenta*; it is found occasionally in the flowers of the mallow (*Malvæ sylvestris*). I have taken it at Kingsdown, near Deal; at Weybridge; Birchwood, Kent; Blackwater, Hants; Ilfracombe, North Devon, and at Sidmouth, South Devon. It has also been taken near Clifton, Bristol, at Norwich, and by Mr. Kirby at Barham.

## 2. *Stelis phæoptera.*

*S. atra*, punctulatissima, albido subpubescens, alis fusco-hyalinis, ano rectangulo.

*Stelis phæoptera*, Latr. *Gen. Crust. et Ins.* iv. 164.

*St.-Farg. Hym.* ii. 527.

*Smith, Zool.* iii. 1154; *Bees Great Brit.* 152 ♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 274 ♀.

*Schenck, Nass. Bien.* 350.

*Thoms. Hym. Scand.* ii. 267.

*Apis phæoptera*, Kirby, *Mon. Apum Angl.* ii. 232 ♀.

*Megachile phæoptera*, Latr. *Hist. Nat. Ins.* xiv. 54.

*Spin. Ins. Ligur.* i. 136.

*Female.* Length 4 lines.—Black, closely and strongly punctured; the face, cheeks, thorax on the sides and beneath having a thin hoary pubescence; the posterior margin of the thorax rounded, the scutellum coarsely punctured, unarmed; wings fusco-hyaline, the apical margins clouded, a darker cloud occupying the marginal cell. Abdomen shining, the apex incurved and pointed, the apical segment rectangular. B.M.

*Male.*—Exactly resembling the female, the margin of the apical segment of the abdomen rounded and entire. B.M.

This species is very local, and parasitic on *Osmia fulviventris* it, like the previous insect, is found occasionally in the flowers of the mallow. It appears in June, and may be taken during July and August, but is much rarer than *S. aterrima*. It was formerly taken about Battersea, Hammersmith, and Fulham, but has not been met with for some years past; Mr. Parfitt has taken it near Exeter; and Mr. Kirby found it at Barham.

3. *Stelis octomaculata*.

*S. atra*, punctulatissima, abdominis segmentis maculis lateralibus flavis.

*Stelis octomaculata*, *Smith, Zool. iii.* 1155 ♂ ♀; *Bees Great Brit.* 153.  
*Schenck, Nass. Bien.* 351.  
*Thoms. Hym. Scand.* 268.

*Stelis ornata*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. ii.* 106.

*Female.* Length 3 lines.—Black; head and thorax closely and strongly punctured, the face has a thin silvery-white pubescence, the hinder margin of the vertex subemarginate. Thorax shining; the wings fusco-hyaline, their apical margins clouded; the scutellum slightly produced, subangular, pointed in the middle. The abdomen shining, closely punctured, but not so strongly as the head and thorax; the basal segment has on each side an ovate yellow macula, and the three following an elongate-ovate stripe, pointed within; the apex rotundate.

*Male.* Length 3 lines.—Closely resembling the female, but differing in having an ovate macula on the two basal segments of the abdomen, the third has a narrow streak on each side, the fourth two spots on each side, and the fifth a single spot.

This species was bred by Dr. Thwaites from the nest of *Osmia leucomelana*; subsequently I took two specimens at Hawley, near Blackwater, Hants, where the same species of *Osmia* is found; I also took a single specimen at Sidmouth, in August 1872. It is very like *S. minuta* of St.-Fargeau, from which it differs principally in the form of the scutellum, the posterior margin being subangular and somewhat produced over the metathorax; in *S. minuta* it is rounded. Dr. Sichel sent specimens of *S. minuta* for comparison; the differences are slight, but appear to be specific. The species is very rare, not more than half a dozen specimens having been taken in this country.

## Genus 6. CÆLIOXYS.

*Apis* (pt.), *Linn. Syst. Nat.* i. 953 (1766).

*Anthophora* (pt.), *Fabr. Syst. Piez.* 372 (1804).

*Megachile*, *Latr. Hist. Nat. Ins.* 53, sec. 3 (1805).

*Cœlioxys*, *Latr. Gen. Crust. et Ins.* iv. 166 (1809).

Head transverse, as wide as the thorax; *ocelli* in a triangle on the vertex; the *eyes* elongate-ovate, pubescent; *antennæ* filiform; the *labial palpi* 4-jointed, the two basal joints elongate, the second a little longer than the first, the third and fourth minute and articulated near the apex of the second joint. *Maxillary palpi* short, 3-jointed, the basal joint shortest, the second thicker and the apical one ovate. The *labrum* elongate, the sides parallel, its base produced at the lateral angles. Thorax subglobose, the *scutellum* armed laterally at its base with a curved acute tooth; the *anterior wings* with one elongate marginal cell rounded at its apex, two submarginal

cells, the second receiving both the recurrent nervures, the first near its base, the second near its apex. Abdomen conical, its base truncate and its apex acute; in the males the apex is obtuse and toothed. The claws simple in the females, and bifid at their apex in the males, which have the anterior coxæ toothed.

This genus is one of considerable extent; about sixty species are known, only six of them being found in Great Britain; some species are widely spread throughout Northern Europe, being found in Russia, Sweden, and Siberia. Twelve species are known from Africa, having been found in Guinea, on the Gambia, in Angola, and at the Cape of Good Hope; about twenty are Asiatic; and thirteen are known from S. America, and rather more than that number from N. America. It is singular that this genus has not been discovered in Australia, since the genus *Megachile*, upon which it is principally parasitic, is common in that country; some of the species are parasitic on species of *Saropoda*. These bees by no means confine their attacks to the nests of one species of *Megachile*: *C. vectis* is frequently parasitic on *M. maritima*, but it also attacks *M. willughbiella*; *C. simplex* is at one time parasitic on *M. circumcincta*, and at another on *M. argentata*. Great difficulty attends the discrimination of the males of the different species, whilst the differences in the form of the apical ventral plates of the abdomen of the females renders their identification comparatively easy. Much confusion has arisen in the synonyma of this genus, in consequence of different authors having been unable to distinguish the typical species described by Linnæus, each sex being accounted as distinct by that author. The types of Linnæus being preserved in his cabinet in the collection of the Linnean Society, I hope by a careful examination of them to remove the difficulty. Foerster has thrown the genus into a chaos of confusion by his system of making species upon the slightest differences. In all species of bees, but more particularly such as are parasitic on more than one species, great discrepancy in size and also in the development of parts must be always taken into consideration. The most variable species of the genus found in this country is *C. simplex*, which I have found to vary in length from  $3\frac{3}{4}$  lines to  $6\frac{1}{2}$  lines; the smaller examples have the lower valve of the anal segment of the abdomen very narrow and acute at the apex, but a gradual approach to this is to be traced in a good series of examples. *C. vectis* appears to be the most uniform in size and structure.

All the British species of this genus emit, when captured, a very offensive odour. Probably they can do this voluntarily; if so, it may preserve them from the attacks of birds, or from molestation when in the act of oviposition in the nests of the industrious bees upon which they are parasitic.

### 1. *Cælioxys quadridentata*.

*C. atra*; scutello utrinque dentato, margine postico obtuse subangulato; abdomine conico, segmentis margine albidis; ano maris dentato, calcaribus posticis nigris.

- Cœlixys quadridentata*, *Smith, Zool. iii. 1151; Entom. iv. 2 & 5; Bees Great Brit. 146.*  
*Apis quadridentata*, *Linn. Syst. Nat. i. 958 ♂.*  
*Apis conica*, *Linn. lib. cit. 958 ♀.*  
*Anthophora quadridentata et conica*, *Fabr. Syst. Piez. 379, 380.*  
*Cœlixys conica*, *Latr. Gen. Crust. et Ins. iv. 167?*  
*Schenck, Nass. Bien. 364.*  
*Gerst. Stett. ent. Zeit. (1869) 170 ♂ ♀.*  
*Thoms. Opusc. Ent. 42; Hym. Scand. ii. 272.*  
*Cœlixys acuta*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. i. 250 ♀.*  
*Foerst. Verh. Pr. Rheinl. x. 274 ♀.*  
*Cœlixys fissidens*, *Foerst. lib. cit. 293 ♂.*  
*Cœlixys fraterna*, *Foerst. lib. cit. 294 ♂.*

*Female.* Length 5–5½ lines.—Black; the head and thorax closely and strongly punctured, the face densely covered with yellowish-white pubescence, that on the anterior margin of the clypeus fulvous. Thorax—the sides and beneath with white pubescence; wings subhyaline, their apical margins clouded; the calcaria at the apex of the intermediate and posterior tibiæ black, those on the anterior tibiæ rufo-testaceous; the posterior margin of the scutellum slightly but obtusely angulated; the lateral teeth short, subacute and slightly curved. Abdomen shining, punctured, the punctures strongest and closest at the base and at the sides; the apical segment very finely punctured and with a longitudinal central carina; the apical ventral plate produced beyond the superior one, rather broadly lanceolate. (*Vide Pl. IX. figs. 2 o, 2 p.*)

*Male.* Length 4½ lines.—Black; the head and thorax punctured as in the other sex, the abdomen rather more strongly and evenly so; the face with a dense white pubescence, which becomes slightly yellowish towards the vertex. Thorax as in the other sex, with the calcaria as in the female; the apical segment produced at the apex into two stout bifurcate processes; the teeth acute, the lower teeth projecting beyond the upper ones, also a stout blunt tooth at the basal lateral margins of the segment; all the segments with a fascia of white pubescence on the dorsal and ventral plates. B.M.

This is a very local species. *C. elongata* is frequently mistaken for it; but the different-coloured calcaria, which are pale in *C. simplex*, will at once separate them, as well as the anal valves, which in *C. quadridentata* are quite different in form from the long acute ones of *C. simplex*. The insect described is certainly the Linnean species; both sexes have been carefully compared with his types in the Museum of the Linnean Society, the figures of the ventral plates given in this work being drawn from them.

## 2. *Cœlixys elongata.*

*C. atra*; scutello utrinque dente incurvo armato, margine postico subangulato; abdominis segmento apicali elongato, producto, semilanceolato.



*Cœlixys elongata*, *St.-Farg. Hym.* ii. 522 ♀.

*Gerst. Stett. ent. Zeit.* (1869) 170 ♂ ♀.

*Apis conica*, *Kirby, Mon. Ap. Angl.* ii. 225 ♂ ♀, var. β ♂, var. γ ♂.

*Cœlixys conica*, *Curtis, Brit. Ent.* 349, pl. 349. fig. 6 ♀, fig. 7 ♂.

*Apis inermis*, *Kirby, lib. cit.* ii. 229 ♂.

*Cœlixys simplex*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 279 ♀.

*Smith, Bees Great Brit.* 174; *Entom.* iv. 5 ♂ ♀.

*Schenck, Nass. Bien.* 369.

*Thoms. Opusc. Ent.* 42; *Hym. Scand.* ii. 276.

*Cœlixys microdonta*, *Foerst. Verhandl. Preuss. Rheinh.* x. 291 ♂.

*Cœlixys divergens*, *Foerst. lib. cit.* 292 ♂ ?

*Cœlixys 3-cuspidata*, *Foerst. lib. cit.* 302 ♀ ?

*Cœlixys mandibularis*, *Nyland. lib. cit.* i. 253 ♀ var. ?

*Female.* Length  $3\frac{3}{4}$ – $6\frac{1}{2}$  lines.—Black; the head and thorax strongly and closely punctured; the face densely covered with pale fulvous pubescence, which becomes almost white in long-disclosed specimens; the pubescence on the sides of the thorax beneath and on the metathorax paler than that on the face, white in old examples; wings fusco-hyaline, clouded at their apical margins; the spines at the apex of the tibiæ pale testaceous. Abdomen shining, strongly punctured at the base, the punctures becoming gradually finer to the apical margin of the fifth segment; the sixth subopaque, carinated down the centre, and finely and closely punctured and tapering to its apex; the ventral plate much longer than the upper one, narrow, elongate, and lanceolate. (See Pl. IX. figs. 2 t, 2 u, 2, n.) B.M.

*Male.* Length 3– $4\frac{1}{2}$  lines.—Black; the head and thorax closely and strongly punctured, the former wider than the latter; the face with a dense pale fulvous pubescence, becoming silvery white at the anterior margin of the clypeus. Thorax—the posterior margin of the scutellum subangular, varying in different individuals to a more or less rounded form; on each side of the scutellum a short curved spine; the spines at the apex of all the tibiæ rufo-testaceous. Abdomen—the lateral angles of the apical margin of the fifth segment produced into a more or less short acute tooth; the sixth segment armed laterally at the base with an acute tooth; the apex of the segment with two produced stout bifurcate appendages, the upper tooth of each being short and stout, the inferior tooth twice as long, more slender, and acute; the appendages, when viewed perpendicularly, have the short upper teeth diverging laterally beyond the lower ones. B.M.

I concur with Dr. Gerstaecker in considering this species to be the *C. elongata* of St.-Fargeau. Why he altogether passes unnoticed the Kirbyan synonyma it is difficult to imagine, since that author has given ample and correct figures of all parts of the species, and, in addition, I have shown that, having examined the typical specimens, Kirby's *A. conica* is decidedly this species, and also that his *A. inermis* is only a mutilated specimen of the male, the metathorax being split transversely and pushed upwards, thereby con-

cealing the teeth that arm the scutellum. In his description of the female will be found, "Tibiæ spinulis atris." This is a mistake, the spines of the typical specimen being rufo-testaceous, which he states to be characteristic of his var. *β. minor*. Dr. Gerstaecker has questioned whether this is Nylander's species; but I have no doubt, as I possess that species from the author.

*C. mandibularis*, I believe, is only founded upon specimens that have the mandibles partly opened, a circumstance that has been overlooked, and the geniculated appearance of the mandibles has been mistaken for a specific characteristic. (See Pl. IX. fig. 2 *h*.)

This is the commonest species of the genus, and has been bred from nests of *Megachile ligniseca*, *M. willughbiella*, and *M. circumcincta*. Some small specimens were taken on the sandhills near Deal, where *M. argentata* abounds; it is probable that it is also parasitic on that species.

### 3. *Cœlixys umbrina*.

*C. atra*, capite thoraceque punctulatissimis; scutello utrinque dente incurvo armato, margine postico rotundato.

*Cœlixys umbrina*, *Smith, Zool. iii. 1153*; *Bees Great Brit. 148*.  
*Apis quadridentata*, *Panz. Faun. Germ. 55. 13 ♂ (nec Linn.)*.

*Female*. Length 4–5 lines.—Black; the head and thorax very strongly and closely punctured; the pubescence on the face dense and pale fulvous, it is also of the same colour on the thorax but rather paler; the posterior margin of the scutellum rounded and with a short curved tooth at its base laterally; wings fusco-hyaline, with a fuscous cloud at their apical margins. Abdomen shining, punctured, most strongly so at the base; the valves of the apical segment of nearly equal length, the ventral plate a little longer than the upper one, its apex angulate. B.M.

*Male*. Length 3–4 lines.—Very like the male of *C. elongata*; but the fifth segment is not produced laterally at its apical margin into a spine; the sixth segment has a short spine on each side, and is produced between these into two bifurcate processes, the teeth at their apex being short, straight, and subacute, the lower teeth projecting beyond the upper ones; the latter not divergent outwardly as in *C. elongata*. (See Pl. IX. figs. 2 *t*, 2 *u*, 2 *n*.) B.M.

A pair of this local species were taken in Hampshire some years ago; they were recently disclosed, and their pubescence of a rich umber colour, which soon fades to the colouring described. The insect is parasitic on *Saropoda bimaculata*; it has been subsequently found in abundance entering its burrows and on the flowers of the bramble in Sandown Bay, Isle of Wight, in the month of July. The apical segment of the female is like that of *C. rufescens*; but the apex of the ventral plate is sharply oblique on each side, forming an angular

point; the species is also uniformly considerably smaller and the abdomen much less convex.

#### 4. *Cælioxys rufescens*.

*C. atra*, ochraceo villosa; scutello utrinque dente incurvo armato, margine postico obtuso angulato; abdomine convexo.

*Cælioxys rufescens*, *St.-Farg. Encycl. Méth.* x. 109; *Hym.* ii. 519 ♂ ♀.

*Smith, Zool.* iii. 1152; *Bees Great Brit.* 149.

*Gerst. Stett. ent. Zeits.* (1869) 169.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 279.

*Schenck, Nass. Bien.* 366.

*Thoms. Hym. Scand.* ii. 276.

*Cælioxys apiculata*, *Nyland. lib. cit.* i. 282, pl. iii. fig. 11 b.

*Cælioxys hebescens*, *Nyland. lib. cit.* i. 251, pl. iii. fig. a, var., and vol. ii. 279.

*Cælioxys diglypha*, *Foerst. Verhandl. Preuss. Rheinl.* x. 295 ♂.

*Cælioxys trinacria*, *Foerst. lib. cit.* x. 300 ♀.

*Female.* Length  $5\frac{3}{4}$ – $6\frac{1}{4}$  lines.—Black; the head and thorax coarsely punctured; the face densely covered with short yellow pubescence; that on the thorax is of a paler colour; the posterior margin of the scutellum subangular, and armed on each side with a curved spine or tooth; the wings fusco-hyaline, and having their apical margins clouded. Abdomen shining, conical, convex above and beneath, strongly punctured; a large angular patch on each side of the basal segment, the second and three following segments with an entire fascia, attenuated in the middle and continued beneath, of ochreous pubescence; the superior plate of the apical segment lanceolate, the lower plate angular at the apex, not longer than the upper plate. (See Pl. IX. figs. 2 b, 2 c, 2 d.) B.M.

*Var. β.* The apex of the inferior plate angulated and notched at the side, forming an acute appendage at the apex.

*Var. γ.* The inferior plate obtuse and rounded at the apex.

*Male.* Length  $4\frac{1}{2}$ –5 lines.—This sex agrees with the female in the pubescence and sculpture of the head and thorax; the face has the pubescence perhaps a little longer, more dense, and of a brighter yellow. The abdomen is similarly convex and similarly banded; the apical segment is produced into two bifurcate processes, the upper tooth slightly erected and obtuse, the lower tooth longer and acute; on each side of the base of the segment is a straight acute spine. B.M.

This is a common species, but it was found in numbers, in company with *Osmia xanthomelana*, in the Isle of Wight; it has been taken both in North and South Devon, in Kent, Surrey and Hants, in Yorkshire and at Loch Rannoch, Scotland.

5. *Cœlixys vectis*.

*C. atra*, capite thoraceque pallide villosis; scutello utrinque dentato, margine postico rotundato; abdominis segmentis utrinque macula tomentosa alba ornatis.

*Cœlixys vectis*, *Curtis, Brit. Ent.* viii. 349, pl. 349 ♂ ♀.

*Smith, Zool.* iii. 1152; *Bees Great Brit.* 150.

*Thoms. Hym. Scand.* ii. 275.

*Cœlixys temporalis*, *Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fem.* i. 253.

*Cœlixys conoidea*, *Gerst. Stett. ent. Zeits.* (1869) 169.

*Foerst. Verhandl. Preuss. Rheinh.* x. 273.

*Cœlixys punctata*, *St.-Farg. Hym.* ii. 520.

*Female.* Length 6–6½ lines.—Jet-black; the head and thorax closely and strongly punctured; the sides of the face densely clothed with white pubescence that has usually more or less of a yellow tint; the pubescence on the clypeus of the same colour, but very short and downy; on its anterior margin it is fulvous. Thorax—the pubescence white; the posterior margin of the scutellum rounded and armed laterally with a slightly incurved spine. Abdomen shining, the basal segment with a quadrate patch of snow-white pubescence laterally which extends to the base of the second segment; at the basal margins of the third, fourth, fifth, and sixth segments laterally an elongate angular patch of snow-white pubescence; the apical segment lanceolate, shorter than the ventral plate, which is also lanceolate and more acute at the apex than the upper plate. (See Pl. IX. figs. 2*i*, 2*k*, 3*l*.)

B.M.

*Male.*—Very closely resembling the female, the abdomen being similarly spotted with snow-white pubescence; the lateral angles of the apical margin of the fifth segment produced into a short acute tooth; the sixth segment has a longer tooth at its basal lateral margin; the apex with two bifurcate processes, the upper teeth shorter and less acute than the lower ones; beneath, the fourth segment has a notch in the middle of its apical margin; the basal segment with a spot of white pubescence in the middle, the following having a subinterrupted fascia.

B.M.

This species is referred by Dr. Gerstaecker to the *Anthophora conoidea* of Illiger, who in describing the species very briefly from a male insect, gives it as var. *γ. minor* of Kirby's *Apis conica*; this variety, on examining Kirby's type, is found to be a male of *C. elongata*. It may possibly be the *C. conoidea* of Klug, described in Germar's 'Reise nach Dalmatien;' but its identification with Illiger's imperfectly described species is impossible. Curtis's name is therefore retained, his beautiful figure at once distinguishing it from all other species of the genus. This insect is the largest species of the genus found in Great Britain; it is local, but has been taken plentifully in Sandown Bay, Isle of Wight, on flowers of the bramble; it is parasitic on *Megachile maritima*. Other localities known are Shirley Common, Wimbledon Common, Lowestoft, and Morthoe, North Devon.

## Subfam. III. DASYGASTRÆ.

## Genus 7. OSMIA.

- Apis* (pt.), *Linn. Syst. Nat.* i. 953 (1766).  
*Andrena* (pt.), *Fabr. Ent. Syst.* ii. 307 (1793).  
*Anthophora* (pt.), *Fabr. Syst. Piez.* 372 (1804).  
*Osmia*, *Panz. Krit. Revis. Ins.* ii. 230 (1806).  
*Amblys*, *Klug, Illig. Mag.* vi. 226 (1807).  
*Hoplitis*, *Klug, Illig. Mag.* vi. 225 (1807).  
*Trachusa* (pt.), *Jurine, Hym.* 247 (1808).  
*Diphisis*, *St.-Farg. Hym.* ii. 307 (1841).

Head scarcely as wide as the thorax, subglobose; *ocelli* placed in a curve forward on the vertex; *antennæ* filiform, the scape stout, slightly thickened at the apex; the *labrum* oblong; the *mandibles* stout and dentate; *tongue* elongate, nearly thrice the length of the labium, acute at the apex; *paraglossæ* very short; *labial palpi* 4-jointed, the first two joints elongate, the second longest and tapering to a point, the third and fourth minute and articulated to the second joint near its apex; *maxillary palpi* 4-jointed, the basal joint thickest at its base, the second joint longest and, as well as the third joint, subclavate, the apical joint minute. Thorax subglobose; *anterior wings* with two submarginal cells, the second receiving the two recurrent nervures, the first at about one third of its length, the second at or near its termination. Abdomen convex and densely pilose beneath in the female; the male with the apical segments emarginate, toothed or serrated, rarely entire.

If I were asked which genus of bees would afford the most abundant and interesting materials for an essay on the diversity of instinct, I should without hesitation point out the genus *Osmia*. Mr. Kirby, in the 'Monographia Apum Angliæ,' has quoted the history of Réaumur's mason-bee, which, although closely allied to the bees included in this genus, differs generically; but its history is parallel to that of some of the European *Osmiæ*. It is merely alluded to here in order to direct attention to the highly interesting history given by Réaumur of its economy. Species of the genus *Osmia* are apparently confined in their geographical range to temperate climates. About sixty species are known, forty being found in Europe, eight or ten in North Africa, the rest inhabiting the United States, Nova Scotia, and Hudson's Bay.

The most abundant species found in this country is *Osmia rufa*; its economy is varied by circumstances. In hilly country or at the seaside it frequently forms its burrows in the sunny side of cliffs or in sandy banks; whilst in cultivated districts, particularly if the soil be clayey, it selects a decaying tree, usually preferring the stump of an old willow; at another time it burrows in the mortar of old walls. It occasionally avails itself of holes adapted to its requirements, such as the lock of some outhouse-door or a cavity in

flint stones used in the rock-work of a garden ; for in both situations I have found them. Its nest was once discovered in the tube of a pipe that had been left on a shelf in a garden-arbour. This remarkable example of insect-economy is preserved in the collection of insect-architecture at the British Museum. The bee had constructed fourteen cells, a fifteenth being left unfinished ; the insect had entered the pipe at the lower end and commenced the first cell a quarter of an inch below the mouth-hole. In France this species has been bred from snail-shells by M. Bellevoye ; in the shells of *Helix nemoralis* and also of *H. hortensis* the cocoons were placed in succession singly ; but in the shells of *H. pomatia* they were found in succession placed side by side, from two up to six, according to the width of the whorl. The *Osmia* lay up in each cell that they construct a store of food consisting of a mixture of pollen and honey, upon which the larva feeds. When it is full-grown the larva spins a tough darkish brown cocoon, in which it remains a few weeks, before it changes to the pupa state ; the majority soon arrive at their perfect condition ; many, however, pass the winter in the larva state. In attempting to account for so remarkable a circumstance all must be conjecture ; but it is not of unfrequent occurrence. *Osmia leucomelana*, according to present observation, always excavates its burrows in the pith of dead branches of the common bramble : with little labour the parent bee removes the pith, usually to the length of from five to six inches ; at the end she deposits the requisite quantity of food, which she closes in with a substance resembling masticated leaves, evidently vegetable matter : five or six of these cells are usually constructed in one bramble stick. The bee does not remove the whole of the pith, but alternately widens and contracts the diameter of the burrow, each contraction marking the end of a cell. The bee deposits an egg on the food immediately before closing up the cell ; it is oblong, white, and about the size and shape of a caraway-seed. The larva is hatched usually in about eight days ; it feeds about ten or twelve, when it becomes full-grown ; it then encloses itself by spinning a thin silken covering, in which it remains in an inactive state until the following spring, when it undergoes its transformations, and usually appears in the perfect condition in the month of June.

*Osmia fulviventris* burrows in posts, rails, or decaying trees, seldom in any other situation : the same habit will be observed in *O. aenea* ; but it is not constant, for I have observed this bee more than once constructing its burrow in the mortar of walls and also in hard sandbanks. *O. aurulenta* and *O. bicolor* are bees that commonly burrow in banks, both being very abundant in some localities, forming colonies ; but although it is undoubtedly the natural habit of these species to construct tunnels in hard banks with great labour and untiring perseverance, still we find them at times exhibiting an amount of sagacity and a degree of knowledge that at once dispels the idea of their actions being the result of a mere blind instinct, impelling them in one undeviating course. A moment's consideration will suffice to call to mind many tunnels

and tubes ready formed which would appear to be admirably adapted to the purposes of the bee; for instance, the straws of a thatch and many reeds; and what could be more admirably adapted to their requirements than the tubes of many shells? So thinks the bee! *O. rufa*, *O. aurulenta*, and *O. bicolor* all select the shells of *Helix hortensis*, *H. nemoralis*, or of *H. pomatia*. The shells of these snails often lie hidden beneath grass, mosses, and plants; the bees finding them in such situations, dispense with their accustomed labour and take possession of the deserted shells. The number of cells varies according to the length and diameter of the whorl of the shell selected, the usual number being four; but in some instances they construct five or six; and when the bee takes possession of the shell of *H. pomatia*, as I have already mentioned, the number is considerably increased. When the bee has completed and provisioned the cells, the whole is carefully protected by closing up the entrance or mouth of the shell with small pellets of clay, sticks, and pebbles; these are firmly cemented together with some glutinous matter, and the bee has finished her task.

We will now observe the intelligence of the bee under different circumstances: she has selected the adult shell of *Helix aspera*; the whorl of this species is greater in diameter than that of *H. nemoralis* or of *H. hortensis*—too wide, in fact, for a single cell. Our little architect, never at a loss, readily adapts it to her purpose by forming two cells side by side; and as she advances towards the entrance of the whorl it becomes too wide even for this contrivance. Here let us admire the ingenuity of the little creature; she constructs a couple of cells transversely! And this is the little animal which has been so blindly slandered as being a mere machine.

I will take this opportunity of correcting a very widely diffused error, which appears to have originated with Réaumur; or, if his account of the development of *Xylocopa* be correct, it differs from that of every wood-boring bee in this country. He says, "When the larva assumes the pupa it is placed in its cell with its head downwards,—a very wise precaution; for thus it is prevented, when it has attained to its perfect state and is eager to emerge into day, from making its way upwards and disturbing the tenants of the superincumbent cells, who being of later date, each than its neighbour below stairs, are not yet quite ready to go into public." Mr. Kirby also quotes from a letter by the Rev. George Ashby, who, after describing the nest of *Megachile centuncularis*, says, "The lowest and first born passes out through the bottom of its own (lowest) cell, and so escapes without disturbing the rest, who are not yet ready to emigrate." But all such conclusions originate, in my opinion, in conjecture. In the case of bees constructing their cells in the spiral tube of a snail's shell, where is the possibility of escape? And I have been informed that species of *Xylocopa*, in India, very commonly make use of bamboo-sticks used in making fences in which to construct their cells, and that no outlet can be found except at the entrance to the tube. Bees that form tunnels in sandbanks never have more than one outlet to their nests. When *Chelostoma flori-*

*somnis* avails itself of the tube of a straw or reed, how is the insect to pass the first knot, which would oppose its escape? True knowledge is to be found in the careful investigation of nature.

A bee is observed to alight on an upright post; she commences the formation of her tunnel, not by excavating downwards, as she would in that case be incommoded with the dust and rubbish which she removes; no, she works upwards, and so avoids such inconvenience. When she has proceeded to the length required she proceeds in a horizontal direction to the outside of the post; and now her operations are continued downwards; she constructs a cell near the bottom of the tube, a second and a third, and so on to the required number. The larvæ when full-fed have their heads turned upwards; the bees which arrive at their perfect condition are the males; and it is these that are first anxious to escape; they usually do so several days before the females. This is the history of every wood-boring bee that I have bred; and I have reared broods of nearly every species indigenous to this country.

There is another species of this genus, whose habits are so different from the rest that our admiration of the ingenuity of these bees is greatly increased when we consider its curious details and reflect upon the degree of care and foresight exhibited by the provident parent; this is the *Osmia parietina*, a bee only as yet found in the northern parts of this country. This species selects the underside of a slate or stone lying on the ground and having a hollow space beneath; to the underside of such stone the bee attaches little masses of pollen and honey; on each she deposits an egg, from which a larva is hatched in a few days, which feeds upon the provision stored for it by its provident parent. A stone of this kind was found in 1849 at Glen Almond, Perthshire, on the Grampians, at an elevation of 800 feet above the level of the sea, by Mr. J. Robertson, who, on turning up the stone, observed a mass of cocoons of some insect. Although not possessing much knowledge of entomology, still he knew them to be the production of some insect; he presented the stone to the British Museum, and it was placed in my hands for observation. The size of the slab was 10 inches by 6, and the number of cocoons attached to it 230: when first discovered, about one third of them were empty; this was in the month of November. In the beginning of the following March (1850) a few males made their appearance, and shortly afterwards a few females were developed; they continued to come forth at intervals until the end of June; at this time there remained thirty-five undeveloped cocoons. On opening one or two in 1851 they proved to contain living larvæ. These cocoons were again carefully closed and the whole left undisturbed until the month of April of the following year (1852), when, on examination, they were found still to contain living larvæ. At the end of May these changed to pupæ, which about the end of June became perfect insects, when both sexes made their appearance. This, then, was the result: a portion of eggs deposited in 1849 had been three years arriving at maturity; or rather in all probability their development had been retarded;



when discovered in 1849 one third of the cocoons were found to be empty; in 1850 a few males and females appeared; in 1851 the same occurrence took place, and then the stone was presented to the British Museum and placed in my hand for observation; in April 1852 all the rest of the cocoons produced bees or parasites, the latter proving to be a species of ruby-tailed fly, *Chrysis bicolor*, a species new to the British list. In the first instance all the deposit was subjected to the same influences and had produced larvæ; the same may be said of them when taken by Mr. Robertson to Edinburgh, and yet only a few of each sex were developed. The following year produced the same result; and the third year the rest appeared. What was the cause of this retarded development it is difficult to conceive.

*Osmia xanthomelana* belongs to the division of mason-bees; its nest is usually constructed at the roots of grass, but occasionally in a hollow chamber about an inch underground. The cells are pitcher-shaped, and constructed of mud mixed with small pebbles; outside they are very rough, but the inner surface is perfectly smooth, the whole reminding one of the texture of a swallow's nest. The cells are each about 5 lines in length, rounded at the bottom, but flattened at the top and closed by a lid, which the bee constructs after having provisioned the cell; the cells are placed close side by side and are more or less joined together: a nest when completed usually contains five or six cells. This species appears in May or the beginning of June; its brood undergoes its transformations and attains the perfect condition by the end of August or the beginning of the following month; in this state it passes the winter months; but occasionally a few remain through the winter in the larval condition.

There are several parasites on the different species of *Osmia* besides the bee parasites of the genus *Stelis*: *Chrysis ignita* is a common destroyer of the larvæ of *O. rufa*, and *C. fulgia* has been bred from the cocoons of the same bee; but its most destructive parasite is a chalcididous insect, *Monodontomerus dentipes*; large numbers of this insect have been obtained from their nests. *Chrysis ignita* has been reared from the cocoons of *Osmia xanthomelana*; and it would no doubt attack the nest of any species of bee that it found adapted to its purpose; bee or wasp suits it equally well. I have obtained it in plenty from a nest of *Vespa rufa*, also from nests of *Odynerus antilope*; their larvæ appear to be almost omnivorous.

*Osmia papaveris* (the *Anthocopa* of St.-Fargeau) is not included in this genus, there not being any reliable evidence of its having been found in this country. Shuckard has included *O. papaveris* in his work 'British Bees,' on the authority of specimens placed in the collection of British Aculeata in the British Museum. There are three specimens of the female, and two males of *Osmia adunca* arranged with them as being those of *O. papaveris*: these are all without locality; but they have small tickets bearing numbers that exactly correspond with others attached to species never found in this country. There can be little doubt of the specimens of the

two species of *Osmia* named, as well as others of *O. cornuta* also placed in the collection, having been introduced by mistake subsequent to Dr. Leach's death, who left his boxes of continental and British Aculeata mixed, to be separated and arranged by others. The habit of cutting sections of the petals of flowers for the purpose of lining their nests is not confined to the *Osmia papaveris*, which, from using for that purpose the petals of the scarlet poppy, has in consequence acquired the popular name of the poppy-bee. *Megachile centuncularis* I have seen cutting the petals of scarlet geraniums, and also *Megachile argentata* lining her nest with the bright yellow petals of *Lotus corniculatus*.

Section I. *Body more or less metallic.* (Sp. 1-3.)

1. *Osmia rufa.*

*O. atra*, hirsuta; abdomine æneo, hirsute rufo tecto; fronte in femina bicorni, atra; fronte in mare simplici, hirsuto albida; ano integro.

*Osmia rufa*, *Smith, Bees Great Brit.* 162 ♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 269.

*Apis rufa*, *Linn. Syst. Nat.* i. 954 ♂.

*Fabr. Ent. Syst.* ii. 334.

*Rossi, Faun. Etrus.* ii. 103.

*Panz. Faun. Germ.* 56. 10.

*Apis bicornis*, *Linn. Syst. Nat.* i. 954 ♀.

*Fabr. Ent. Syst.* ii. 334.

*Christ. Hym.* 159, tab. 12. fig. 9.

*Rossi, Mantis.* 310.

*Kirby, Mon. Apum Angl.* ii. 271 ♂ ♀.

*Apicis bicornis*, *Harris, Expos.* 162, tab. 49. fig. 4 ♀.

*Apicis agino*, *Harris, Expos.* 162, tab. 49. 7 ♂.

*Apis cornigera*, *Rossi, Faun. Etrus.* ii. 108.

*Panz. Faun. Germ.* 55. 15.

*Megachile cornigera*, *Spin. Ins. Liguor.* i. 147.

*Anthophora bicornis*, *Fabr. Syst. Piez.* 375.

*Zett. Ins. Lapp.* 406.

*Osmia bicornis*, *Latr. Encycl. Méth.* viii. 576.

*St.-Farg. Hym.* ii. 314.

*Smith, Zool.* ii. 745.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 259.

*Schenck, Nass. Bien.* 338.

*Gerst. Stett. ent. Zeit.* (1869) 351.

*Thoms. Hym. Scand.* ii. 235.

*Amblys bicornis*, *Klug, Illig. Mag.* vi. 198.

*Osmia hederæ*, *Smith, Zool.* ii. 747, var. minor ♂.

*Female.* Length 4-6½ lines.—Head and thorax nigro-æneous; the face clothed with black pubescence, and armed on each side of the clypeus with a stout horn, which is oblique or sometimes notched at the apex, the horns bent inwards. Thorax—the disk clothed with black pubescence, intermixed with fulvous posteriorly; that on the sides beneath, on the metathorax, and femora of a yellowish

white; the pubescence on the tibiæ and tarsi fulvous, that on the tarsi beneath rufo-fulvous; the calcaria and claws rufo-testaceous; wings subhyaline, clouded towards their apex, the marginal cell having a fuscous stripe along its anterior margin; the nervures fusco-ferruginous. B.M.

Var.  $\beta$ . Length 4 lines.—The horns on the face angular.

*Male*. Length  $3\frac{1}{2}$ – $5\frac{1}{2}$  lines.—Strongly resembling the female; the face unarmed, clothed with long white hair; the antennæ slender and filiform, nearly as long as the thorax; the head and thorax are of a blue-green, the wings as in the female; the pubescence on the disk of the thorax long and of an ochraceous tint, the legs clothed as in the other sex. Abdomen densely clothed with long fulvous pubescence, suberect, and arranged in fasciæ; the margin of the apical segment entire. B.M.

One of the most abundant bees found in England, forming occasionally large colonies. *Osmia cornuta* is given in old lists of British bees as being an indigenous species; but no sufficient or reliable evidence of its being so exists. Specimens are placed in the British collection of bees in the British Museum, but they have no locality attached to them; the species is therefore omitted in this work.

## 2. *Osmia ænea*.

*O. corpore femineæ cærulescente, albido subpubescente; ventre lana atra dense vestito; corpore maris æneo, fulvo pubescente, ano bidentato.*

*Osmia ænea*, *Smith, Bees Great Brit.* 170 ♂ ♀.

*Schenck, Nass. Bien.* 339.

*Apis ænea*, *Linn. Faun. Suec.* 421; *Syst. Nat.* i. 955 ♂.

*Scop. Ent. Carn.* 303.

*Andrena ænea*, *Ent. Syst.* ii. 309.

*Rossi, Faun. Etrus.* ii. 96.

*Panz. Faun. Germ.* 56. 3 ♂.

*Anthophora ænea*, *Fabr. Syst. Piez.* 381.

*Apis cærulescens*, *Linn. Syst. Nat.* i. 955 ♀.

*Kirby, Mon. Apum Angl.* ii. 264.

*Andrena cærulescens*, *Fabr. Ent. Syst.* ii. 307.

*Rossi, Faun. Etrus.* ii. 86.

*Panz. Faun. Germ.* 65. 18 ♀.

*Fabr. Syst. Piez.* 323.

*Osmia cærulescens*, *Latr. Encycl. Méth.* viii. 581 ♂ ♀.

*St.-Farg. Hym.* ii. 325.

*Brullé, Hist. Nat. Canar.* iii. 85.

*Smith, Zool.* ii. 743.

*Lucas, Expl. Sc. Algér.* iii. 190.

*Nyland. Notis. wr Sällsk. pro Faun. et Flo. Fenn.* i. 262.

*Gerst. Stett. ent. Zeit.* (1869) 352.

*Thoms. Hym. Scand.* ii. 240.

*Female*. Length  $3\frac{1}{2}$ – $4\frac{1}{2}$  lines.—Head and thorax very closely punctured, black, blue-black, or violet; the head with long sparing pale

yellowish pubescence; on the face, at the sides of the clypeus, a little white pubescence. Thorax—the disk thinly covered with similar pubescence to that on the head; on the sides, beneath, and on the legs it is paler, white or nearly so; wings fusco-hyaline, their apical margins and also the marginal cell clouded, varying in depth of colour in fresh or old specimens. Abdomen shining, blue, usually with violet tints, finely and closely punctured; the apical margins of the segments fringed with white short pubescence, usually broadly interrupted on the first three segments, frequently entirely obliterated on the basal segment; beneath, densely clothed with black pubescence. B.M.

*Male.* Length  $3\frac{1}{4}$ –4 lines.—Brassy green; the head and thorax less bright than the abdomen, and both very closely punctured; the face with long fulvous pubescence, palest on the clypeus. Thorax clothed with fulvous pubescence, which is most dense on the sides; wings subhyaline, their apical margins clouded and iridescent; the nervures rufo-piceous, paler than in the other sex. Abdomen narrowest at the base, more finely and less closely punctured than the thorax; the margins of the segments fringed with fulvous pubescence, on the fourth and fifth margins the pubescence is shorter, paler, and more dense; the sixth segment with a small notch in the middle of its margin, the seventh incurved and bidentate. B.M.

This is one of the most abundant and widely distributed species of the genus. Its usual time of appearance is June. Its habit is varied: at one time it selects holes in walls; but I have most frequently bred it from old posts &c. The name adopted is that of the male. It will be seen that Linnæus described both sexes on the same page; and the generally recognized rule of adopting the male appellation, in my opinion, should be rigidly adhered to; but in a few exceptional cases a departure from the general rule will be fully justified.

### 3. *Osmia fulviventris*.

*O. atra*, pallido villosa; abdomine nitido, atro-cærulescente, ventre lana ferruginea tecto; ano in *mare* submarginato et bidentato.

*Osmia fulviventris*, *Latr. Encycl. Méth.* viii. 578.

*St.-Farg. Hym.* ii. 319 ♂ ♀.

*Brullé, Hist. Nat. Canar.* ii. pt. 2; *Entom.* 85.

*Lucas, Expl. Sc. Algér.* iii. 192.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 272.

*Smith, Bees Great Brit.* 168.

*Schenck, Nass. Bien.* 338.

*Gerst. Stett. ent. Zeit.* (1869) 351.

*Thoms. Hym. Scand.* ii. 238.

*Apis fulviventris*, *Panz. Faun. Germ.* 56. 18 ♀.

*Apis leaiana*, *Kirby, Mon. Apum Angl.* ii. 263 ♀.

*Anthophora fulviventris*, *Fabr. Syst. Piez.* 378.

*Apis hirta*, *Smith, Zool.* iv. 742.

*Female.* Length 4–5 lines.—Head and thorax black; the head as

wide as the thorax, both strongly and very closely punctured; the face thinly clothed with pale fulvous pubescence; the anterior margin of the clypeus slightly emarginate, and with two teeth in the middle, usually concealed with bright ferruginous hairs; mandibles incrassate, with two stout teeth at their apex and a blunt one within, the margin terminating in a short acute tooth. Thorax sparingly clothed on the disk with fulvous pubescence, but more densely so on the sides, and beneath with paler pubescence; wings fusco-hyaline, with their apical margins clouded; the legs with pale fulvous pubescence, that on the tarsi beneath rufo-fulvous. Abdomen nigro-æneous, subovate, convex, shining, and rather finely punctured, most closely so at the sides; the margins of the segments thinly ciliated with fulvous pubescence, usually more or less abraded; the sixth segment covered with short silky pale pubescence; beneath, densely clothed with bright ferruginous pubescence. B.M.

*Male.* Length 4-5 lines.—Head and thorax nigro-æneous, the abdomen more bright, and with a brassy brightness, very closely and moderately punctured; the face densely clothed with fulvous pubescence, which is palest on the clypeus. Thorax clothed with fulvous pubescence, which is palest on the sides and beneath, that on the legs is sparing but also pale fulvous; wings as in the other sex. Abdomen oblong-ovate, with a little pale fulvous pubescence at the base, the margins of the segments sparingly fringed with shorter pubescence of the same colour; the sixth segment notched in the middle of its apical margin, and with a slight central depression; the seventh segment bidentate. B.M.

This species is not rare, but rather local. It usually appears in June, females being found as late as August. It is frequently found on thistle-heads, also on hawkweed; it burrows in wood. *Stelis phaeoptera* may occasionally be taken about its burrows. It is widely distributed, specimens having been received from Scotland and from most parts between that locality and Cornwall. Mr. Vernon Wollaston found it in Madeira.

## Section II. *Body black.* (Sp. 4-11.)

### 4. *Osmia xanthomelana.*

*O. aterrima*, villosa, thorace abdominisque segmentis duobus basilibus rufo pilosis, metathorace area media nitida; corpore in *mare* fulvescenti hirsuto, fronte albida pilosa; abdomine nigro-æneo, ano bidentato.

*Osmia xanthomelana*, *Smith, Zool.* ii. 745 ♂ ♀; *Bees Great Brit.* 165.

*Steph. Illus. Brit. Ent. Supp.* 16, pl. 43. fig. 2 ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 270.

*Gerst. Stett. ent. Zeit.* (1869) 334.

*Schenck, Nass. Bien.* 339.

*Thoms. Hym. Scand.* ii. 247.

*Apis xanthomelana*, Kirby, *Mon. Apum Angl.* ii. 246 ♀.

*Apis tunensis*, Kirby, *lib. cit.* 270 ♂ only.

*Osmia atricapilla*, Curtis, *Brit. Ent.* v. 223 ♀.

*Waterh. Zool.* ii. 403 ♂ ♀.

*Osmia nigriventris*, Zett. *Ins. Lapp.* 465.

*Female.* Length  $4\frac{1}{2}$ – $6\frac{3}{4}$  lines.—Black; head as wide as the thorax, the face clothed with black pubescence, intermixed with brown on the margin of the vertex. Thorax clothed above with reddish brown pubescence; that on the sides beneath, and also that on the legs, black; the wings fusco-hyaline, a dark cloud occupying the upper portion of the marginal cell, the nervures black. Abdomen shining, subglobose; the first and second segments with reddish brown pubescence, on the following segments it is black; beneath, densely clothed with black pubescence. B.M.

Var. β. The sixth segment of the abdomen with a little fulvous pubescence.

*Male.* Length 4–5 lines.—The head as wide as the thorax, the face clothed with white pubescence intermixed with ochraceous at the insertion of the antennæ, which are shorter than the thorax; the thorax has a fulvous pubescence above, beneath it is griseous; the wings rather clearer than in the other sex. Abdomen shining, its pubescence fulvous; the sixth segment slightly notched in the middle, the seventh bidentate; beneath, the second ventral plate is pointed in the middle, and the third deeply notched, the notch ciliated with bright yellow hairs. B.M.

This is a very local species. It appears about the end of April or the beginning of May. Mr. Kirby discovered it at Somersham, near Ipswich. It has been found subsequently at Darent Wood; and near Liverpool Mr. George Waterhouse took it in abundance, finding its nests and breeding the sexes. He has published an interesting account of its economy in the second volume of the 'Zoologist.' Near Bristol it has been observed frequenting the ground-ivy (*Glechoma hederacea*); other localities known are Eastbourne and the neighbourhood of Exeter. The male placed by Mr. Kirby in his collection as belonging to this species is that of *Osmia fulviventris*.

##### 5. *Osmia fuciformis*.

*O. aterrima*, villosa, thorace abdominisque segmentis duobus basilibus rufo pilosis, metathorace area media nitida.

*Osmia fuciformis*, Latr. *Encycl. Méth.* viii. 579 ♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 270.

*Gerst. Stett. ent. Zeit.* (1869) 333.

*Osmia chrysomelina*, Panz. *Faun. Germ.* 110. 16 ♂ ♀.

*Female.* Length  $4\frac{1}{2}$ –5 lines.—Black; the head as wide as the thorax, very closely punctured; the face sparingly clothed with black pubescence, on the margin of the vertex it is rufous. Thorax clothed above with rufo-fulvous pubescence, that beneath and on the legs is black;

the triangular space at the base of the metathorax opaque. Abdomen widest towards the apex, with rufo-fulvous pubescence on the two basal segments; the third and following segments thinly covered with black pubescence and very brightly shining; beneath densely clothed with black pubescence. B.M.

The insect described was named *O. fuciformis* by Dr. Nylander, but was regarded by myself as a variety of *O. xanthomelana* in the first edition of this work. Dr. Gerstaecker has pointed out a character which appears to separate this from *O. xanthomelana*, namely the opaque space at the metathorax of one; and the shining space in the other. Dr. Gerstaecker, however, I believe, has applied these distinctive characters to the wrong insects. Kirby's type of *O. xanthomelana* has the base of the metathorax shining; in my *O. fuciformis* it is opaque, and the species is smaller than the former insect. The basal joint of the posterior tarsi is covered within with jet-black hairs; in the other species they are more or less rufous. I do not know the male. The character "metatarso postico apicem versus sensim dilatato," which Gerstaecker assigns to his *O. fuciformis*, is precisely that of the male of *O. xanthomelana*. Taken at Birch Wood, Kent.

#### 6. *Osmia parietina*.

*O. aterrima*, villosa; capite, thorace abdominisque segmento primo in *mare* et *femina* fulvo villosis; ano in *mare* integro, facie subcinerea.

*Osmia parietina*, Curtis, *Brit. Ent.* v. 222, tab. 222 ♀.

Smith, *Zool.* ii. 743; *Bees Great Brit.* 167 ♂ ♀.

*Osmia vulpecula*, Gerst. *Stett. ent. Zeit.* (1869) 335?

*Female*. Length 4-4½ lines.—Black; the face clothed with long pale fulvous pubescence, sometimes with a few darker hairs on the clypeus, which is truncate anteriorly. Thorax densely clothed with bright rufo-fulvous pubescence; wings subhyaline, with a cloud in the marginal cell and on their apical margins; the nervures obscure fusco-ferruginous; the base of the metathorax opaque; the tarsi with a mixture of pale fulvous hairs, beneath it is reddish brown; the claws ferruginous. Abdomen shining, and with fine shallow punctures; the basal segment thinly clothed with fulvous pubescence; the sixth segment has a griseous pubescence intermixed with black hairs; beneath, densely clothed with black pubescence. B.M.

*Male*. Length 3-3½ lines.—Head and thorax brassy black; the face and cheeks with white pubescence, that above the insertion of the antennæ fulvo-ferruginous. Thorax clothed above with fulvo-ferruginous pubescence; beneath and on the legs it is hoary; wings as in the female; metathorax opaque. Abdomen subglobose, shining, and with fine shallow punctures; the basal segment with thin, pale fulvous pubescence, on the rest of the segments it is

black; the apical margin of the sixth segment entire, the seventh with a small notch in the middle. B.M.

This insect is not found in the west of England. Mr. Curtis took it some years ago in the month of June at Ambleside, Westmoreland. In describing the species he has stated that the colour is obscure in certain lights. It might have had an æneous reflection, particularly if an old specimen was examined. I had many opportunities of examining his bees; and they were certainly the same species as mine from Scotland. Mr. Curtis so named them himself; and I gave him both sexes. The colour of the abdomen of the female is black, occasionally reflecting an obscure æneous tint. Dr. Gerstaecker thinks my *O. parietina* distinct from that described by Mr. Curtis. This is a mistake: the insects have been most carefully compared, and Curtis agreed with me in considering them identical. The only other localities known are Bridgend (Glamorganshire), Loch Rannoch (Perthshire), and the Grampian Hills.

### 7. *Osmia pilicornis*.

*O. aterrima*, villosa; capite, thorace abdominisque segmentis duobus basalibus in *femina* fulvo villosis; antennis in *mare* subtus ciliatis; capite, thorace abdomineque cinereo hirsutis; ano emarginato.

*Osmia pilicornis*, *Smith, Zool.* iv. 1567 ♂ ♀; *Bees Great Brit.* 167. *Thoms. Hym. Scand.* ii. 246.

*Female.* Length 4-4½ lines.—Black; the head and thorax closely punctured; the anterior margin of the clypeus truncate; the face with thin black pubescence, a few fulvous hairs at the insertion of the antennæ and on the posterior margin of the vertex; the flagellum of the antennæ obscurely rufo-piceous beneath towards the apex. Thorax densely clothed above with bright rufo-fulvous pubescence; wings subhyaline, clouded at their apical margins; the pubescence on the legs and thorax beneath black. Abdomen shining, subglobose, and with fine shallow punctures; the two basal segments with rufo-fulvous pubescence, less dense than that on the thorax; on the other segments above, and on all beneath, it is black. B.M.

*Male.* Length 4-4¼ lines.—Nigro-æneous; the face densely clothed with long white pubescence, at the insertion of the antennæ it is pale ochraceous; the antennæ nearly as long as the head and thorax, the flagellum pilose beneath. Thorax thinly clothed on the disk with long pale ochraceous pubescence, at the sides and beneath it is white; the anterior femora densely fringed with white pubescence, on the rest of the femora, tibiæ, and tarsi it is of the same colour, but thinly scattered; the posterior femora and tibiæ subincrassate; the wings subhyaline and iridescent. Abdomen ovate, shining, and closely punctured, the apical margins of the segments impunctate and very glossy; at the base, sides, and apex a long



griseous pubescence; on the third and fourth segments it is slightly ochraceous; the sixth and seventh segments are both deeply incised in the middle. B.M.

The female of this species has a close general resemblance to the same sex of *O. parietina*, from which it is distinguished by having fulvous pubescence on the two basal segments of the abdomen and black pubescence on the face; its smaller size will separate it from *O. xanthomelana*; and it has the legs with entirely black pubescence. This species was first discovered by Capt. Blomer, subsequently by Dr. Thwaites, on Durdham Downs, who proposed the specific name *O. pilicornis*. It has also been found in Leigh Woods, near Bristol, in some abundance, and also at Birch Wood. It appears about the end of May, but is a very local insect.

### 8. *Osmia aurulenta*.

*O. nigra*, ferrugineo-rufo villosa, abdominis segmentis marginibus fulvis, ano in *mare* bidentato.

*Osmia aurulenta*, *Latr. Encycl. Méth.* viii. 584 ♀.

*St.-Farg. Hym.* ii. 323, tab. 20. fig. 4 ♀.

*Smith, Bees Great Brit.* 163 ♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 273.

*Schenck, Nass. Bien.* 338.

*Gerst. Stett. ent. Zeit.* (1869) 351.

*Thoms. Hym. Scand.* ii. 248.

*Apis aurulenta*, *Panz. Faun. Germ.* 63. 22 ♀.

*Apis hæmatoda*, *Panz. Faun. Germ.* 81. 20 ♂.

*Apis tunensis*, *Kirby, Mon. Apum Angl.* ii. 269 ♀.

*Megachile tunensis*, *Latr. Hist. Nat.* xiv. 58.

*Osmia tunensis*, *Smith, Zool.* ii. 744.

*Female.* Length 4–4 $\frac{3}{4}$  lines.—Black, closely punctured; the head large, subquadrate, as wide as the thorax; mandibles stout, tridentate, the apical tooth acute; the face clothed with a short fulvous pubescence; the antennæ not longer than the head, filiform and slender. Thorax clothed with a rufo-fulvous pubescence, paler beneath; the wings fusco-hyaline, the tegulæ ferruginous; the legs have a rufo-fulvous pubescence, that on the tarsi beneath bright ferruginous; the calcaria rufo-testaceous, the claws ferruginous. Abdomen subglobose, at the base and on the sides a rufo-fulvous pubescence; the margins of the segments have a short fringe of the same colour; beneath, densely clothed with bright ferruginous pubescence. B.M.

*Male.* Length 4–5 $\frac{1}{2}$  lines.—The face densely clothed with long pale pubescence, that on the vertex and disk of the thorax ochraceous; both the latter have an æneous tinge; the pubescence on the sides of the thorax and beneath hoary; the legs have a similar pubescence; the wings as in the female. Abdomen narrowest at its base, obscurely æneous; the base has a little pale pubescence; the margins of the three apical segments have a fringe of bright fulvo-

ferruginous pubescence; the margin of the sixth segment slightly notched in the middle and deeply emarginate laterally, forming a stout incurved tooth; the apical segment concealed, bidentate.

B.M.

This is a very common species in the western and south-western counties, but has not been received from the north; it usually appears about the end of April, but has been taken in March. It has been observed to be most abundant in chalky districts, where it is common on the *Lotus corniculatus*. Very fine and richly coloured specimens have been taken in North Wales, at Llanberis. In the neighbourhood of Bristol this bee very commonly constructs its cells in snail-shells.

### 9. *Osmia bicolor*.

*O. hirsuta aterrima*, abdomine tarsisque quatuor posticis hirsuto ferrugineis; corpore in *mare* fusco-æneo, hirsuto pallido, ano emarginato.

*Osmia bicolor*, *Latr. Encycl. Méth.* viii. 580 ♀.

*St.-Farg. Hym.* ii. 318 ♀ (nec ♂).

*Smith, Zool.* ii. 746 ♂ ♀; *Bees Great Brit.* 165.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 103.

*Schenck, Nass. Bien.* 338.

*Thoms. Hym. Scand.* ii. 250.

*Apis bicolor*, *Schrank, Ins. Austr.* 400.

*Kirby, Mon. Apum Angl.* ii. 277 ♀.

*Apis fusca*, *Christ. Hym.* 182, tab. 14. fig. 10 ♀.

*Panz. Faun. Germ.* 56. 11 ♀.

*Anthophora fusca*, *Fabr. Syst. Picz.* 377.

*Osmia fusca*, *Gerst. Stett. ent. Zeit.* (1869) 351.

*Female.* Length  $4\frac{1}{2}$ –5 lines.—Black; the head not quite so wide as the thorax, both clothed with deep black pubescence; wings subhyaline, their apical margins having a fuscous cloud, the nervures and tegulæ black; the intermediate and posterior tibiæ and all the tarsi have a short ferruginous pubescence; the tarsi obscure ferruginous. Abdomen subglobose, clothed with bright ferruginous pubescence above and beneath; the base above has a little black pubescence.

B.M.

*Male.* Length  $4\frac{1}{2}$  lines.—Fusco-æneous; head and thorax very closely punctured; the face clothed with pale yellow pubescence, that on the clypeus very dense and nearly white. Thorax—the disk thinly clothed with pale yellow pubescence, much paler on the sides, hoary beneath; the legs have a pale pubescence, the apical joints of the tarsi ferruginous. Abdomen oblong-ovate, shining, and thinly covered with long pale pubescence; two or three of the apical segments have a fringe of pale fulvous pubescence, as well as the extreme lateral margins of the abdomen; the margin of the sixth segment entire, the seventh bidentate or rather deeply notched.

B.M.

A very local species, seldom taken near London. It usually appears in April, when it has been taken plentifully at Purfleet and in chalk-pits at Northfleet. Near Bristol it very commonly constructs its cells in snail-shells, from which I have frequently bred it. The pubescence of the male soon fades to cinereous or nearly white. The description is that of a bred specimen.

### 10. *Osmia leucomelana*.

*O. aterrima*, albido subvillosa; abdominis segmentis marginibus utrinque albis, ventre lana cinerascens tecto; calcaribus pallidis: corpore *maris* nigro-fusco, ano in media fovea impressa.

*Osmia leucomelana*, *Smith*, *Zool.* ii. 741 ♂ ♀; *Bees Great Brit.* 172.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 263 ♀, ii. 105 ♂.

*Gerst. Stett. ent. Zeit.* (1869) 352.

*Osmia interrupta*, *Schenck, Nass. Bien.* 341 ♂ ♀.

*Osmia claviventris*, *Thoms. Hym. Scand.* ii. 254 ♂ ♀.

*Female.* Length  $3\frac{1}{2}$ – $4\frac{1}{2}$  lines.—Black and shining; head as wide as the thorax, closely punctured, the clypeus most strongly so, its anterior margin slightly emarginate in the middle; a thin white pubescence on the face and cheeks; the flagellum of the antennæ nigro-piceous beneath. Thorax closely punctured, with a thin white pubescence on the sides and beneath; wings pale fusco-hyaline, their apical margins faintly clouded; the legs with glittering white pubescence, that on the basal joint of the tarsi beneath yellowish; the apical joint of the tarsi and the spines at the apex of the tibiæ pale rufo-testaceous. Abdomen oblong-ovate, slightly narrowed at the base and shining, and with fine distant shallow punctures; the three basal segments margined laterally with white pubescence, the fourth usually having an entire fascia; clothed beneath with cinereous pubescence. B.M.

*Male.* Length 3–4 lines.—Brownish black, very closely punctured; the face with dense pale fulvous pubescence; the flagellum fulvo-piceous beneath, the base being black. Thorax thinly clothed with pale fulvous pubescence; wings subhyaline, the nervures dark fusco-ferruginous; the calcaria and apical joint of the tarsi pale rufo-testaceous. Abdomen oblong-ovate, incurved, the apical margins of the segments with a thin fringe of short pale pubescence; the sixth segment with its extreme lateral apical margin produced into an acute angle or tooth; the seventh triangular, its apex acute, and with a deep fossulet in the middle; beneath, the apical margin of the second segment elevated, and forming a large transverse tubercle or plate. B.M.

This is a rare or very local species which appears in June. I once found it at Charlton, near Blackheath. At Hawley, near Blackwater, Hants, I found it burrowing in dead bramble-sticks, from which both sexes were bred. It has also been taken at Weybridge early

in July, and in Leigh Woods, near Bristol, at the end of May. Mr. Kirby took it at Coddendam, near Needham Market, Suffolk, but only the female. In his Monograph he has described the apical spines of the tibiæ as being black; this is an oversight: his own typical specimen has them rufo-testaceous. This circumstance has, I believe, caused both Schenck and Thompson to mistake his species, who accurately describe the sexes of *O. leucomelana* under another name.

### 11. *Osmia spinulosa*.

*O. atra*, cinereo subvillosa, scutello bidentato, ventre lana ferruginea tecto; ano *maris* inflexo, spinuloso; ventre basi cornuta.

*Osmia spinulosa*, *Smith*, *Zool.* ii. 741 ♂ ♀; *Bees Great Brit.* 169.

*Schenck*, *Nass. Bien.* 340.

*Thoms. Hym. Scand.* ii. 251.

*Apis spinulosa*, *Kirby*, *Mon. Apum Angl.* ii. 261, tab. 17. fig. 1 ♀, fig. 2 ♂.

*Female.* Length 3–3½ lines.—Black, closely punctured, the head and thorax most strongly so; the anterior margin of the clypeus truncate; the face with cinereous pubescence on each side of the clypeus, and above the insertion of the antennæ is a tuft of pale fulvous. Thorax thinly clothed above with pale fulvous pubescence, that on the sides and also beneath is more or less cinereous; the scutellum rounded posteriorly, and armed on each side with a small acute tooth; wings subhyaline, their apical margins clouded, the nervures nigro-fuscous; the legs with pale fulvous pubescence, that on the first joint of the tarsi beneath bright fulvous; the claw-joint rufo-testaceous. Abdomen ovate and shining, clothed beneath with bright ferruginous pubescence. B.M.

*Male.* Length 3–3½ lines.—Black, punctured as in the other sex; the face with yellowish white pubescence below the antennæ. Thorax sparingly clothed with pale ochraceous pubescence; on the sides, beneath, and on the legs it is cinereous; the apical joint of the tarsi ferruginous; wings as in the female. Abdomen incurved; the apical margin of the sixth segment denticulate, that of the seventh with an acute tooth in the middle; the basal ventral segment armed with a stout curved spine. B.M.

This is a local insect, apparently preferring chalky districts; it is found all along the coast between Lower Walmer and Dover; plentifully at Kingsdown, in July and August. It is not uncommon at Luccomb Chine, Isle of Wight, and has been taken at Croydon and Reigate; it frequents the hawkweed, wild scabious, and the thistle. The pubescence is frequently almost entirely cinereous above. The specimens described are in fine condition.

Genus 8. **HERIADES.**

- Apis* (pt.), *Linn. Syst. Nat.* i. 954 (1766).  
*Hylæus* (pt.), *Fabr. Ent. Syst.* ii. 302 (1793).  
*Anthophora* (pt.), *Fabr. Syst. Piez.* 372 (1804).  
*Heriades*, *Spin. Ins. Ligur.* fasc. ii. (1808).  
*Chelostoma* (pt.), *Latr. Gen. Crust. et Ins.* iv. (1809).  
*Trypetes*, *Schenck, Nass. Bien.* 32 (1861).

Head subglobose; *ocelli* placed in a triangle forward on the vertex; *antennæ* subclavate; *clypeus* transverse, with two minute teeth in the middle of its anterior margin; *labrum* oblong, broadest at the base, its apical margin slightly rounded; *tongue* elongate, only a little longer than the labium; *labial palpi* 4-jointed, the first and second joints elongate, the first half the length of the second, which tapers to an acute point; the third and fourth joints minute, clavate, and articulated near the apex of the second joint; *maxillary palpi* 3-jointed, the first joint short and stout, the second stout, subfusiform, and three times the length of the basal joint; the third joint slender, two thirds of the length of the second, and with two setæ at its apex. Thorax globose; *anterior wings* with two submarginal cells, the second receiving both recurrent nervures. Abdomen oblong, cylindric, and convex; furnished with a dense pollen-brush beneath.

1. **Heriades truncorum.**

*H. atra*; abdominis basi transverse carinata, segmentorum marginibus albidis; ano *maris* inflexo, inermi.

- Heriades truncorum*, *Spin. Ins. Ligur.* fasc. ii. 9.  
*Curtis, Brit. Ent.* xi. tab. 504 ♀.  
*St.-Farg. Hym.* ii. 404 ♂ ♀.  
*Zett. Ins. Lapp.* 467.  
*Smith, Zool.* iv. 1447; *Bees Great Brit.* 192.  
*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* 271; *Mon. Heriades*, *Mém. Soc. Imp. Sc. Nat. Cherb.* iv. 110.  
*Thoms. Hym. Scand.* ii. 263.  
*Apis truncorum*, *Linn. Syst. Nat.* i. 954 ♀, et *Cab. Mus. Linn. Soc. Kirby, Mon. Apum Angl.* ii. 258 ♂ ♀.  
*Hylæus truncorum*, *Fabr. Ent. Syst.* ii. 305.  
*Panz. Faun. Germ.* 64. 15 ♀.  
*Anthophora truncorum*, *Fabr. Syst. Piez.* 379.  
*Megachile truncorum*, *Latr. Hist. Nat. Ins.* iv. 52.

*Female.* Length  $2\frac{1}{2}$ –3 lines.—Black, closely and strongly punctured; the head as large as and a little wider than the thorax; the face with a little white pubescence on the sides; the mandibles stout and bidentate at the apex. Thorax with a thin cinereous pubescence on the sides; beneath, on the legs, and the apical joints of the tarsi rufo-piceous; wings fusco-hyaline, the nervures black. Abdomen shining; the apical margins of the segments with very narrow white pubescent fasciæ; densely clothed beneath with pale yellow pubescence. B.M.

*Male.* Length 3 lines.—Closely resembles the female; the face

with silvery white pubescence; the antennæ filiform and longer than the head; the thorax more pubescent than in the female, and truncate behind; the abdomen inflexed at the apex; the segments with white narrow fasciæ; the sixth segment with its apical margin entire, compressed in the middle, on each side of which is a deep transverse fovea. B.M.

*Heriades truncorum* is a very rare species in this country, but less so on the continent: I have received it from Westphalia in some numbers. Mr. Kirby received it from his friend Mr. Trimmer, who took it near Brentford, where I have searched for it unsuccessfully. Mr. Ingall found it near Dulwich, taking three or four specimens. It must no doubt be looked for about old posts and rails in June. It is a species I never met with.

#### Genus 9. CHELOSTOMA.

- Apis* (pt.), *Linn. Syst. Nat.* i. 954 (1766).  
*Hylæus* (pt.), *Fabr. Syst. Piez.* 319 (1804).  
*Anthophora* (pt.), *Fabr. lib. cit.* 372 (1804).  
*Megachile* (pt.), *Latr. Hist. Nat.* xiv. 51 (1805).  
*Chelostoma*, *Latr. Gen. Crust. et Ins.* iv. 161 (1809).  
*Heriades* (pt.), *Zett. Ins. Lapp.* 467 (1840).  
*Gyrodroma* (pt.), *Thoms. Hym. Scand.* ii. 259 (1872).

Head subquadrate, rather wider than the thorax; *ocelli* in a triangle; *antennæ* subclavate, short, a little longer than the head, slender and filiform in the male, with the intermediate joints denticulate beneath; *labrum* elongate, narrowed anteriorly, and truncate at the apex; *mandibles* bidentate, ciliated on their inner margin; the *labial palpi* 4-jointed, the basal joint one third the length of the second, the second joint attenuated at the apex, the third short and placed in a line with the second; the fourth clavate and articulated to the side and near the apex of the third. *Maxillary palpi* 3-jointed, the joints short and subequal. *Anterior wings* with two submarginal cells, the second receiving both the recurrent nervures. Abdomen as long as the head and thorax, subclavate, and with a dense pollen-brush beneath; in the *male* the abdomen cylindrical, incurved, the apex armed with two blunt teeth; beneath, the second segment produced into a large concave mucro, the fourth segment being densely pilose.

This genus and *Heriades* are very closely allied: both have 3-jointed maxillary palpi, and 4-jointed labial; but in *Chelostoma* three joints of the labial palpi are articulated in a line, the fourth being attached to the side of the third; in *Heriades* only two are in a line, the third and fourth being minute and attached to the second; the neuration of the wings is the same in both genera.

Both the British species burrow in decaying posts and rails; but, like many species of burrowing-bees, they occasionally make use of ready-formed burrows. Not unfrequently *Chelostoma florissomne* makes use of straws and reeds, their tubes being admirably adapted

to the bees' requirements: on one occasion I found numbers occupying the straws of a thatched outhouse. *Chelostoma* is subject to the attacks of several parasitic insects; *Chrysis cyanea* and *C. ignita* have both been bred from its nests, also *Fœnus assectator*, an insect frequently seen where the burrows of *Chelostoma* are found. Mr. Marsham, in the 'Transactions of the Linnean Society,' volume iii., has given an account of *Pimpla manifestator* introducing its eggs into the nests of this bee; but it is not very clearly shown that the larva of *Chelostoma* was the object of its attack. I am inclined to suspect it was the larva either of *Melandrya caraboides* or that of *Clytus arietis*; both these insects are commonly to be seen about the burrows of *Chelostoma*, inserting the apical segment of their abdomen into them, the burrows forming a suitable situation for their eggs, and the larvæ being wood-eaters. Mr. Kirby records the fact of his friend Mr. Trimmer obtaining *Ichneumon femorator* from the nest of *Chelostoma*.

The males of this genus usually pass the night in flowers, in which they curl up their bodies and take their repose; but at other times they pass the night in a position that would appear to be ill suited for repose. I have observed them attaching themselves to blades of grass by seizing hold with their mandibles and suspending themselves in a horizontal position, with their hind legs stretched out in a line with their bodies. A number of males thus suspended were found on a dead branch of hawthorn; they were killed by chloroform, and remained thus attached after death, so that the branch and bees could be exhibited at a meeting of the Entomological Society of London. Other species of Hymenoptera (for instance, some Polistidæ) attach themselves in a similar manner. Other insects curl their bodies round straws, twigs, or blades of grass: this is the habit of several species of Chrysididæ, of *Stilbum* and *Hedychrum*, and of *Elampus panzeri*.

### 1. *Chelostoma florissomne*.

*C. atrum*, elongatum, glabriusculum; mandibulis prominentibus, intus fulvo-barbatis; abdominis segmentis marginibus albis. *Mas* cinereo villosus; abdomine incurvo, ventre basi cornuta, ano bidentato.

*Chelostoma florissomne*, *Curtis, Brit. Ent. xiv. tab. 628 ♂*.

*Eversm. Bull. Soc. Moscou, xv. 74.*

*Smith, Zool. iv. 1445; Bees Great Brit. 189 ♂ ♀.*

*Apis florissomnis*, *Linn. Syst. Nat. i. 954 ♂, et Cab. Mus. Linn. Soc. Scop. Ent. Carn. 299, fig. 796.*

*Fabr. Syst. Ent. 387.*

*Kirby, Mon. Apum Angl. ii. 253.*

*Hylæus florissomnis*, *Fabr. Syst. Piez. 319 ♂.*

*Panz. Faun. Germ. 46. 13.*

*Megachile florissomnis*, *Spin. Ins. Ligur. i. 134.*

*Apis maxillosa*, *Linn. Syst. Nat. 954 ♀, et Cab. Mus. Linn. Soc. ♀.*

*Kirby, Mon. Apum Angl. ii. 251.*

*Hylæus maxillosus*, *Fabr. Ent. Syst. ii. 303.*

*Panz. Faun. Germ. 53. 17.*

*Megachile maxillosa*, Latr. *Hist. Nat. Ins.* xiv. 51.

*Chelostoma maxillosa*, Latr. *Gen. Crust. et Ins.* iv. 162.

Brullé, *Expéd. Sc. de Morée*, iii. 342.

St.-Farg. *Hym.* ii. 407.

Schenck, *Nass. Bien.* 348.

*Heriades maxillosa*, Zett. *Ins. Lapp.* 467.

Nyland. *Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 268 ♂ ♀ ; *Mon.*

*Heriades*; *Mém. Soc. Imp. Sc. Nat. Cherb.* iv. 107.

*Female.* Length 3–5 lines.—Black, shining and punctured, the pubescence sparing and griseous; on the face on each side of the clypeus a little white pubescence; the anterior margin of the clypeus produced and forming an elevated flattened plate; the flagellum more or less rufo-piceous beneath. The thorax with a little scattered pubescence on the sides and beneath, that on the legs short and griseous, but dense and fulvous on the tarsi beneath; the calcaria pale testaceous; wings subhyaline, their apical margins clouded, the nervures black. Abdomen elongate-clavate, the apical margins of the segments with narrow white pubescent fasciæ; clothed beneath with pale fulvous pubescence. B.M.

*Male.* Length 4–5 lines.—Black; the face densely clothed with fulvo-ochraceous pubescence; the mandibles bidentate and fringed beneath with long pale hairs; the cheeks produced and forming a blunt tubercle at the base of the mandibles; the antennæ filiform, the flagellum, except the two basal joints, flavo-testaceous beneath. Thorax with long, loose, very pale fulvous or cinereous pubescence; the wings as in the female. Abdomen cylindrical, and thinly covered with pale ochraceous pubescence; the apex armed with two blunt teeth. B.M.

This is a very common insect in this country, appearing early in June; it is found throughout Europe, and is one of the true carpenter bees. A closely allied species, *C. nigricorne*, which occurs in Denmark, Sweden, and France, will probably be found in North Britain, and may be mixed with *C. florissomne* in collections. The male of *C. nigricorne* has the antennæ entirely black and the joints simple; the apical segment deeply concave, its margin truncate, the lateral angles being subdentate or acute; the female wants the tubercle on the clypeus. This short description will serve to identify the species.

## 2. *Chelostoma campanularum.*

*C. atrum*, glabriusculum; *maris* ano inflexo, acute bidentato, ventris basi gibba.

*Chelostoma campanularum*, Eversm. *Bull. Soc. Moscou*, xxv. 75.

Smith, *Bees Great Brit.* 190.

*Apis campanularum*, Kirby, *Mon. Apum Angl.* ii. 256 ♂ ♀.

*Megachile campanularum*, Latr. *Hist. Nat. Ins.* xiv. 52.

*Heriades campanularum*, Spin. *Ins. Ligur.* i. 198.

St.-Farg. *Hym.* ii. 405.

Smith, *Zool.* iv. 1448.



*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. i. 273; Mon.*

*Heriades, Mém. Soc. Imp. Sc. Nat. Cherb. iv. 111.*

*Schenck, Nass. Bien. 347.*

*Gyrodroma florisomnis, Thoms. Hym. Scand. ii. 262.*

*Apis florisomnis minima, Christ. Hym. 197, tab. 17. fig. 18.*

*Apis minuta, Schrank, Ins. Austr. 412?*

*Female.* Length  $2\frac{1}{4}$ – $2\frac{1}{2}$  lines.—Black, shining, closely and finely punctured. Head subglobose, as wide as the thorax; the antennæ clavate; mandibles bidentate, their apex rufo-piceous. The thorax with a little hoary pubescence at the sides; the metathorax truncate, the wings subhyaline and iridescent; the calcaria pale testaceous, the claws of the tarsi ferruginous. Abdomen oblong and cylindric, obtuse at the apex, densely clothed beneath with pale yellow pubescence. B.M.

*Male.* Length  $2$ – $2\frac{1}{4}$  lines.—Closely resembles the female; the flagellum filiform and a little longer than the head; the legs frequently more or less obscure rufo-piceous; the abdomen incurved at the apex and bidentate; beneath, with an elevated tubercle on the second segment, the fifth concave and clothed with pale pubescence. B.M.

This little bee is rather local, but plentiful in many places; five or six may be frequently taken in a single flower of *Campanula rotundifolia*: the males pass the night in those flowers. The species appears in June.

#### Genus 10. ANTHIDIUM.

*Apis* (pt.), *Linn. Syst. Nat. i. 953 (1766).*

*Anthidium, Fabr. Syst. Piez. 364 (1804).*

*Megachile* (pt.), *Latr. Hist. Nat. xiv. 51 (1805).*

*Trachusa* (pt.), *Jurine, Hym. 253 (1809).*

Head nearly as wide as the thorax; *ocelli* in a triangle on the vertex; *antennæ* filiform, the scape subclavate, the basal joint of the flagellum subglobose; *clypeus* triangular, truncate at the base, rounded anteriorly (♀), truncate (♂); *tongue* elongate, nearly thrice the length of the mentum; *paraglossæ* very short; *labial palpi* 4-jointed, the first and second joints elongate, the second longest and tapering to a point, near its apex the third and fourth minute joints articulate, both being subclavate; *maxillary palpi* 2-jointed, the basal joint short and cup-shaped. Thorax subglobose; the *scutellum* transverse and lunate, produced over the metathorax, which is truncate; *anterior wings* with one marginal cell, which is as long as the two submarginal ones united; the second submarginal cell receiving the first recurrent nervure near its commencement, the second sometimes uniting with the apical nervure, and in some instances passing a little beyond it; the basal joint of the anterior and intermediate tarsi as long as the tibiæ; the claws bifid. Abdomen convex, incurved, the base truncate; densely clothed with long hair beneath.

*Male* much larger than the female, the legs more elongate, and the apex of the abdomen armed with spines.

This genus is remarkable in presenting the only instance among our native species of bees in which the male is considerably larger than the female; this peculiarity is at once understood, and the object of the structural difference apparent, when the habits of the insect are observed. The female is usually attended by the male, and when on the wing, flying from flower to flower, is frequently seized by the male, and carried off out of sight into the air; hence the necessity for his superiority in size and strength is clearly apparent. In this country only a single species is found; but upwards of a hundred are described, about forty inhabiting Europe alone. Many species are found in Arabia and Syria; others are found in Algeria, the Gambia, Sierra Leone, the Cape of Good Hope, Natal, and Angola; four or five are known from India; and others from Brazil and various parts of South America, Chili, Mexico, and the United States.

*Anthidium manicatum* has never been observed constructing its own nidus; and probably it at all times makes use of some cavity in trees, posts, or other situation adapted to its requirements; its nests are frequently found in the holes perforated in old willow-trees by the larvæ of *Aromia moschatus* or *Cossus ligniperda*, and lined with a woolly down, which the bee collects from various plants, such as the hedge-nettle, *Stachys germanica*, and the wild lychnis, *Agrostemma coronaria*; from such plants the bee with its broad mandibles scrapes off the downy covering of the leaves and stems, rolling it up into a little bundle which she carries off to her nidus. The cells are not arranged in the systematic order usually observable in bee architecture; they are composed of a thin semitransparent membrane, each cell being closed with similar membrane after being stored with a suitable supply of pollen and honey, upon which an egg has been deposited; in this manner cell after cell is constructed, until the cavity chosen is filled with a suitable number, when her labours are completed.

Nests of a species of *Anthidium* from Natal are attached to the outside of twigs of bushes or plants, each cell being enveloped in a woolly covering and separate from each other.

The Rev. Gilbert White, in his 'History of Selborne,' with his usual tact, has described the habit of our British species thus:—  
 "There is a sort of wild bee frequenting the garden campion for the sake of its tomentum, which probably it turns to some purpose in the business of nidification. It is very pleasant to see with what address it strips off the pubes, running from the top to the bottom of a branch, and shaving it bare with the dexterity of a hoop-shaver. When it has got a vast bundle, almost as large as itself, it flies away, holding it secure between its chin and fore legs."

### 1. *Anthidium manicatum*.

*A. atrum*, griseo villosum, abdomine maculis lateralibus flavis; *maris* abdomine lateribus fasciculato-pilosis, inflexo, ano quinquentato.

*Anthidium manicatum*, *Fabr. Syst. Piez.* 364 ♂ ♀.

*Latr. Ann. Mus. Hist. Nat.* xiii. 212.

*Curtis, Brit. Ent.* iv. tab. 21.

*St.-Farg. Hym.* ii. 355.

*Smith, Zool.* iv. 1452; *Bees Great Brit.* 185.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 265.

*Schenck, Nass. Bien.* 344, 345.

*Thoms. Hym. Scand.* ii. 218.

*Apis manicata*, *Linn. Syst. Nat.* i. 958 ♂.

*Fabr. Ent. Syst.* ii. 330.

*Schäff. Icon. Ins.* tab. 32. figs. 11, 12.

*Christ. Hym.* 133, tab. 9. fig. 5.

*Panz. Faun. Germ.* 55. 11 ♂.

*Kirby, Mon. Apum Angl.* ii. 248, tab. 16. fig. 12 ♀, 13 ♂.

*Donov. Brit. Ins.* xiv. 57, tab. 489.

*Trachusa manicata*, *Jurine, Hym.* 253.

*Female.* Length 4–5¼ lines.—Black; the face on each side below the antennæ and the clypeus yellow, the latter black at the base, from which a central black stripe runs to the anterior margin of the clypeus, which is minutely denticulate; the mandibles and a minute spot on the vertex above the eyes yellow; the face and cheeks with a thin griseous pubescence; that on the vertex is rufo-fuscous. Thorax—the tubercles and a spot on the front of the tegulæ yellow; the femora usually more or less rufo-piceous beneath; the tibiæ with a yellow line above, frequently interrupted in the middle; the tarsi yellow, and densely covered above with short yellowish white pubescence, beneath with golden pubescence; the apical joint of the tarsi rufo-testaceous; the mesothorax thinly clothed with rufo-fuscous pubescence; on the sides beneath and on the legs the pubescence is cinereous. Abdomen, each segment with a lateral yellow macula, which are ovate on all the segments except those on the fifth, which are oblong; the fourth segment has usually two additional minute yellow spots; beneath, clothed with dense pale yellowish shining pubescence.

*Var. β.* The abdominal segments with transverse yellow fasciæ, which are widely interrupted at the base, and more narrowly so towards the apex of the abdomen. B.M.

*Male.* Length 5–7 lines.—Black; the clypeus, the face on each side, the mandibles, and a spot on the vertex above the eyes yellow; the clypeus has a trident-shaped black macula at its base; and the mandibles have their tips black; the face and cheeks have a cinereous pubescence, that on the vertex and on the disk of the thorax fulvo-ochraceous; the tegulæ in front and behind and the tubercles behind yellow; the wings as in the other sex; the anterior and intermediate tibiæ yellow at their apex; the thorax at the sides and beneath and the femora have a cinereous pubescence; the tarsi densely covered and fringed behind with silvery white pubescence; the basal joint of the two anterior pairs yellow; sometimes the posterior tibiæ have a yellow spot at their base, and occasionally at their apex also; their pubescence silvery, having a golden tinge above. Abdomen variable in its markings, having a lateral ovate

spot on the four basal segments, a minute one on the fifth, and two central transverse marks on the fifth and sixth; the sixth with a lateral stout bent acute tooth, the seventh has an obtuse one on each side and a minute slender one in the middle; the base with a thin cinereous pubescence, and at its extreme lateral margins a tuft of silvery pubescence; the following segments have a pale fulvous fringe. B.M.

Var.  $\beta$ . The seventh segment has sometimes two large transverse spots, those on the sixth being obsolete.

Var.  $\gamma$ . The apical transverse spot obsolete.

This species varies greatly in the presence or absence of the yellow spots and stripes on the abdomen and legs. Var.  $\beta$  was in the collection of Mr. Desvignes, who obtained it from Scotland. It is of great rarity in this country, but very common on the continent. Dr. Sichel sent examples of the ten varieties described by Latreille in his Monograph of the genus in the Ann. du Mus. d'Hist. Nat. vol. xiii., several of which have not been found in Great Britain. The variety  $\beta$  of the female, so common in France, is rare in this country, and our common form of colouring rare on the continent. This bee usually appears at the end of June or beginning of July, and is abundant in all parts of the south of England, but appears to be much less so in the north. It is very partial to the flowers of the red archangel, *Lamium purpureum*, and sometimes swarms where that plant is plentiful.

#### Genus 11. MEGACHILE.

*Apis* (pt.), *Linn. Syst. Nat.* 953 (1766).

*Centris* (pt.), *Fabr. Syst. Piez.* 354 (1804).

*Anthophora* (pt.), *Fabr. Syst. Piez.* 372 (1804).

*Megachile*, *Latr. Hist. Nat.* xiv. 51 (1805).

*Trachusa* (pt.), *Jurine, Hym.* 247 (1808).

Head as wide as the thorax; *mandibles* stout, quadridentate, exterior pair acute, the inner pair obtuse; *ocelli* in a triangle anteriorly placed on the vertex; *antennæ* filiform and geniculated; *labial palpi* 4-jointed, the two basal joints elongate, of nearly equal length; the two apical joints minute and subclavate and articulated outside and near the apex of the second joint; the *paraglossæ* very short, and folding round the base of the tongue; *tongue* twice the length of the labium; the *maxillary palpi* 2-jointed, short, the basal joint shortest, the apical joint obtuse at the apex and setose; the *labrum* oblong, with the sides parallel. Thorax subglobose; *anterior wings* with one marginal and two submarginal cells, the second submarginal receiving the two recurrent nervures. Abdomen ovate, truncate and concave at the base, the ventral segments clothed with dense pubescence in the females, and the apical ones emarginate or dentate in the males.

*Megachile* is the most cosmopolitan of all the genera of bees.

The number of known species is about 300 ; they are numerous alike in the tropics and in northern latitudes. The type of the genus is perhaps the most widely distributed species of the Apidæ, being found in Southern Europe, Russia, Denmark, Sweden, Finland, and Lapland, also in Canada and at Hudson's Bay. Fifty species are known from India, China, and the various islands in the eastern archipelago, forty from Australia ; but no species has been received from New Zealand. Africa has furnished between forty and fifty species ; and others may be yet found in Madagascar, the Mauritius, and other adjacent islands. South America has at present yielded between fifty and sixty species ; and about the same number have come from Mexico and the States of North America,—thus making the present known number of species, as already stated, about 300 ; and many are yet doubtless unknown to science.

The habits of the British, and, indeed, of all the known European species appear to be uniform in one respect : they all excavate burrows, either in the ground or in wood ; and these they line either with the cuttings of leaves or of the petals of flowers. Some of the exotic species have a different habit. *Megachile lanata*, a common Indian insect, constructs tubes of agglutinated particles of sand ; the same is also the habit of another Indian species, *M. proxima*.

*Megachile centuncularis* burrows usually in wood ; frequently, however, it does so in the ground ; and I have seen it entering holes in the mortar of walls. These it lines with cuttings of the leaves of different trees and plants, making use of those of the rose, the laburnum, the lilac, and of various kinds of willows ; but on two occasions I observed it cutting the petals of the scarlet geranium, probably for the purpose of lining the cells. I am inclined to think so, because I frequently found the cells of *Megachile argentata*, which burrows in the ground, lined with the yellow petals of *Lotus corniculatus*. The outer covering of the cells of this little bee is usually cuttings of rose-leaves ; and the circular pieces used for closing the cell I have found to be those of the thick leaves of the buckthorn. The plants it prefers frequenting appear to be *Echium vulgare* and the hare's-foot trefoil, *Trifolium arvense*. I have frequently observed *Mutilla ephippium* entering the burrows of this bee, but have not succeeded in rearing it from the nests.

*Megachile willughbiella* is the most common of the British species. It is widely distributed, and very abundant in most parts of the country. In Kirby's 'Monographia' is given an extract from Sir John Hill's translation of Swammerdam's 'Book of Nature.' In a note, Sir John says that he saw thousands of the nests of this species in Lincolnshire in willow trees. In the British Museum is preserved a piece of a willow tree in which are numerous burrows of this bee ; some of them are exposed, and in one are no less than thirteen cells. In one case one common entrance leads to three burrows. The flat end of the block is about  $2\frac{1}{2}$  inches square ; and in this space are no less than ten burrows.

*Megachile maritima* usually burrows in the ground. I have not observed it in any other situation. Its nests are found in the cliffs

of Sandown Bay in great numbers; but I have not found it burrowing in wood. This bee is frequently seen on the flowers of the mallow, *Malva sylvestris*; and where that plant is not found it appears to choose the common bramble.

*Megachile circumcincta* is a ground-burrower, and sometimes forms colonies of considerable extent. *M. ligniseca* is, as I believe, exclusively a wood-burrowing species, preferring trees that are more or less in a decaying state; the elm, oak, or ash appear equally to answer its purposes.

Div. I. *Anterior tarsi of the males simple.*

1. *Megachile centuncularis.*

*M. cinerascenti pubescens*; abdomine *feminae* subcordato, segmentorum marginibus albidis; abdomine *maris* subgloboso, coxis anterioribus inermibus.

*Megachile centuncularis*, *Latr. Hist. Nat. Crust. et Ins.* iv. 166.

*Spin. Ins. Ligur.* i. 142.

*St.-Farg. Hym.* ii. 337, tab. 21. fig. 3 ♀.

*Guér. Icon. Rég. Anim.* 449, tab. 73. fig. 7.

*Smith, Zool.* ii. 695 ♂ ♀; *Bees Great Brit.* 174.

*Nyland. Notis. wr Sällsk. pro Faun. et Flo. Fenn.* i. 258.

*Schenck, Nass. Bien.* 330.

*Thoms. Hym. Scand.* ii. 227.

*Apis centuncularis*, *Linn. Syst. Nat.* i. 953 ♀.

*Scop. Ent. Carn.* 300.

*Fabr. Ent. Syst.* ii. 337.

*Schrank, Ins. Austr.* 404.

*Rossi, Faun. Etrus.* 927.

*Kirby, Mon. Apum Angl.* ii. 237 ♂ ♀.

*Anthophora centuncularis*, *Fabr. Syst. Piez.* 378.

*Panz. Krit. Revis.* 242.

*Zett. Ins. Lapp.* 465.

*Réaumur. Ins. vi. Mém.* iv. tab. 10. figs. 2, 3, 4.

*Megachile parvula*, *St.-Farg. Hym.* ii. 340, var. minor.

*Female.* Length  $3\frac{1}{2}$ – $5\frac{1}{2}$  lines.—Black; head, the front covered with pale fulvous pubescence, that on the vertex is less dense and fuscous; mandibles quadridentate, the two apical ones acute, closely punctured. Thorax, the pubescence on the sides and beneath pale fulvous; on the metathorax, which is closely punctured, the pubescence is less dense and more or less fuscous; the legs have a short cinereous pubescence, on the tarsi beneath it is fulvous; the calcaria and claws rufo-testaceous; wings subhyaline, their apical margins slightly clouded. Abdomen subcordate; the margins of the basal segments depressed; the apical margins of all the segments with a narrow fringe of pale pubescence, which is usually more or less interrupted in the middle; beneath, densely clothed with bright fulvous pubescence.

B.M.

Var.  $\beta$ . The legs dark rufo-piceous.

The fringe on the apical margin of the fifth segment is usually entire.

*Male.* Length  $3\frac{1}{2}$ –5 lines.—Head rather wider than the thorax, the face clothed with pale fulvous pubescence, sometimes whitish on the clypeus; antennæ filiform; mandibles bidentate, the apical tooth acute. The apex of the anterior femora rufo-flavous beneath; the pubescence on the thorax beneath cinereous, above it is faintly fulvous; wings as in the female. Abdomen subelongate and obtuse at the apex; the margin of the apical segment entire and subdentate.

Var.  $\beta$ . The margin of the apical segment slightly notched in the middle. B.M.

This species has probably the widest geographical range of any in the entire family of the Apidæ. It is found in all parts of the United Kingdom, and is very widely diffused over the continent of Europe, being found in Russia, Denmark, Sweden, Finland, and Lapland. It is also found throughout Southern Europe. Specimens have also been received from North America, Hudson's Bay, and Canada that we have been unable to distinguish from it. It is very common during the months of June, July, and August.

## 2. *Megachile ligniseca*.

*M. pallide pubescens*, abdomine oblongo-ovato, masculino ano emarginato.

*Megachile ligniseca*, *Smith, Zool.* ii. 694; *Bees Great Brit.* 176.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 102.

*Schenck, Nass. Bien.* 329.

*Thoms. Hym. Scand.* ii. 226.

*Apis ligniseca*, *Kirby, Mon. Apum Angl.* ii. 243 ♂ ♀.

*Apis centuncularis*, *Panz. Faun. Germ.* 55. 12 ♀.

*Don. Brit. Ins.* iv. tab. 120 ♀.

*Female.* Length 6–7 lines.—Black; the face has a little pale pubescence on each side of the clypeus, and fulvous at the insertion of the antennæ; on the vertex it is fuscous; on the cheeks, legs, thorax beneath, on the two basal segments of the abdomen, and on the metathorax it is cinereous; on the disk of the thorax it is pale fulvous; the mandibles quadridentate, the two apical teeth subacute, the inner one obtuse; the wings subhyaline, faintly clouded at their apical margins; the tarsi fulvous beneath, the claws ferruginous. Abdomen oblong-ovate, the margins of the segments deeply depressed; at the base there is a little cinereous pubescence, towards the apex it is sparing and black; beneath densely clothed with fulvous pubescence, that on the two apical segments is black. B.M.

*Male.* Length 5–6 lines.—The face clothed with bright pale yellow pubescence; at the insertion of the antennæ it is of a deeper yellow, and on the vertex black; the antennæ filiform, half the length of

the thorax, which has a yellowish brown pubescence on the disk, on the sides and beneath it is cinereous; the wings and legs as in the other sex; the anterior coxæ unarmed. The abdomen oblong-ovate, the two basal segments have a thin pale pubescence, the margins depressed; the intermediate ones have on each side a short pale fringe; the apex inflexed, the margin of the sixth segment emarginate. B.M.

This species appears to be rather local; it is found round London, but only occasionally. Mr. Kirby found its nests in old elm trees, its burrows being lined with the leaves of that tree. I have observed it most commonly at Richmond, Hampton Court, and Windsor. In some districts it is doubtless plentiful. *Celioxys simplex* was bred from its burrows at Dartford, Kent.

### 3. *Megachile versicolor*.

*M. pallide pubescens*; abdomine subcordato, segmentorum utrinque marginibus albidis; ventre lana versicolori dense vestito.

*Megachile versicolor*, *Smith*, *Zool.* ii. 697 ♀; *Bees Great Brit.* 177.

*Female*. Length  $4\frac{3}{4}$ – $5\frac{1}{3}$  lines.—Black; the head and thorax closely and rather strongly punctured. The mandibles with four acute teeth; the face with dense pale fulvous pubescence on each side; the clypeus coarsely punctured. Thorax, the pubescence on the sides pale fulvous; beneath and on the legs above it is more or less cinereous; the three apical joints of the tarsi ferruginous; all the tarsi with rufo-fulvous pubescence beneath. Abdomen shining; on the apical margin of the segments laterally a narrow fringe of white pubescence; beneath, the pubescence is rufo-fulvous on the second, third, and fourth segments, and black on the fifth and sixth. B.M.

This species is most like *M. centuncularis*. All that I have seen (about a dozen examples) agree in the particular distinctions pointed out—the more acute mandibles, and the bicoloured pubescence beneath the abdomen. The specimen from which the description is drawn is one in very fine condition; others have the pubescence on the sides of the thorax more or less grey. I am not certain about the determination of the male, but have a specimen that differs from the male of *M. centuncularis* in having the margin of the seventh segment laterally dentate, and in the middle of the segment a prominent larger tooth. This may prove to be the true male. The female has been taken at Weybridge, Bournemouth, Bristol, and Carlisle.

### 4. *Megachile pyrina*.

*M. pallide pubescens*; abdomine subcordato, segmentorum marginibus pallide fulvis; abdomine *maris* incurvo, ano emarginato; tarsis rufis.



*Megachile pyrina*, *St.-Farg.* ii. 334 ♂ ♀.

*Smith, Bees Great Brit.* 177.

*Megachile rufitarsis*, *Smith, Zool.* ii. 695 ♂.

*Megachile fasciata*, *Smith, lib. cit.* 694 ♀.

*Female.* Length 5–6 lines.—Black; the face with bright golden-yellow pubescence; on the vertex it is usually more or less fuscous. Thorax, the pubescence on the disk short and fuscous, on the sides and beneath pale fulvous, frequently inclining to cinereous; the apical joints of the tarsi ferruginous; the pubescence beneath the tarsi fulvous; the calcaria pale rufo-testaceous. Abdomen oblong, the two basal segments with thin pale pubescence, the following with fuscous; the apical margin of all the segments with entire fasciæ of pale fulvous pubescence, and beneath densely clothed with pale fulvous.

*Male.* Length 5 lines.—The pubescence similar to that of the female, but longer and more dense on the face; the apical segment of the abdomen deeply emarginate in the middle, and denticulate at the sides; the seventh segment has a longish spine in the middle; the anterior coxæ have a blunt spine.

This species has been captured at and near to Weybridge, Bristol, and Southampton. It must be very local. No one has been ascertained to have taken it for some years past.

### 5. *Megachile odontura*.

*M. pallide villosa*; abdominis apice denticulato, ano cornuto.

*Megachile odontura*, *Smith, Zool.* vii. *App.* 58; *Bees Great Brit.* 178.

*Dours, Cat. Hym. de France*, 192.

*Male.* Length  $4\frac{1}{4}$  lines.—Black; the face densely clothed with bright pale fulvous pubescence; the mandibles tridentate, and at their base, beneath, a large blunt tooth or tubercle. Thorax clothed with fulvous pubescence, palest at the sides and beneath; the femora fringed beneath with long pale or whitish pubescence, the posterior tibiæ have a similar fringe; the anterior coxæ have a blunt spine. Abdomen oblong, obtuse at the apex, the two basal segments thinly clothed with pale fulvous pubescence; on the following segment it is short and fuscous; and all these have a narrow pale marginal fascia, more or less attenuated in the middle; the apical margin of the sixth segment denticulate, the teeth being twelve in number; the seventh segment compressed in the middle, and forming a prominent triangular spine. B.M.

The specimen in the British Museum is the only one I have seen; but Dours includes the species in his 'Catalogue des Hyménoptères de France.' The British specimen is from Dr. Leach's collection, and has a numbered ticket attached. On reference to his private manuscript catalogue the entry is found:—"June: found settling on a footpath near our house" at Spitchwick, Devonshire.

6. *Megachile argentata*.

*M. pallide pubescens*; abdomine subtus argenteo villosulo, segmentis supra marginibus pallido fasciatis.

*Megachile argentata*, *Latr. Gen. Crust. et Ins.* iv. 166.

*St.-Farg. Hym.* ii. 343 ♂ ♀.

*Spin. Ins. Lâgur.* i. 140.

*Lucas, Expl. Sc. Algér.* iii. 196.

*Smith, Bees Great Brit.* 179.

*Schenck, Nass. Bien.* 331.

*Thoms. Hym. Scand.* ii. 228.

*Apis argentata*, *Fabr. Ent. Syst.* ii. 336.

*Anthophora argentata*, *Fabr. Syst. Piez.* 377.

*Apis albiventris*, *Panz. Faun. Germ.* 56. 19.

*Megachile albiventris*, *Smith, Zool.* ii. 696.

*Megachile leachella*, *Curtis, Brit. Ent.* v. 219.

*Female.* Length  $3\frac{1}{2}$ – $4\frac{1}{4}$  lines.—Black; head as wide as the thorax; the front with dense pale fulvous pubescence, sparing on the clypeus, on the cheeks it is cinereous. Thorax: the pubescence on the mesothorax is short and thin, but more dense at the sides and pale fulvous; beneath and on the legs it is cinereous; wings hyaline, with their apical margins slightly clouded. Abdomen cordate, the apical margins of the segments with narrow pale fasciæ, the sixth with two pale pubescent spots; beneath, densely clothed with silvery white pubescence.

B.M.

*Male.* Length  $3\frac{1}{2}$ –4 lines.—Head wider than the thorax, the pubescence above fulvous, beneath and on the legs it is cinereous; the apical half of the anterior femora yellowish in front, and the anterior coxæ with a blunt tooth; wings as in the female. Abdomen short and obtuse at the apex, towards which it is somewhat narrowed; all the segments with narrow pale marginal fasciæ, the apical segment clothed with it and having its margin denticulate; the margin of the seventh segment entire.

This little bee is local, but in some situations abundant, particularly so on the sandhills at Deal, at Littlehampton, and in Whitesand Bay, at the Land's End. It also occurs at Southend, Weybridge, and at Burnham, Somerset. Its flight is as rapid as that of *Saropoda bimaculata*, and it also makes a similar piping hum. It is found in June, July, and August, and often frequents *Echium vulgare*, and is also partial to the hare's-foot trefoil.

The specimens described are in the finest condition, taken on their first appearance. They are frequently found entirely bleached to a hoary pubescence, and are usually found with the fulvous tinge more or less faded. This species is sometimes mistaken for the poppy-bee, *Osmia papaveris*.

Div. II. *Anterior tarsi of the males dilated.*7. *Megachile circumcincta.*

*M. pallide flavo villosa*, capite anoque atris; antennis *maris* articulo ultimo subdilato, tarsi anterioribus dilatato-ciliatis.

*Megachile circumcincta*, *St.-Farg. Hym.* ii. 335 ♀.

*Smith, Zool.* ii. 693 ♂ ♀; *Bees Great Brit.* 180.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 103 ♀.

*Schenck, Nass. Bien.* 330.

*Thoms. Hym. Scand.* ii. 224.

*Apis circumcincta*, *Kirby, Mon. Apum Angl.* ii. 246 ♀, var.  $\gamma$ . *A. willughbiella* ♂.

*Female.* Length  $5-5\frac{1}{2}$  lines.—Black; the pubescence on the head brownish black, that on the cheeks paler. The thorax and three basal segments of the abdomen clothed with pale fulvous pubescence, on the disk of the thorax it is fuscous; the legs have a pale fulvous pubescence, on the tarsi beneath it is rufo-fulvous; the claws of the tarsi ferruginous; wings subhyaline, their apical margins clouded, the nervures black. Abdomen, the pubescence on the three apical segments black, as well as on the two apical ones beneath; the rest is bright rufo-fulvous. B.M.

Var.  $\beta$ . The abdomen with pale fulvous pubescence on the two basal segments.

Var.  $\gamma$ . Only the basal segment with pale fulvous pubescence.

*Male.* Length  $4\frac{1}{2}-5\frac{1}{4}$  lines.—The pubescence on the face pale fulvous, on the vertex it is thin and more or less fuscous; the apical joint of the antennæ compressed and slightly dilated. Thorax: the pubescence above is rufo-fulvous, on the sides, beneath, and on the legs it is pale fulvous, frequently inclining to cinereous; the anterior coxæ armed with blunt spines; the apex of the tibiæ and the tarsi pale flavo-testaceous, beneath a minute black spot; the first joint as broad as the tibiæ, slightly widest at the apex, the three following joints each gradually decreasing in width; all the joints fringed with long whitish pubescence. Abdomen oblong, blunt at the apex, with pale pubescence on two or three of the basal segments; on the rest it is shorter and black; on the apical margin of the fourth and fifth a narrow fringe of white pubescence, sometimes more or less obsolete; the sixth segment with its apical margin emarginate, the inflexed margin beneath with one angular tooth on each side; the seventh with a central obtuse spine. B.M.

This species appears in June; it is rather local, and, as far as has been ascertained, always constructs its burrow in the ground. Occasionally I have met with large colonies, especially in Surrey and Hampshire. This bee usually lines its burrows with cuttings of rose-leaves; *St.-Fargeau* says he observed it using those of *Rhamnus frangula* (the alder buckthorn): all the species vary in their choice in this respect.

8. *Megachile willughbiella*.

*M. fulvescenti pubescens*; abdomine brevi, ano nigro; *maris* antennis articulo ultimo compresso, dilatato; tarsis anterioribus dilatato-ciliatis.

*Megachile willughbiella*, *Latr. Hist. Nat. Ins.* xiv. 57.

*Curtis, Brit. Ent.* v. 218, tab. 218.

*St.-Farg. Hym.* ii. 333?

*Smith, Zool.* ii. 691; *Bees Great Brit.* 181.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 256 ♂ only.

*Schenck, Nass. Bien.* 329.

*Thoms. Hym. Scand.* ii. 222.

*Apis willughbiella*, *Kirby, Mon. Apum Angl.* ii. 233 ♀ ♂.

*Anthophora fulviventris*, *Zett. Ins. Lapp.* 465.

*Female.* Length 6–7 lines.—Black; head as wide as the thorax, the face clothed with dark fulvous pubescence, the vertex with black, and the cheeks with pale ochraceous; the mandibles stout, prominent, and quadridentate, the two apical teeth acute, the inner pair obtuse. Thorax above clothed with a rufo-fulvous pubescence; at the sides and beneath it is paler; the wings subhyaline, the apical margins faintly clouded, the nervures and tegulæ black; the legs have a short fulvous pubescence, that on the tarsi beneath ferruginous; the calcaria and claws ferruginous, the latter black at their tips. Abdomen subcordate; the three basal segments have a pale fulvous pubescence, that on the apical segments is much shorter and black; the fourth and fifth segments have a narrow fringe of white pubescence; the pollen-brush on the abdomen beneath is black at the sides and at the apex and fulvous in the middle. B.M.

*Male.* Length 5–6 lines.—The face has a pale fulvous pubescence, that on the clypeus very bright and glittering; the antennæ half the length of the thorax, the apical joint compressed, wider than the other joints. Thorax, the pubescence fulvous above, griseous beneath; the anterior legs have a stout spine on the coxæ, the femora dilated and of a pale testaceous yellow beneath, having two longitudinal ferruginous stripes; the tibiæ beneath and the tarsi pale testaceous; the tibiæ have a bent spine at their apex in front; the basal joint of the tarsi as broad as the tibiæ, the three following joints transverse, gradually narrowing to the apical joint, the tarsi densely fringed with a pale glittering curled pubescence, which has a ferruginous stain beneath; the claws pale ferruginous, their tips black; the intermediate and posterior legs have a loose cinereous pubescence, the posterior tibiæ slightly bent, the claws ferruginous, the tips black. Abdomen subquadrate, the pubescence loosely scattered and pale fulvous; the apex emarginate, the seventh segment armed with three short angular teeth. B.M.

This is the most abundant species of the genus found in this country: in districts where willow-trees abound the insect occasionally occurs in immense numbers; hence its popular name, the willow-bee. It is found during June, July, and August. Dours

does not include it in his Hymenoptera of France; but it has been received from Paris, taken by Dr. Sichel.

### 9. *Megachile maritima*.

*M. pallide pubescens*, thoracis disco fusco-ferrugineo; mandibulis magnis, prominentibus; abdomine oblongo-cordato, segmentorum marginibus albicantibus. *Mas* pedibus anticis dilatato-ciliatis, tibiis posticis clavatis, ano emarginato.

*Megachile maritima*, *Smith, Zool.* ii. 692 ♂ ♀; *Bees Great Brit.* 182.  
*Schenck, Nass. Bien.* 329.

*Apis maritima*, *Kirby, Mon. Apum Angl.* ii. 242 ♀.

*Apis lagopoda*, *Fabr. Ent. Syst.* ii. 325 ♂.

*Anthophora lagopoda*, *Fabr. Syst. Piez.* 374 ♂.

*Panz. Faun. Germ.* 55. 7.

*Female.* Length 6-7 lines.—Black; the face before the antennæ densely clothed with fulvous pubescence, above the antennæ and on the vertex it is dark fuscous or black; the mandibles stout, and with four blunt teeth, fringed with fulvous hairs beneath. Thorax, the pubescence on the disk dark fuscous, on the sides and beneath pale fulvous, more or less so according to age; the legs with a pale bright pubescence; on the anterior tibiæ above it is fuscous; they are fringed behind, as well as the tarsi, with long pale fulvous hairs; the posterior tibiæ with short cinereous pubescence outside; all the tarsi clothed beneath with rufo-fulvous pubescence; wings subhyaline, slightly clouded at their apical margins. Abdomen, the two basal segments with thin loose fulvous pubescence; on the other segments it is short and black, and their apical margins have a narrow pale fringe; beneath, densely clothed with very pale pubescence, whitish at the base; at the apex is a little black pubescence. B.M.

*Male.* Length 6-7 lines.—The general pubescence fulvous, palest at the sides of the thorax, beneath, and on the legs. The antennæ filiform, with the apical joint compressed and dilated; the mandibles with their inferior margins towards their apex rufo-piceous; the anterior coxæ armed with a blunt spine; the anterior legs have the femora and tibiæ pale testaceous beneath, the former having a dark longitudinal stripe in the middle; the tarsi pale testaceous and broadly dilated, the apex of the tibiæ also pale; the basal joint of the tarsi as broad as the tibiæ at the base, and widened slightly towards the apex, which is much produced above and rounded at the point; the following three joints very short, each in succession much reduced in width; the tarsi with a dense curled fringe behind of pale pubescence, which is slightly ferruginous at its margin; the posterior tibiæ incrassate, and, as well as the tarsi, curved inwardly; the basal joint of the tarsi broadly dilated. Abdomen oblong, the apex obtuse; the sixth segment with a deep central depression, its apical margin deeply emarginate in the middle, with the sides crenulated; the seventh segment has on its margin a minute lateral tooth. B.M.

This species I have received from France, and also its close ally *M. lagopoda*, although Dours does not include the latter in his Hymenoptera of France. The male of *M. lagopoda* has not the dilated apical joint in the antennæ, the basal joint of the posterior tarsi is much longer, and the fringe of the anterior tarsi is black beneath; the female is very like that of *M. maritima*, but its pollen-brush is bright ferruginous.

I have found this species most abundant at the sea-side; it swarms in Sandown Bay, Isle of Wight, in July, and is also very plentiful at Littlehampton; it has occurred at Hampstead, but rarely, and is found at Southend, Deal, Dover, and Folkestone; I have taken it in North Wales, at Barmouth, and also in Anglesea.

### Genus 12. CERATINA.

*Apis* (pt.), *Rossi, Mantis. Ins.* i. 139 (1792).

*Hylæus* (pt.), *Fabr. Ent. Syst.* ii. 302 (1793).

*Prosopis* (pt.), *Fabr. Syst. Piez.* 293 (1804).

*Ceratina*, *Latr. Hist. Nat. Ins.* xiv. 50 (1805).

Head transverse; *ocelli* in a triangle on the vertex; *antennæ* short and subelavate; *mandibles* stout and tridentate; *labial palpi* 4-jointed, the two basal joints elongate, the third and fourth minute, articulated near the apex of the second joint; the *maxillary palpi* 6-jointed, the three basal joints about equal in length, the three apical ones minute, each gradually decreasing in length. Thorax ovate; the *anterior wings* with three submarginal cells, the second forming a truncated triangle, the second and third cells each receiving a recurrent nervure a little beyond the middle. Abdomen subelavate, convex, with the two basal segments constricted.

This genus of bees is widely distributed; at present about forty species are known; six are European, four African, and sixteen Asiatic. Of New-World species fourteen are known; it has not as yet been found in Australia, but a closely allied genus, *Thaumatoma*, appears to take its place in West Australia. The genus *Ceratina* was formerly classed among the parasitic bees; St.-Fargeau considered them to be parasitic from the circumstance of their being destitute of the usual polliniferous appendages. Spinola was the first to correct this error in a memoir in the *Annales du Muséum d'Hist. Nat.* 1807, where a correct history of their economy is given. I have observed them making their tunnels in dead bramble-sticks. Two species are described as British; the second, *C. cucurbitina*, is believed to have been found in South Devonshire many years ago; it requires confirmation by subsequent capture to establish the species as really belonging to our fauna.

#### 1. *Ceratina cyanea*.

*C. cyanea*, glabriuscula, clypeo callisque humeralibus nigris, abdomine clavato. *Mas* clypeo labroque albis.

*Ceratina cyanea*, *St.-Farg. Hym.* ii. 505.

*Gerst. Stett. ent. Zeit.* 1869, 180.

*Thoms. Hym. Scand.* ii. 68.

*Apis cyanea*, *Kirby, Mon. Apum Angl.* ii. 308, tab. 17. fig. 7 ♀, fig. 8 ♂.

*Ceratina cærulea*, *Smith, Zool.* iv. 1448; *Bees Great Brit.* 194.

*Schenck, Nass. Bien.* 171.

*Female.* Length  $2\frac{1}{4}$ –3 lines.—Shining dark blue, closely and finely punctured; antennæ, clypeus, and mandibles black, the latter rufopiceous at their apex and tridentate; the flagellum rufopiceous beneath towards the apex. Thorax, the mesothorax with a central impressed line and also a short one opposite each tegula; the wings fusco-hyaline and iridescent; the pubescence on the legs cinereous, but on the posterior tarsi beneath it is yellowish; the apical joints of the tarsi rufotestaceous, the calcaria pale testaceous. Abdomen, the sixth segment with a central carina terminating in a sharp point at the apex; beneath, the segments have a thin, long, pale pubescence. B.M.

Var.  $\beta$ . A minute pale spot on the clypeus.

*Male.*—Usually about the size of the female, differing in having the clypeus and labrum white; the sixth segment of the abdomen as in the other sex, the seventh produced into an elevated mucro, which is deeply emarginate at the apex and rendered bidentate.

B.M.

This species was considered by myself and others to be identical with the *Apis cærulea* of Villars until Dr. Gerstaecker pointed out the error; on referring to Villars's 'Linnæi Entomologia,' and comparing the description and figure with the British species, it is apparent that he describes a different species, which, I think, is identical with the *Ceratina aenea* of Brullé.

*Ceratina cyanea* is a very local insect, but plentiful in certain localities. I have found it during June and July plentiful in the warren at Folkestone, frequenting the flowers of *Echium vulgare*; later in the season, in October, a quantity of perforated bramble-sticks were obtained from the same locality, and on examining them some weeks afterwards it was ascertained that they contained the perfect bee. By placing the sticks in a warm situation several came forth on Christmas day; this clearly established the fact of the insect hibernating in the perfect condition. The species is not uncommon in the neighbourhood of Bristol, and has been taken sparingly at Charlton, Kent, at Birch and Darent Woods, at Weybridge and Budleigh-Salterton, South Devon.

## 2. *Ceratina cucurbitina.*

*C. nigra, nitida*; clypeo callisque humeralibus albo ornatis. *Mas*  
clypeo labroque punctis albis.

*Apis cucurbitina*, *Rossi, Mantis. Ins.* i. 145 ♀.

*Hylæus albilabris*, *Fabr. Ent. Syst.* ii. 305.

*Prosopis albilabris*, *Fabr. Syst. Piez.* 293.

*Ceratina albilabris*, *Latr. Hist. Nat. des Ins.* xiv. 50.

*Spin. Ins. Ligur.* i. 151.

*Germ. Faun. Ins. Eur.* v. no. 17.

*Dufour, Ann. Soc. Ent. Fr.* ix. (1840) 16.

*St.-Farg. Hym.* ii. 506, pl. 19. fig. 1 ♂, 2 ♀.

*Lucas, Expl. Sc. Algér.* iii. 223.

*Smith, Zool. Append.* vii. 57; *Bees Great Brit.* 195.

*Giraud, Ann. Soc. Ent. Fr.* vi. (1866) 454.

*Female.* Length 3 lines.—Black, shining and punctured, finely and closely so on the abdomen; a longitudinal white spot on the clypeus; the lips of the mandibles rufo-piceous; the wings fusco-hyaline; the tubercles white, and usually a minute white spot at the base of the tibiæ; the apical joints of the tarsi rufo-testaceous; the abdomen clavate, the apical margins of the segments narrowly rufo-piceous.

*Male.*—Usually rather smaller than the female, and differing in having the clypeus entirely and a spot on the labrum white. B.M.

The spots described as white are usually yellowish in cabinet specimens; but white in fresh ones. I have considerable doubt of this being a British species. There is a single specimen, a male, in the Museum collection; it has a number attached; and in Dr. Leach's MS. Catalogue the entry to the corresponding number is, "Taken in Tothill Lane, Devonshire." If the entry really alludes to the *Ceratina*, no doubt future captures will prove the species to be indigenous. It is generally distributed on the Continent.

#### Subfam. IV. SCOPULIPEDES, Latr.

##### Genus 13. EUCERA.

*Apis* (pt.), *Linn. Syst. Nat.* i. 953 (1766).

*Eucera*, *Scop. Ann. Hist. Nat.* iv. 8 (1869).

Head transverse; *ocelli* in a curve on the vertex; *antennæ* filiform; the *labial palpi* 4-jointed, the first joint elongate, linear, and twice the length of the second; the third and fourth joints minute, clavate, and articulated near the apex of the second joint; *maxillary palpi* 6-jointed, the basal joint robust, much thicker than the following joints, which are subclavate, each gradually decreasing in length as compared with the preceding joint; *tongue* one third longer than the palpi; the *paraglossæ* setiform, elongate, nearly as long as the tongue, and acuminate at the apex. The *anterior wings* with two submarginal cells, the second receiving both the recurrent nervures; the calcaria simple, the claws of the tarsi bifid.

The males have the antennæ elongate, nearly as long as the body, filiform, and with four or five of the apical joints arcuate; the entire flagellum minutely and beautifully reticulated.



Only one species of this genus is found in this country; but about twenty are described as inhabiting Europe; species have been found in Algeria; and one has been received from North China. St.-Fargeau mentions one from Cayenne. All the Brazilian species, the males of which have elongate antennæ and closely resemble the genus *Eucera*, belong either to the genus *Tetralonia* or *Melissodes*, in both of which the anterior wings have three submarginal cells. Klug has described two species from Syria, and Spinola two from Egypt.

Kirby describes four species belonging to his subdivision of long-horned bees; his second species, which he names "*linguaria*," is a small faded form of *Eucera longicornis*; the third, "*pollinaris*," is a female belonging to the genus *Tetralonia* of Spinola, and is from the Cape of Good Hope; the fourth is a species of *Melissodes*; it is in a faded and bad condition, but is probably identical with *Melissodes denticulata*, described by myself in the Catalogue of Hymenopterous Insects, part ii. p. 311, and is from North America. *Eucera longicornis* appears usually in May, and prefers a stiff clayey soil in which to form its burrows; they are sometimes found in large colonies, when numbers of males may be seen on the wing gyrating in all directions over the ground perforated with their burrows: occasionally they may be observed to come into contact, when two, three, or four will cling to each other, and get their long antennæ so intertwined that they have some difficulty in disengaging themselves. Their burrows are usually about 6 inches in length: at the end of each an oval chamber is excavated; it is perfectly smooth within and coated or lined with a liquid secretion by the parent bee, which prevents the mixture of pollen and honey deposited in a semifluid state from being absorbed. Each cell is the abode of a single larva, which passes the winter months in that condition; about the month of April the change to the pupa state takes place; and very shortly afterwards the perfect condition is attained. The pupa is enveloped in a thin transparent pellicle which encloses every limb. On arriving at the mature active state the bee by degrees frees itself from the shroud in which it was enclosed, and comes forth into the open air and sunshine. Immediately on emerging, it passes its antennæ through the notch at the base of the first joint of the anterior tarsus, and thus divests those organs of the thin pellicle in which they were enclosed. The long antennæ of the males of this and the two allied genera are doubtless adapted to some peculiar phase in the economy of these bees; and the remarkable hexagonal reticulation which covers their antennæ is no doubt an adaptation which is connected with their peculiar function, but which we are as yet unable satisfactorily to appreciate.

### 1. *Eucera longicornis*.

*E. nigra*, pallide fulvo villosa, thorace abdominisque basi hirsuto fulvis. *Mas* antennis filiformibus longitudine corporis.

*Eucera longicornis*, Scop. *Ann. Hist. Nat.* iv. 8 ♀.

*Latr. Hist. Nat. Ins.* xiv. 43.

*Fabr. Syst. Piez.* 382.

*Brullé, Expéd. Sc. de Morée*, iii. 334.

*Zett. Ins. Lapp.* 469.

*St.-Farg. Hym.* ii. 118.

*Lucas, Exp. Sc. Algér.* iii. 159.

*Smith, Zool.* iv. 1449; *Bees Great Brit.* 197.

*Nyland. Notis. ur Sällsk. pro Faun. et Flor. Fenn.* i. 249.

*Bär, Bull. Mosc.* xxiii. 530, tab. 13. fig. 1.

*Schenck, Nass. Bien.* 170.

*Thoms. Hym. Scand.* ii. 58.

*Apis longicornis*, *Linn. Syst. Nat.* i. 953 ♂, et *Cab. Mus. Linn. Soc.*

*Scop. Ent. Carn.* 298.

*Fabr. Syst. Ent.* 388.

*Rossi, Faun. Etrus.* ii. 922.

*Christ. Hym.* 142, tab. 11. fig. 9 ♂.

*Kirby, Mon. Apum Angl.* ii. 278 ♂ ♀.

*Andrena strigosa*, *Panz. Faun. Germ.* 64. 16.

*Female.* Length  $6\frac{1}{2}$ –7 lines.—Black; the face and labrum clothed with cinereous pubescence, somewhat fulvous on the labrum anteriorly, the mandibles ferruginous at their apex. Thorax above clothed with fulvous pubescence, on the sides pale yellow, and beneath cinereous; tegulæ and nervures ferruginous, the wings pale fulvo-hyaline; the legs have a fulvous pubescence above, on the tarsi beneath it is ferruginous; the calcaria pale testaceous, the apical joints of the tarsi ferruginous, tips of the claws black. Abdomen broad, subdepressed, at the base thinly clothed with pale fulvous pubescence; the second and third segments have laterally on their apical margins a fascia of very short cinereous pubescence, on the fourth segment an entire fascia; the two apical segments covered with short fulvous pubescence; beneath, the apical segments have a fulvous fringe. B.M.

*Male.* Length 5–7 lines.—Black; the labrum and clypeus yellow, the pubescence on the face yellowish white; on the margin of the vertex, disk of the thorax, and two basal segments of the abdomen it is fulvous; the antennæ as long as the entire insect; the extreme apex of the abdomen fulvous; the wings and legs as in the other sex. B.M.

This species appears about the middle of May, and is generally distributed in this country, and widely so on the Continent, being found in France, Switzerland, Germany, Italy, Denmark, Sweden, Lapland, Russia, and Siberia. A colony of great extent was found about a mile beyond Southend, in a sloping bank at the foot of which, in the month of October, several years in succession, many specimens of *Meloë rugosus* were found; and although the beetle was never traced to the nidus of *Eucera*, it is very probable that it was parasitic upon it, no other bee except a species of *Andrena* having been observed burrowing in the same situation. *Nomada sexfasciata* is the parasite of this species.

## Genus 14. SAROPODA.

Apis (pt.), *Panz. Faun. Germ.* fasc. 55. 17 (1800).

Anthophora (pt.), *Spin. Ins. Ligur.* i. 127 (1806).

Heliophila, *Klug, Illig. Mag.* vi. (nec *Burmman*) (1807).

Saropoda, *Latr. Gen. Crust. et Ins.* iv. 177 (1809).

Head transverse; *ocelli* placed in a triangle on the vertex; *antennæ* filiform; the *labrum* subquadrate, the anterior angles rounded; *mandibles* bidentate, the teeth obtuse; *tongue* elongate, one third longer than the palpi; *labial palpi* 4-jointed, the first joint more than six times the length of the second, the two apical joints minute, the four joints consecutive; *maxillary palpi* 4-jointed, the basal joint short and robust and about one third of the length of the second, which is as long as the third and fourth joints united, the apical joint cylindrical. Thorax globose; the *anterior wings* with three submarginal cells, the second forming a truncated triangle and receiving the first recurrent nervure near the middle; the third rounded at apical margin and receiving the second recurrent nervure at its extremity; the claws of the tarsi bifid and rather large. Abdomen subovate, truncate at the base; the terminal segment with a smooth triangular plate which has rigid setæ at its sides.

The genus *Saropoda* contains at present a small number of species, only nine being described: one is found in this country, one in Russia, four in Egypt, two in Africa, and one in Australia. From the latter countries additional species will probably come. This genus and *Anthophora* are very closely allied, and can only be separated by an examination of the tongue, the latter genus having 6-jointed maxillary palpi.

Of all the busy bees that revel in the beauty of a summer's day, *Saropoda bimaculata* must ever be an especial favourite; it is only to be found when it is sunniest, brightest, and hottest—when summer days are summer days indeed. Who has not heard its merry hum? Who has not seen it when for a moment it settles on a flower, or rests on some sunny bank, panting with delight? the eyes splendid as opals; could their brilliancy be preserved, this bee would rival and challenge admiration with the most brilliant of its tribe. It is a local species, but abounds in many localities. It flies with incredible swiftness, darting from flower to flower with the rapidity of lightning; again settling it resumes its loud and cheerful note, merry and joyous as the cricket on the hearth.

*Saropoda bimaculata* burrows in banks and sandy cliffs. Large colonies are found occasionally; at Sidmouth, in South Devon, and particularly at the top of the cliff at High Peak, a mile from the town, its numbers are incredible. It is found at intervals along the line of cliff all the way between this and Budleigh-Salterton, a distance of about eight miles; it is also extremely abundant in Sandown Bay, Isle of Wight, where the cliffs are riddled with its burrows: still it is a local insect, not found very near to the

metropolis. It formerly occurred at Coombe Wood, and is not uncommon at Weybridge and at Blackwater, Hants.

### 1. *Saropoda bimaculata*.

*S. nigra*, pallide villosa, facie antice oreque flavescens, ano tomentosum-incano. *Mas* thorace fulvo-villosa, facie immaculata.

*Saropoda bimaculata*, *Latr. Gen. Crust. et Ins.* iv. 177.

*Curtis, Brit. Ent.* viii. 361. fig. ♂.

*Smith, Zool.* iii. 891; *Bees Great Brit.* 199 ♂ ♀.

*Dours, Mon. Icon. Anthoph.* 169.

*Apis bimaculata*, *Panz. Faun. Germ.* 55. 17 ♀.

*Kirby, Mon. Apum Angl.* ii. 286 ♀.

*Anthophora bimaculata*, *Spin. Ins. Ligur.* i. 127.

*St.-Farg. Hym.* ii. 36.

*Heliophila bimaculata*, *Khig, Illig. Mag.* vi. 227.

*Apis rotundata*, *Panz. Faun. Germ.* 56. 9 ♂.

*Kirby, lib. cit.* ii. 291 ♂ ♀.

*Anthophora rotundata*, *Schenck, Nuss. Bien.* 169.

*Female.* Length  $4\frac{1}{2}$ –5 lines. Black; the clypeus, labrum, and mandibles at their base yellow; the clypeus black at its base, divided by a narrow central yellow line; the apical half of the mandibles rufo-piceous; the face has a short thin pale fulvous pubescence; on the vertex it is more or less fuscous. Thorax—the disk with short fuscous pubescence, that on the sides, beneath, and on the legs pale fulvous; on the basal joint of the posterior tarsus within is a dense dark fusco-ferruginous pubescence; the apical joints of the tarsi rufo-piceous; the legs frequently entirely rufo-piceous, sometimes obscurely so; wings hyaline at their base, more or less clouded at their apical margins, the tegulæ testaceous. Abdomen subglobose, with a little long pale fulvous pubescence at the base; on the following segments a short thin fuscous pubescence; the base of the third, and the fourth and fifth entirely, covered with a pale cinereous pilosity; at the extreme apex the pubescence is black; all the segments with narrow pale pubescent fasciæ on their apical margins. B.M.

*Male.* Length  $4\frac{1}{2}$  lines.—Black; the face below the antennæ, the labrum, mandibles, and scape in front yellowish white; the face has a thin pale fulvous pubescence; on the vertex and disk of the thorax a rich fulvous pubescence, but much paler on the sides and beneath; legs dark rufo-piceous, sometimes black; the posterior tibiæ subincrassate; the claw-joint of the tarsi enlarged, larger than in the other sex; wings as in the female. Abdomen subovate; the apical margins of the segments with narrow pale fulvous pubescent fasciæ. B.M.

This bee, usually appearing in July, is frequently found on the purple heath, and no doubt frequents other flowers; but I have not frequently observed it doing so. Kirby's *A. rotundata* is this species in finer condition than his *A. bimaculata*. The descriptions of the

sexes are those of the insect in perfect unbleached condition ; these bees, appearing only in hot bright sunny weather, soon fade and become more or less cinereous.

### Genus 15. ANTHOPHORA.

*Apis* (pt.), *Linn. Syst. Nat.* i. 953 (1766).

*Anthophora*, *Latr. Nouv. Dict. d'Hist. Nat.* ix. 167 (1803).

*Megilla* (pt.), *Fabr. Syst. Piez.* 328 (1804).

*Lasius* (pt.), *Jurine, Hym.* 235 (1807).

*Saropoda* (pt.), *Curtis, Brit. Ent.* viii. (1831).

Head transverse, not quite as wide as the thorax ; *ocelli* in an isosceles triangle on the vertex ; *antennæ* short, subclavate, the scape shorter than the second joint of the flagellum ; the *labrum* subquadrate, its anterior margin more or less rounded ; the *clypeus* convex and produced ; *tongue* elongate, one third longer than the palpi ; *labial palpi* 4-jointed, the basal joint thrice the length of the second, the two apical joints minute, subclavate, and articulated near the apex of the second joint ; *paraglossæ* short and lanceolate ; *maxillary palpi* 6-jointed, the basal joint short, stout, and about half the length of the second joint, the rest filiform and decreasing in length. Thorax ovate ; *anterior wings* with three submarginal cells, the second narrowed towards the marginal and receiving the first recurrent nervure in the middle ; the third, which is rounded towards the apex of the wing, receives the second recurrent nervure at its apex ; the posterior tibiæ and basal joint of the tarsi densely pubescent externally. Abdomen ovate, sometimes densely pubescent or with pubescent fasciæ.

In some species the males have the intermediate legs elongated.

Of the insects which are parasitic on *A. acervorum* in the larva state, the first which claims notice is a species belonging to the Chalcididæ, of the genus *Melittobia* of Westwood, with which the genus *Anthophorabia* of Newport is synonymous. The latter gentleman published a valuable and highly interesting memoir on this parasite in the 'Linnæan Transactions,' vol. xxi. p. 63.

In the autumn of 1853 I had the good fortune of finding this interesting parasite in the cells of *Anthophora*. The female is a minute shining dark green insect, not more than half a line in length ; the male is equally minute, but is of a testaceous yellow colour, having only rudimentary wings, and is not furnished with the usual compound eyes, but has in their place exceedingly minute simple eyes or ocelli, besides three true ocelli on the vertex of the head. This remarkable conformation was discovered by Mr. Newport, who has given ample details, the results of most elaborate physiological investigations, in the paper alluded to. *Melittobia* is here treated as the parasite of *Anthophora*, in accordance with the history of its habits as detailed by Mr. Newport ; but when I discovered the larva it was feeding on that of *Monodontomerus nitidus*, a true parasite on the bee, which has been found in its cells feeding on the pupæ. Having obtained a large supply of larvæ of the bee, and also of

*Monodontomerus* and *Melittobia*, ample means of observation were afforded, the result of which appeared to show that *Monodontomerus* is the true parasite of *Anthophora*, and *Melittobia* a parasite of *Monodontomerus*. *Melittobia* attacks indiscriminately the larvæ of both insects; but in their natural situation I only found them feeding on *Monodontomerus*. Several cells were obtained containing larvæ of *Melittobia*; but their victim was consumed; therefore it was not possible to determine satisfactorily whether they had fed upon the Chalcididous insect or the bee. M. Audouin discovered *Melittobia acasta* in the nests of *Osmia*, *Anthophora*, and *Odynerus*: probably there are several species closely allied; for with insects so minute and belonging to a family in which a very general resemblance obtains, it requires a practised eye as well as a careful microscopic investigation before the specific differences can be detected. The mode of attack which these parasites practise appears to be made by several females obtaining entrance to the cell of the bee and attacking its larvæ, upon which they deposit their eggs, to the number of one hundred at least, which soon hatch. The young larvæ attach themselves to their victim, continuing to feed until full-grown, when they fall off and lie inactive at the bottom of the cell. By the time the whole brood is full-fed the larva of the bee is entirely consumed. The bees and the parasites appear in their perfect condition about the same time in the season, some having passed the winter months in the larva state, others in their perfect condition.

The genus *Anthophora* has a world-wide distribution; the number of species at present known is about one hundred and thirty, four only being found in this country. Dr. Dours, in his monograph of the genus published in 1869, enumerates one hundred and fifteen species, several from the islands of the Eastern archipelago and South America being unknown to him. The economy of the species varies considerably, some being true carpenter bees, others burrowers in the ground, in the mortar of walls or buildings, or in cliffs at the seaside. They are subject to the attacks of numerous parasites, some belonging to their own order, others being coleopterous; their nests are also frequently attacked by the general devastator, *Forficula*. This predaceous and, indeed, omnivorous insect devours alike the store laid up by the bee for the sustenance of its brood, the larva, pupa, and also the perfect insect itself.

Two bees are parasites upon the genus *Anthophora*—*Melecta luctuosa* and *M. armata*—the former upon *A. retusa*, and the latter upon *A. acervorum*: the latter makes its appearance very early in the spring, as soon, in fact, as the first wild flowers bloom; it may be sometimes observed early in March, attracted by the garden-crocus; it continues to be found as late as July, and was captured in the Isle of Wight on the 15th of that month. The latter circumstance is explained by an investigation of a colony in the month of November, when a large portion of the brood will be found to have arrived at its perfect condition, the rest being still in the larva or the pupa state, the latter fast advancing to maturity: the

entire brood of the colony will pass the ensuing winter either as larvæ or perfect insects; none can withstand its rigour in the intermediate or pupa state. Those which remain larvæ until the return of spring advance to the perfect state very irregularly; many will not become perfect until May, and a few probably not until June; this will account for the species being found during so many months in one season. I have frequently had larvæ in an artificial condition (that is, in glass tubes or boxes) which have not changed until the second season, but am quite unable to account for such an apparent anomaly; how little, in fact, is at present known of the *complete history of the Aculeate Hymenoptera!* for, to use the words of Kirby, "So much knowledge, even with respect to a single genus, where the species are numerous, is not to be expected from one man." But if each hymenopterologist would give faithful records of his observations, the day will come when, by a combination of observations, an approach will be made towards a perfect knowledge of the history, economy, and uses of each individual species.

### Section I. *Males with elongate intermediate tarsi.*

#### 1. *Anthophora retusa.*

*A. hirsuta, atra, tibiaram posticarum scopæ fulvo-aurea. Mas corpore pilis fulvis dense vestito, ano nigricante.*

*Anthophora retusa, Smith, Bees Great Brit.* 203 ♂ ♀.

*Dours, Mon. Anthoph.* 172 (not var.).

*Apis retusa, Linn. Syst. Nat.* i. 954, et *Cab. Mus. Linn. Soc.* ♀.

*Megilla retusa, Nyland. Notis. ur Sällsk. pro Faun. Fenn.* ii. 265.

*Thoms. Hym. Scand.* ii. 56.

*Apis haworthana, Kirby, Mon. Apum Angl.* ii. 307 ♂.

*Anthophora haworthana, Curtis, Brit. Ent.* vii. 357 ♂.

*Smith, Zool.* iii. 895.

*Female.* Length 7 lines.—Black; the head nearly as wide as the thorax; the sides of the face and the labrum have a brown pubescence. Thorax, the disk clothed with short black pubescence, the sides of the metathorax with sooty black, the posterior tibiæ and the basal joint of the tarsi clothed with fulvo-ferruginous pubescence; all the tarsi beneath ferruginous; the calcaria pale testaceous, the claws ferruginous. Abdomen slightly pubescent, the margins of the segments having a fringe of short sooty-black hair. B.M.

*Male.* Length 6–7 lines.—Black; the scape in front, the clypeus, the face on each side, and the labrum yellow; the clypeus with two large black maculæ at its base, sometimes uniting, and the labrum with two small black dots at the base; the pubescence on the vertex and on the disk of the thorax fulvous; in the centre of the latter is a mixture of black hairs; the anterior legs thinly fringed behind with fulvous hairs, the intermediate and posterior tibiæ fringed with fulvous; the basal joint of the intermediate tarsi has a thick short fringe in front, and a longer one behind, of black pubescence; the basal joint of the tarsi black, the apical joints

fulvous; the wings subhyaline, faintly clouded at their apical margins. Abdomen—the basal segment, and sometimes the second also, thinly clothed with pale fulvous pubescence, the apical segments have a short black pubescence, the margins of the segments more or less fringed with pale hairs. B.M.

Having changed the specific name of this species, I may state the reasons for so doing. In the first place, the authentic specimen in the Linnæan Cabinet is undoubtedly the present species; I have also ascertained that the next species, formerly considered the *retusa* of Linnæus, is not found in Sweden, whereas the present insect is common. The two species may at once be separated by simply examining the calcaria which arm the tibiæ; in *A. retusa* they are pale testaceous, in *A. acervorum* they are black. Mr. Kirby was not acquainted with the female of *A. retusa*; at least he considered the Linnæan typical specimen to be identical with *A. acervorum*; but on turning to the remarks on the Linnæan type in the 'Monographia,' we at once see the difference between it and the next species; Mr. Kirby says, "it is smaller, not quite so hairy, nor is its hair of so deep a black"—all characteristics of *A. retusa*, and not of *A. acervorum*.

The synonymy of this and the following species is difficult to determine; the older authors were not apparently acquainted with both species. As the difference in the two males is at once obvious, Mr. Kirby, with his acute perception of specific differences, at once detected this; and although he was not so successful in separating the females (if he possessed both at the time of the publication of his monograph), yet in his collection he subsequently placed the true female with his *A. haworthana*. Dours has mixed the females; for he says, the calcaria are sometimes black, sometimes testaceous. I have examined hundreds of the *A. acervorum*, but never saw one with pale calcaria. I have adopted such synonyma as I feel satisfied may be relied on.

## 2. *Anthophora acervorum*.

*A. atra*, tibiarum posticarum scopa fulvo-aurea. *Mas* corpore atro, hirsuto-fulvo, ano nigricante; pedibus intermediis elongatis, crinito-pectinatis.

*Anthophora acervorum*, *Smith, Bees Great Brit.* 204.

*Apis acervorum*, *Fabr. Ent. Syst.* ii. 322 ♀.

*Panz. Faun. Germ.* 78. 18 ♀.

*Megilla acervorum*, *Fabr. Syst. Piez.* 328.

*Apis palmipes*, *Rossi, Mantis. Ins.* i. 141 ♂.

*Apis hispanica*, *Panz. Faun. Germ.* 55. 6 ♂.

*Apis retusa*, *Kirby, Mon. Apum Angl.* ii. 296 ♂ ♀.

*Anthophora retusa*, *Blanch. Hist. Nat. des Ins.* 406, tab. 7. fig. 2.

*Smith, Zool.* iii. 894.

*Schenck, Nass. Bien.* 168.

*Megilla hispanica*, *Panz. Krit. Revis.* 225.

*Female.* Length 7-8 lines.—Black; the pubescence black, the pos-



terior tibiæ and basal joint of the tarsi clothed exteriorly with fulvo-ferruginous pubescence; the calcaria black. B.M.

*Male.* Length 7-8 lines.—Black; the scape in front, the clypeus, and face on each side, a transverse line above the clypeus, the labrum, and a spot at the base of the mandibles yellow; a black spot on each side at the base of the labrum and clypeus; the vertex, thorax above, and two basal segments of the abdomen clothed with fulvous pubescence, that on the thorax beneath cinereous; the intermediate legs elongate, the basal joint of their tarsi having a short thick black fringe at the apex in front, and having, as well as the three following joints, a thin fringe of long black hair behind, the apical joint fringed with long black hair on both sides; the posterior tibiæ have a white fringe on their hinder margin; the apical segments of the abdomen clothed with black pubescence; the calcaria black. B.M.

This bee is found in all parts of the United Kingdom. Extensive colonies are frequently met with; one of the largest I ever observed was in the chalk-pits at Northfleet; in the month of April so great were their numbers, that a dark flickering shadow was cast on the ground from the countless numbers assembled. This is the "wild bee" which Gilbert White observed in such numbers in the trenches of the Danish Camp, on Mount Carbon, near Lewes, which he describes, in his 'History of Selborne,' as "dashing round the heads of intruders, with a sharp and hostile sound."

*Anthophora acervorum* is considered by some continental entomologists to be synonymous with *A. pilipes*, Fabr. I have taken great trouble in order to obtain the sexes of *A. pilipes*; from France I have received a male very much like that of *A. acervorum*, but a female clothed with fulvo-cinereous pubescence; the same have been sent from Westphalia and also from Copenhagen; in this country no light-coloured female has to my knowledge been taken.

The parasite of this bee is *Melecta armata*, whose incursions are described by Shuckard as being very repugnant to it; he describes their attacking each other with fierce pugnacity. I have never witnessed any such combats, and imagine the circumstance must have arisen from some temporary cause, and is not part of the natural economy of the insect.

Two hermaphrodite specimens of this species have been captured: one was taken at Bristol, and is in the collection formed by the late Mr. Walcott of that city; the second example was captured by myself in April 1836, in a garden at Barnes. A description of this remarkable insect was published in the 'Entomological Magazine;' and two figures of it are given in the third volume of the 'Zoologist,' p. 890: in it the female character predominates; but one side of the face is male in colour, the antennæ on that side being thirteen-jointed; and the intermediate leg is male, the tarsi being elongated and fringed with long hair; the other legs are also male.

Section II. *Males with the intermediate tarsi not elongated.*3. *Anthophora quadrimaculata.*

*A. atra*, pallido villosa, thorace flavescente, abdominis segmentis pallido marginatis. *Mas* femoribus intermediis magnis, clavatis.

*Anthophora quadrimaculata*, *St.-Farg. Hym.* ii. 84 ♂.

*Smith, Bees Great Brit.* 205 ♂ ♀.

*Schenck, Nass. Bien.* 169.

*Dours, Mon. Anthoph.* 145.

*Apis quadrimaculata*, *Panz. Faun. Germ.* 55. 7 ♂.

*Megilla quadrimaculata*, *Fabr. Syst. Piez.* 331.

*Panz. Krit. Revis.* 226.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 244.

*Thoms. Hym. Scand.* ii. 55.

*Apis vulpina*, *Kirby, Mon. Apum Angl.* ii. 290 ♂.

*Saropoda vulpina*, *Curtis, Brit. Ent.* viii. 361.

*Smith, Zool.* iii. 892.

*Apis subglobosa*, *Kirby, lib. cit.* ii. 295 ♀.

*Anthophora borealis*, *Mor. Bull. Moscou* (1864) 446.

*Female.* Length  $4\frac{1}{2}$  lines.—Black; the pubescence on the face fuscous; on each side anteriorly is a little short cinereous pubescence; that on the vertex is black; on the disk of the thorax it is fulvo-ochraceous, the tips of the hairs black; on the metathorax the pubescence is pale fulvo-ochraceous, that on the thorax beneath is cinereous; the legs have a short cinereous pubescence, that on the posterior tibiæ and intermediate and posterior tarsi above is white; the tarsi fulvous beneath, the calcaria testaceous, the claws ferruginous; the wings hyaline, very faintly clouded at their apical margins. Abdomen subglobose, the margins of the segments fringed with fulvo-ochraceous pubescence; between the fasciæ the pubescence is fuscous, that at the apex black. B.M.

*Male.* Length 4 lines.—Black; the scape in front, the clypeus, a transverse line above, the face on each side, the labrum, and a spot at the base of the mandibles yellow; the clypeus has on each side at its base an angular black spot, and the labrum a minute round dot; in other respects it closely resembles the female; the femora clavate, the intermediate pair most thickly so. B.M.

This species appears about the end of June, and constructs its nest in banks, sandy cliffs, &c.; it frequents the deadnettle (*Lamium purpureum*), and is not uncommon in the vicinity of London. It in some respects resembles *Saropoda bimaculata*; its flight is rapid, and it makes a shrill piping sound similar to that of the latter insect. Dr. Nylander has examined the type of the *Megilla quadrimaculata* of Fabricius in the museum at Kiel, and has confirmed the suspicion of Kirby, expressed in his own interleaved copy of the 'Mongraphia,' viz. that his *Apis vulpina* was synonymous with that insect.

4. *Anthophora furcata*.

*A. nigro*, griseo pubescente; facie antice, labio anoque villosio ferrugineis. *Mas* corpore atro, cinereo pubescente; facie antice labioque flavis, abdomine apice furcato.

*Anthophora furcata*, *St.-Farg. Hym.* ii. 82 ♂ ♀.

*Eversm. Faun. Hym. Bull. Nat. Moscou*, 1852, 111.

*Smith, Bees Great Brit.* 206.

*Schenck, Nass. Bien.* 169.

*Dours, Mon. Anthoph.* 110.

*Apis furcata*, *Panz. Faun. Germ.* 56. 8 ♂.

*Kirby, Mon. Apum Angl.* ii. 288 ♂ ♀, tab. 17. fig. 5 ♀, 6 ♂.

*Megilla furcata*, *Panz. Krit. Revis.* 226.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 245.

*Thoms. Hym. Scand.* ii. 55.

*Saropoda furcata*, *Curtis, Brit. Ent.* viii. 361.

*Smith, Zool.* iii. 893.

*Female.* Length 6 lines.—Black; the pubescence on the labrum obscure ferruginous, that on the face fuscous, intermixed with black on the vertex; the thorax has a fuscous pubescence on the disk, on the metathorax and sides it is pale fulvo-ochraceous; the legs have a similar pubescence, that on the posterior tibiæ and basal joint of the tarsi is ferruginous; the apical joints of the tarsi ferruginous; wings subhyaline. Abdomen ovate; the base has a thin pale pubescence, which is also thinly scattered over the whole abdomen, that at the apex being bright ferruginous. B.M.

*Male.* Length 5–5½ lines.—This sex closely resembles the female, but it has the clypeus and the face on each side, a transverse line above the clypeus, the labrum, and usually a narrow interrupted line on the scape in front yellow; the clypeus has a round fuscous spot on each side at the base; the pubescence on the thorax is similar to that of the other sex above; beneath it is cinereous; the apical joints of the tarsi ferruginous. Abdomen thinly clothed with pale pubescence, towards the apex it is black. B.M.

This bee is not rare about London during July and August, but does not appear to be so generally distributed as the preceding species; it burrows in old posts, rails, &c. I have not found it beyond the London district; but Mr. Kirby found it in Suffolk, and it has been taken about Norwich.

## Division II. SOCIALES.

## Genus 16. BOMBUS.

*Apis* (pt.), *Linn. Syst. Nat.* i. 953 (1766).

*Bombus*, *Latr. Hist. Nat. Ins.* iii. 385 (1802).

*Megilla* (pt.), *Syst. Piez.* 328 (1804).

*Bremus*, *Jurine, Hym.* 259 (1807).

Body oblong and densely pubescent; *head* subtriangular, not so

wide as the thorax; *ocelli* in a curve, placed in a transverse depression on the vertex; *antennæ* geniculated and filiform, the scape half the length of the flagellum; *labrum* transverse, its anterior margin ciliated; *mandibles* stout, broad at the base and grooved at their apex, which is rounded; *tongue* elongate and pubescent, its proportions differing in the species; *labial palpi* 4-jointed, three fourths the length of the tongue, the first joint longer than the mentum, the second joint about one fourth the length of the first, in some species one third of the length; the two apical joints minute and articulated outside the second joint near its apex; *paraglossæ* short and rounded at their apex; *maxillary palpi* 2-jointed, the first usually robust, the second of about equal length, but varying in length in different species to twice the length. Thorax globose; *anterior wings* with three submarginal cells, the second narrowed towards the marginal and receiving the first recurrent nervure near its centre, the third receiving the second recurrent nervure near its apex; *legs* stout and pubescent; the posterior pair in the female smooth, gradually widened to the apex, and fringed at the external edges with long curled pubescence, forming a corbicula or pollen-basket; the basal joint of the tarsi oblong, broad, externally concave, its edges fringed with short stiff hairs; the inner surface pilose, the hair short, forming a dense brush; its base notched and having a stout external tooth; all the tarsi with the claws bifid. Abdomen subglobose.

The males have the tongue more elongate and slender; the mandibles fringed with stiff curled hairs; the antennæ 13-jointed, longer and more slender; the posterior tibiæ slightly widened at the apex and convex externally; the abdomen with seven segments.

Sexes three—males, females, and workers.

The geographical distribution of *Bombus* is very extensive, its species numbering little short of one hundred, twenty being British. Although found both in the Old and New World, and in a few instances ranging into the tropics, *Bombus* only penetrates Africa as far as Oran; it has not been found in Madagascar, Australia, or New Zealand. Wheresoever it occurs its parasite (*Apathus*) appears to accompany it, although it is of rare occurrence in the tropics. The range of *Bombus* in the Old World is probably more extensive than that of any other Hymenopterous genus: it is found in Lapland, Siberia, Kamtschatka, North China, Syria, and Northern India; and it has been found in Java, but that appears to be its southern limit, as not a single species has to my knowledge been found in the eastern archipelago. In the New World its geographical range extends to Greenland; Sir John Richardson found several within the arctic circle, at the Great Bear Lake; Captain Parry on his second voyage found two species at Boothia Felix. North America is rich in species of *Bombi*, and from Mexico some of the most beautiful species have been received. In South America we find it in Cayenne, and again on the Amazons at Para; further south it occurs on the Tapajos; and crossing eastwards we find it again at Monte Video. The largest species known is found in Chili.

Of the wild bees of this country the *Bombi* are certainly the most generally known; their size and sonorous hum necessarily attract every one's attention. They are known under a variety of popular names: in Hampshire they are called dumbledors, in other counties bumble-bees or hummel-bees, and more generally in the present day humble-bees; in Scotland the brown moss-building species are called foggie-bees. Their scientific name is simply an imitative one, and certainly very characteristic.

No one in early spring can have failed to notice the loud hum of these insects as the females fly along hedgerows and banks in search of suitable spots in which to make their nests, or when after their hibernation during winter they seek the sweets of spring's earliest flowers. In the month of May, when the horse-chestnut blooms, their hum among the flowers is heard from the break to the close of day.

Great difficulty attends the discrimination of the species, and unless examples are in a state of good preservation it is only a waste of time to attempt to determine them; but no amount of examination or comparison of specimens will at all times produce perfectly correct results. Of some species, such as the surface-builders (moss-builders as they are frequently incorrectly called), it is necessary to obtain nests and to breed the insects: the males are the most difficult to determine; but by an examination of the organs of generation they can be assigned to their respective species with undeviating correctness. During the last forty years I have endeavoured to obtain an exact knowledge of our native species, and by obtaining nests and collecting innumerable varieties into which the sexes run, I hope to be able to remove some of the difficulties attendant on the study of these interesting insects. In some species the difference in the colouring of the males renders it impossible to assign them to their legitimate partners without the aid either of good descriptions or by obtaining them from the nests. An insuperable difficulty is met with when old long-exposed examples, having their original colouring entirely bleached and changed, are examined; such may be deemed worthless and cast aside: but there is another difficulty, arising from the tendency to vary even in their original state of coloration. An instance of this kind is found in *Bombus muscorum*; in this country it varies greatly, and ten species have been described from its varieties: examples from Denmark include a black form, which is extremely rare in England, and has only been observed in small workers, but it occurs in all the sexes in the north of Europe. Similar differences occur in one or two other species; *B. subterraneus* and *B. soroënsis* are examples of this: such differences led to no less than forty species being described out of less than half of the real number.

The economy of the *Bombi* has been described in detail by numerous authors; but the majority have contented themselves with reproducing that of J. P. Huber, who paid great attention to these bees, and whose observations are in most respects in accordance with my own. However, I have never found the females hibernating in their old

nests (I allude to the species that construct them underground); such may be the case in some instances or in other countries, but I have never succeeded in finding them thus domiciled. The situations in which I have found them have been in the accumulation of rubbish, under clumps of furze, in the dry rotten wood of decaying trees, under moss in woods, and repeatedly under stacks of turf on commons; in all such situations I have found them singly, never packed in clusters, as has been described.

The females having passed the winter months in a state of torpidity are roused from their slumber by the warmth of the earliest spring days, and at once commence their life of unceasing labour. The burrowers underground are the first to appear and to seek for some cavity that may in some degree abridge their labour: a small one suits for the establishment of the colony; but the enlargement of it as the nest increases in dimensions devolves upon the offspring. These bees are occasionally found with loads of earth attached to their legs, and I have seen them so overloaded as to be unable to take flight until they had freed themselves of part of their load. The parent bee, having found a suitable situation for her nest, collects quantities of pollen and honey, hoarding it up in a mass: having a sufficient supply she commences depositing eggs upon it; in a few days the larvæ hatch, and at once commence to feed on the food on which they are cradled. At the side of the mass of food the parent bee also constructs receptacles called honey-pots, in which a coarse kind of liquid honey is stored: the use of this has been suggested to be for keeping the food of the larvæ moist; but in my opinion it is for the sustenance of the working colony at such times as they are prevented by unfavourable weather from leaving the nest.

When the larvæ are full-grown they spin a tough oval cocoon of silk, in which they rapidly undergo their transformation into the pupa state, and shortly afterwards acquire their perfect condition. The first bees developed are neuters, or workers. On emerging from the cocoons they are by no means in a mature state, fitted to take part in the labour of the community; several days elapse before they acquire the gay livery they are dressed in when they quit the nest and commence their labours. Young females do not appear until the season is considerably advanced, and later on males make their appearance; but the development of the various species differs considerably as to the time of the sexes being matured. My own observation in this respect leads me to the belief that *B. pratorum* first produces the males; these I have found usually about the third week in May. It has been asserted that males of this genus having once quitted the nest never return to it. That they seldom do so may be strictly correct; but I have seen the male of *B. pratorum*, *B. hortorum*, and also that of *B. derhamellus* enter their nests; and Mr. Kirby states, speaking of a male, "I have myself seen this insect entering the nidus of *A. lapidaria*."

The number of which the various communities consists varies very considerably; but as a rule the burrowers underground have a population twice as numerous as the surface-builders. The numbers in

the nests of the latter are greatly increased or diminished by the state of the weather: in fine dry seasons nests have double the number of inhabitants to what are found in them in wet unfavourable ones. A nest of *B. sylvarum*, found towards the end of August, had only three females, about half a dozen males, and a dozen workers, while several pupæ were dead in their cocoons. This was after a wet summer and autumn; the insects themselves, particularly the workers, were mere dwarf examples of the species. The average number of the population of *B. muscorum*, according to my observation, has been, in autumn when all the sexes are found, about 120; 25 of these were females, 36 males, the rest being workers.

The division which is here named surface-builders contains those species usually called moss-builders or carder-bees, which are said to card or comb and cleanse the moss which they use in the construction of their nests. Thus we find it recorded that "to these nests a moderately long arched passage is formed of the same material (moss) of sufficient size to permit the free passage of the bees to and fro." The nest is described as having a "vaulted covering, the inside of which is further strengthened by being plastered with a coating of wax." Whatever may be the habits of these bees in other parts of the world, my own observations have failed to detect in any of the numerous nests of *B. muscorum*, *B. venustus*, *B. elegans*, or of *B. sylvarum* any plastering of wax inside the covering, neither have I observed any long arched passage leading to the nest. With regard to the materials used in the construction of nests, I have found usually an admixture of moss, but very frequently not a sprig of that material; bits of grass, usually the tender blades dried—in fact a small bundle of hay has formed the covering, the blades on the inner surface being apparently more or less adhering, probably from the insects having bound them together with a gummy secretion or saliva. Several instances have come to my knowledge of the sagacity of these insects in making use of the nests of birds, and of their adapting them to their own requirements. One was recorded in the former edition of this work. Dr. William Bell observed the nest of a robin built in the porch of his cottage at Putney; some time afterwards he found that a humble-bee had taken possession of it, and had adapted it to its own purposes. Unfortunately the nest was destroyed before he had ascertained the name of the species; but, judging from the description Dr. Bell gave of the bee, there can be little doubt of its being *B. pratorum*. Mr. Walcott, of Bristol, communicated a similar account of finding the nest of a robin invaded by *B. derhamellus*, the eggs of the bird being covered with the accumulation of pollen and honey stored up by the bees. Mr. Walcott added to this account:—"I have in two previous instances found broods of the same bee in birds' nests." Another correspondent gave me the following account of *B. muscorum*:—"This insect took possession of a wren's nest at Holmbush, near Brighton; I had observed the bird building, and afterwards was astonished on finding that a bee

had taken possession of the nest, and had, as I found, constructed its waxen cells amongst the eggs of the wren." A very remarkable account of one of the brown bees was related to me by a lady, who observed it frequently flying into a stable through a latticed window; the bee was engaged in collecting a bundle of horsehair from a heap accumulated from currying the horses. Having made up a small parcel the bee flew off with it a short distance, and settled down with it among some grass. On examining the spot a nest constructed entirely of horsehair was discovered. This very interesting nest was unfortunately destroyed before the bee had quite completed its construction.

An interesting feature in the history of the *Bombi* is the varied temperament of the different species, and the degrees of pugnacity with which some species will resent any attempt to invade their domiciles. Nests of the surface-builders may be taken almost with impunity, whilst such an outrage on the underground ones would be a dangerous undertaking. No species is more courageous than *B. lapidarius*, and *B. virginialis* is equally formidable. This relates to such attempts being made in the height of the season; later, in the autumn, the bees lose their courage, and offer little if any resistance to attack on their habitations.

The *Bombi* have several parasites that invade their nests, and some of these must considerably reduce their numbers. The dipterous genus *Volucella* contains two or three species that feed upon their larvæ; a species of the genus *Conops* is also said to do so, but I have never found them in the nests. The larvæ of *Volucella* sometimes destroy the greater part of the brood; the same species (*V. bombylans*) also feeds upon the larvæ of Vespidae. The larvæ of *Conops* were found by Audouin in the intestines of *B. lapidarius*; and Latreille states that *Conops rufipes* lives in the larva state in the abdomen of various species of *Bombi*, and that it there passes through its stages of transformation, and, on arriving at its perfect condition, it escapes between the segments of the abdomen. Robineau-Desvoidy and also Léon Dufour have recorded similar observations. *Mutilla europæa* is parasitic in this country and throughout Europe on various species of *Bombus*; in England it has been found in nests of *B. muscorum*, *B. lapidarius*, and *B. latreillellus*. Hr. Drewsen, of Copenhagen, found it in the nest of *B. scrimshirani*, obtaining from a single nest no less than seventy-six individuals. Prof. Edward Brandt, of St. Petersburg, informed me that he had found *Mutilla* in the nests of *B. hortorum*, *B. lapidarius*, and of *B. muscorum*. Although *Mutilla* is a parasite of *Bombus*, many species of that genus must infest nests of other genera of insects. About three hundred species of Mutillidae are known, many of which inhabit countries where *Bombus* is not found. Numerous species of *Mutilla* are found in Australia, but *Bombus* is not found there, neither is it found in tropical Africa, where *Mutilla* is by no means uncommon.

A few species of Coleoptera are common in nests of *Bombi*; they probably resort there for the purpose of feeding on the wax or the honey. *Antherophagus nigricornis* and *pallens* are frequently found



in nests of *Bombus muscorum*, and *Anobium paniceum* I have observed in plenty in the same nests. Probably the greatest consumers of the wax is a species of *Acarus*; these sometimes infest the bodies of the bees themselves in such numbers as to render them incapable of flight. The bee-parasites belonging to the genus *Apathus* are not uncommon in the nests of some species; their parasitism is treated upon in the observations on that genus.

### Section I. *Surface-builders.*

#### 1. *Bombus muscorum.*

*B. hirsuto flavescens*, thorace fulvo, abdomine plus minusve atro fasciato.

*Bombus muscorum*, *Latr. Hist. Nat. des Crust. et Ins.* xiv. 65.

*Dahlb. Bomb. Scand.* 46, tab. fig. 17 ♀ var.

*Dreus. & Schiödde, Kroy. Tidsskr.* ii. 107 (1838).

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 227.

*Smith, Bees Great Brit.* 212; *Entomol.* iii. 267.

*Gerst. Stett. ent. Zeit.* (1869) 320.

*Thoms. Hym. Scand.* ii. 28.

*Apis muscorum*, *Linn. Syst. Nat.* i. 960 ♀, et *Cab. Mus. Linn. Soc.*

*Schränk, Ins. Austr.* 397.

*Rossi, Faun. Entrus.* ii. 100.

*Apis floralis*, *Kirby, Mon. Apum Angl.* ii. 321 ♂ ♀, tab. 17. fig. 14 ♂.

*Apis beckwithella*, *Kirby, lib. cit.* ii. 323 ♂ ♀, var. β ♀.

*Apis francillonella*, *Kirby, lib. cit.* ii. 319 ♀.

*Apis forsterella*, *Kirby, lib. cit.* ii. 325 ♀ minor.

*Apis sowerbiana*, *Kirby, lib. cit.* ii. 322 ♂.

*Apis curtisella*, *Kirby, lib. cit.* ii. 324 ♂.

*Bombus senilis*, *Fabr. Syst. Piez.* 352 ♀ (teste *Nyland.*).

*Bombus pygmæus*, *Fabr. lib. cit.* 353 ♀ (teste *Nyland.*).

*Female.* Length 6–7 lines.—Black; the face with a thin pale fulvous pubescence; the clypeus shining and naked, and on the vertex a few black hairs. The thorax clothed above with rufo-fulvous pubescence, on the sides and beneath it is cinereous; the femora fringed with cinereous pubescence, that on the tibiæ and tarsi black, on the latter more or less rufo-fuscous; the basal joint of the posterior tarsi and the apical portion of the two anterior pairs with ferruginous pubescence beneath; the fringe of the posterior tibiæ sometimes intermixed with pale hairs. Abdomen subtriangular, its pubescence pale fulvous; the first segment has laterally a tuft of paler pubescence; on the third segment a band of black pubescence, varying in width in different specimens. (*A. floralis*, *Kirby.*)

B.M.

Var. β. The first segment of the abdomen with pale pubescence, a broad band of black occupies the second and the greater part of the third, on the rest it is rufo-fulvous. (*A. beckwithella*, *Kirby.*) B.M.

*Worker.* Length 3–6 lines.—Closely resembling the female, the

pubescence on the legs being black, the abdomen exhibiting similar varieties of pubescence. B.M.

Var.  $\beta$ . Length 4–5 $\frac{1}{4}$  lines.—The general pubescence, except that on the legs, fulvous; on the abdomen it is sparing at the base, with a tuft at the lateral angles, towards the apex it is more dense and of a brighter fulvous. (*A. francillonella*, Kirby.) B.M.

Var.  $\gamma$ . Length 4 lines.—The general pubescence inclining to hoary, on the disk of the thorax it is more fulvous, worn and bleached, with the edges of the wings ragged. (*A. forsterella*, Kirby.) B.M.

*Male*. Length 5–6 lines.—Head, a little pale pubescence on the face, that on the vertex mixed with black; the antennæ as long as the thorax, which has a fulvous pubescence above, varying in richness of colour. Abdomen, the pubescence pale, with three or four dark bands more or less distinct. (*A. sowerbiana*, Kirby.) B.M.

Var.  $\beta$ . The abdomen with a little pale pubescence at the base, the rest black. (*A. curtisella*, Kirby.) B.M.

Var.  $\gamma$ . The abdomen with a little pale pubescence at the extreme base, that on the three following segments black, the rest fulvous.

Var.  $\delta$ . The pubescence of the entire insect nearly black.

This is probably the most variable species of all the British *Bombi*; it is found in all parts of the kingdom, in Denmark and Germany, as well as other parts of the continent. It occasionally occurs nearly black in all the sexes. In England I have only seen workers of this variety. I have considered six of Mr. Kirby's species to be varieties of *B. muscorum*, having repeatedly found them all in nests of this species. That the insect here described is the true *Apis muscorum* of Linnæus, is proved beyond doubt by an examination of the type specimen, which has the name attached to it in the handwriting of Linnæus; it is in his cabinet, now in the possession of the Linnean Society.

The parasite *Mutilla europæa* was found in the nest of this *Bombus* last summer, by Miss Madeline Pasley, at Shedfield Grange, near Wickham, Hants; several nests were examined and the *Mutilla* was found in each. This is the first time I have heard of this parasite being found in the nest of *Bombus muscorum*.

## 2. *Bombus agrorum*.

*B. ater*, hirsutus, thorace toto anoque ferrugineis.

*Bombus agrorum*, *Fabr. Syst. Piez.* 348 ♀.

*Dahlb. Bomb. Scand.* 43.

*Drews. & Schiöde, Kröy. Tidsskr.* ii. 108 ♂ ♀ ♂.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 228.

*Schenck, Nass. Bien.* 147.

*Thoms. Hym. Scand.* 6 ♀.

*Apis agrorum*, *Fabr. Ent. Syst.* ii. 321 ♀.

*Kirby, Mon. Apum Angl.* ii. 326.

*Bremus agrorum*, *Panz. Faun. Germ.* 85. 20 ♀.

*Female.* Length 7–8 lines.—The pubescence on the head black, intermixed with brown on the face and vertex; on the thorax above it is bright fulvous, on the sides and beneath it is very pale, inclining to white; on the tibiæ it is black, the corbicula on the posterior pair is fringed with long paler hairs. The basal segment of the abdomen with pale fulvous pubescence, the three following segments with black and the apical segments with fulvous pubescence; beneath, the segments thinly fringed with pale hairs.

*Worker.* Length 5–6½ lines.—Sometimes coloured like the female, but usually the abdomen mixed entirely with pale pubescence.

*Male.* Length 5–6½ lines.—Occasionally the pubescence as in the female, but very variable, frequently corresponding with the male of *B. muscorum*.

In nests of *Bombus muscorum* I have found females of this species on one or two occasions; the species is much less common than *B. muscorum*. I included *B. agrorum* among the varieties of *B. muscorum* in the first edition of this work; but finding the species plentifully last summer, I was induced to examine the generative organs of the males, and to compare them with those of *B. muscorum*, and feel satisfied that it is really a distinct species.

### 3. *Bombus venustus*.

*B. hirsuto flavescens*, thorace ferrugineo-fulvo.

*Apis muscorum*, Kirby, *Mon. Apum Angl.* ii. 317 ♂ ♀ ☿.

*Bombus muscorum*, *Fabr. Syst. Piez.* 349.

*Illig. Mag.* v. 163.

*Westw. Nat. Libr.* vi. 233, pl. 16.

*Schenck, Nass. Bien.* (in part.) 156.

*Thoms. Hym. Scand.* ii. 28.

*Bombus senilis*, *Smith, Bees Great Brit.* 214; *Entomol.* iii. 268.

*Female.* Length 8–9 lines.—The pubescence on the head pale fulvous, that on the thorax above rich fulvous orange; that on the sides is much paler, becoming whitish beneath; on the anterior and intermediate tibiæ the pubescence is black; the posterior tibiæ fringed with pale fulvous hairs. Abdomen clothed above with pale fulvous pubescence, inclining to lemon-yellow.

*Worker.* Length 4–6 lines.—Clothed like the female.

*Male.* Length 6–7 lines.—The pubescence as in the worker; the antennæ as long as the thorax, the joints subarcuate; the apex of the abdomen has usually a mixture of fuscous pubescence.

Dr. Nylander having informed me that he had seen a specimen named by Fabricius *Bombus senilis*, and that in his opinion it was a faded example of the worker of *B. muscorum*, I have changed the name. It is certainly the *Apis muscorum* of Kirby, but not of Linnæus. The name *senilis* is not characteristic of either the present species or of the *Apis muscorum* of Linnæus, except of examples in a worn and faded condition. The specimen of

*B. senilis*, named by Fabricius, in the Banksian collection is also a faded worker of *Bombus muscorum*.

#### 4. *Bombus elegans*.

*B. hirsutus*, ater, supra flavus, thorace fascia atra.

*Bombus elegans*, Seidl, Stett. ent. Zeit. (1873) p. 335.

*Bombus fragrans*, Illig. Mag. v. 165 ♂ (*nec Pallas*).

Dahlb. Bomb. Scand. 46, tab. fig. 16 ♀.

St.-Farg. Hym. i. 464.

Drews. & Schiöde, Kröy. Tidsskr. ii. 121 (1838).

Smith, Bees Great Brit. 216; Entomol. iii. 268.

Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. i. 229.

Thoms. Opusc. Ent. 251.

*Apis fragrans*, Kirby, Mon. Apum Angl. ii. 329 ♂ (*nec Pallas*).

*Bombus distinguendus*, Morow. Horæ Soc. Ent. Rossicæ, vi. 32.

Thoms. Hym. Scand. ii. 26.

*Female*. Length 8–10 lines.—Head, the face has a pale fulvous pubescence, more or less obscured and intermixed with black hairs; the pubescence on the thorax above yellow, more or less inclining to fulvous, and having a band of black pubescence between the wings; the pubescence on the legs is also black. Abdomen clothed with bright yellow pubescence, having usually more or less of a fulvous tinge towards the base. B.M.

*Worker*. Length 5–7 lines.—Excepting in size, there is no difference between the workers and females. B.M.

*Male*. Length 6–7 lines.—Closely resembling the worker, but having the pubescence on the face and cheeks paler, the antennæ as long as the thorax, the abdomen narrower and more elongate. B.M.

This species has hitherto been regarded as the *Bombus fragrans* of Pallas, which is a much larger insect and has dark brown wings. The bee has the same agreeable odour that suggested its name in the first instance; but the descriptions of older authors are usually much too brief, and the size of a species is only occasionally given.

This is a scarce species in the south of England, but has been occasionally taken at Hampstead, Shirley Common, Norwood, Lowestoft, Yarmouth, and on Durdham Downs, near Bristol; in the north it is more common. I found its nest in Yorkshire, and on disturbing it the bees emitted a powerful aromatic odour; the community, although it contained males and females, was small.

#### 5. *Bombus smithianus*.

*B. hirsutus*, ater, thorace supra fulvo; abdomine supra flavescente, subtus nigro.

*Bombus smithianus*, White, Proc. Linn. Soc. (1851); Ann. & Mag.

Nat. Hist. x. 2nd ser. 294.

Smith, Bees Great Brit. 215; Entomol. iii. 268.

*Bombus arcticus*, *Dahlb. Bomb. Scand.* 50. fig. 20 ♀ (*nec Kirby, Parry's First Voy. Append.* ccxvi, 1821).

*Zett. Ins. Lapp.* 476.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 228.

*Bombus agrorum*, *Thoms. Hym. Scand.* ii. 28?

*Female.* Length 8–10 lines.—The head clothed with black pubescence, except a few pale hairs at the margin of the vertex. Thorax clothed above with rich rufo-fulvous pubescence; beneath, and also on the legs, it is black. Abdomen clothed with a fulvous-yellow pubescence; at the extreme base is a little black pubescence; the fulvous colour of the pubescence is richest towards the base of the abdomen; beneath it is entirely black. B.M.

*Worker.* Length 4–7 lines.—Exactly resembles the female, but the pubescence of the abdomen appears usually to be yellower. B.M.

*Male.* Length 6–7 lines.—Closely resembles the other sexes, but has some pale pubescence on the face and also on the abdomen beneath; the posterior tibiæ have sometimes some pale hairs mixed with the marginal fringe. B.M.

This species was brought from Shetland by Mr. Adam White in 1851; in the following year a nest was found, and sent with all the sexes in it. Collectors have taken it since that time, but it has not been found in Scotland. It was taken at Lerwick and Mousa, but is said to be most abundant at Unst.

## 6. *Bombus sylvarum.*

*B. hirsuto flavescens*, thoracis fascia abdominisque cingulis nigris, ano fulvo.

*Bombus sylvarum*, *Fabr. Syst. Piez.* 348.

*Latr. Hist. Nat.* xiv. 65.

*Spin. Ins. Ligur.* i. 131.

*Illig. Mag.* v. 164.

*Dahlb. Bomb. Scand.* 44, tab. fig. 13 ♂, 14 ♀, 15 ♀.

*St.-Farg. Hym.* i. 163.

*Drews. & Schödte, Krøy. Tidsskr.* ii. 109 (1838).

*Smith, Bees Great Brit.* 217; *Entomol.* iii. 269.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 236.

*Schenck, Nass. Bien.* 142.

*Thoms. Hym. Scand.* ii. 30.

*Apis sylvarum*, *Linn. Syst. Nat.* i. 960 ♀, and type in *Cab. Mus. Linn. Soc.*

*Scop. Ent. Carn.* 307.

*Fabr. Ent. Syst.* ii. 321.

*Schrank, Ins. Austr.* 400.

*Rossi, Faun. Etrus.* ii. 101.

*Kirby, Mon. Apum Angl.* ii. 326, tab. 17. fig. 15 ♀, 16 ♂.

*Bombus veteranus*, *Fabr. Syst. Piez.* 352 ♀.

*Huber's Observ. Linn. Trans.* vi. 227, tab. 25. figs. 13–18.

*Female.* Length 8 lines.—The head has a short yellow pubescence, that on the vertex black. Thorax—the pubescence on the disk

black; anteriorly, posteriorly, on the sides, beneath, and also on the legs it is pale yellow; the tarsi beneath have a short ferruginous pubescence, the claws ferruginous. Abdomen—the basal segment clothed with pale yellow pubescence, most dense at the sides; on the second segment it is black, the posterior and lateral margins fringed with pale yellow; on the third it is black, the margins being fringed with pale yellow; on the three following segments it is fulvous, the margins being fringed with pale hairs.

B.M.

*Worker.* Length 6–7 lines.—Differs very little, except in size, from the female; it has, however, usually a greater mixture of pale pubescence, and the apex of the abdomen is not so bright a red.

B.M.

*Male.* Length 6 lines.—Closely resembles the other sexes; the mandibles fringed with fusco-ferruginous hairs; the antennæ as long as the thorax, and the apex of the abdomen usually as bright as in the female.

B.M.

This bee is found in all parts of the United Kingdom, and is one of the most constant in coloration; the hum of its wings is distinct from, and more shrill than, that of any other *Bombus*; it closely resembles that of *Saropoda bimaculata*. I once found a nest of it underground; it had taken possession of a cavity, and built a nest in it of moss, grass, &c., in the same way as when following its normal habit of building on the surface.

### 7. *Bombus lapponicus*.

*B. hirsutus*, *ater*, thorace antice flavescente; abdomine rufo, basi nigro, ano flavescente.

*Bombus lapponicus*, *Fabr. Syst. Piez.* 345 ♀.

*Ahrens, Faun. Eur.* 10. 18.

*Dahlb. Bomb. Scand.* 41, tab. fig. 12 ♀.

*Zett. Ins. Lapp.* 471.

*Germer, Faun. Ins. Eur.* x, tab. 18.

*St.-Farg. Hym.* i. 459.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 235.

*Smith, Bees Great Brit.* 218; *Entomol.* iii. 269.

*Thoms. Hym. Scand.* ii. 41.

*Apis lapponica*, *Fabr. Ent. Syst.* ii. 318.

*Quenel, Acerbi's Trav. in Lapl.* ii. 253, tab. 1. fig. 3.

*Apis flavicollis*, *Sowerby, Brit. Miscell.* i. 39, tab. 19 ♀.

*Bombus regelationis*, *Newm. Ent. Mag.* ii. 327.

*Bombus monticola*, *Smith, Zool.* vii. *Append.* 59.

*Female.* Length 7–9 lines.—Black; on the posterior margin of the vertex, on the thorax anteriorly, and usually on the posterior margin of the scutellum the pubescence is yellow. Abdomen clothed with bright fulvo-ferruginous pubescence, with more or less of black at the base; at the apex inclining to yellow.

B.M.

Var.  $\beta$ . The pubescence on the scutellum entirely black.

*Worker.* Closely resembles the female, varying in size from 4–6 lines. B.M.

*Male.*—Length 5–6 lines.—Head, the pubescence on the clypeus and vertex yellow; it is also yellow on the thorax in front and on the sides of the scutellum; the abdomen as in the other sexes; the posterior legs have a little pale pubescence, as well as the abdomen and femora beneath. B.M.

This is a local mountain species. It was first discovered in this country by Mr. Edward Newman, on the Black Mountain, Brecknockshire; it has also been found on Snowdon and other mountains in Wales, in Herefordshire, Monmouthshire, and on Halifax Moor, Yorkshire; it has been taken most numerously at Loch Rannoch, Perthshire.

### 8. *Bombus derhamellus.*

*B. hirsutus, ater, corbicula anoque fulvis. Mas fusco-cinerascens, ano fulvo, thorace inter alas abdominisque fascia atris.*

*Bombus derhamellus, Illig. Mag. v. 169 ♂.*

*Dahlb. Bomb. Scand. 44 ♂ ♀ ♂.*

*Smith, Bees Great Brit. 219; Entomol. iii. 282.*

*Apis derhamella, Kirby, Mon. Apum Angl. ii. 363 ♂.*

*Apis donovanella, Kirby, lib. cit. ii. 357 ♂ nec ♀, tab. 18. fig. 6 ♂.*

*Apis raiella, Kirby, lib. cit. ii. 367 ♀ ♂.*

*Bombus raiellus, Illig. Mag. v. 169 ♀.*

*Dahlb. Bomb. Scand. 33 ♂ ♀.*

*Dreus. & Schiödte, Krøy. Tidsskr. ii. 115 (1838).*

*Smith, Zool. ii. 550 ♂ ♀.*

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn. i. 238.*

*Schenck, Nass. Bien. 153.*

*Thoms. Hym. Scand. ii. 32.*

*Bombus donovanellus, Westw. Nat. Libr. vi. 255, pl. 17. fig. 1 ♂.*

*Bombylius minor, Ray, Hist. Ins. 246 ♀.*

*Female.* Length  $6\frac{1}{2}$ –8 lines.—The body clothed with black pubescence, that on the three apical segments rufo-fulvous; the corbicula on the posterior tibiæ rufo-fulvous, the apical joints of the tarsi ferruginous. B.M.

*Worker.* Length  $4\frac{1}{2}$ –6 lines.—Differs only in size, having the corbicula rufo-fulvous as in the female. B.M.

*Male.* Length 5–6 lines.—The pubescence on the head black, more or less fuscous on the clypeus, the mandibles fringed with ferruginous pubescence. Thorax clothed above with obscure fuscous-yellow pubescence, that between the wings black; the tibiæ and tarsi ciliated with rufous hairs; the tarsi ferruginous beneath, the claws ferruginous. Abdomen—the two basal segments clothed with obscure flavo-fuscous pubescence, that on the third segment black, and that on the remainder rufo-fulvous. B.M.

Var.  $\beta$ . The pubescence on the second segment of the abdomen bright yellow.

Var.  $\gamma$ . The thorax fringed with yellow pubescence, that on the two basal segments of the abdomen yellow.

Var.  $\delta$ . The abdomen entirely covered with obscure flavo-fuscous pubescence.

Var.  $\epsilon$ . The abdomen almost entirely fulvous.

The description of the male is that of the normal condition. The male of Kirby's *A. donovanella* is certainly that of *B. derhamellus*, as will be seen by an examination of his typical specimen. The species is generally distributed. I have frequently found its nests in hay-fields; several occurred in a hay-field at Beaumaris, in Anglesey. The species is common. The bees make no defence when their nests are disturbed.

### 9. *Bombus pomorum*.

*B. hirsutus*, *ater*, thorace antice scutelloque obscure flavis, abdomine rufo-fulvo.

*Bombus pomorum*, *Schenck, Nass. Bien.* 512 ♂ ♀ ☿.

*Smith, Entomol.* iii. 281 ♀ ♂.

*Bremus pomorum*, *Panz. Faun. Germ.* 86. 18 ♂.

*Female*. Length 8 lines.—Black; head elongate, the clypeus smooth and shining, the pubescence black. Thorax—the pubescence black, in front and on the scutellum intermixed with obscurely yellow or pale hairs; the legs with black pubescence; the basal joint of the tarsi with short ferruginous pubescence beneath; wings hyaline, faintly clouded at their apical margins. Abdomen clothed with rufo-fulvous pubescence, palest towards the apex and darkest on the basal segment.

*Male*. Length 5–6 lines.—Head elongate, the pubescence black. The thorax has in front and also on the scutellum a mixture of greyish hairs, that on the disk black; the legs fringed beneath with fulvous pubescence; wings as in the female. Abdomen with fulvous pubescence, that on the basal segment grey; on the second segment the colour is darker and less bright than on the rest of the abdomen.

Var.  $\beta$ . The thorax with grey pubescence, with a black band beneath the wings.

The worker I have not seen, but Schenck says it resembles the female; he also observes that the male resembles a male *Apathus*. This is true; but the only male of that genus it resembles is that of *A. rupestris*, from which it is very distinct; its elongate head and naked clypeus at once distinguish it from that insect; its antennæ are longer and more slender. *B. pomorum* is the rarest species found in this country. I took three males in 1863, and my son a female in the following year, near Deal.

Panzer describes the basal segment of the abdomen as having white hair in the male, but in the figure it is coloured black.



10. *Bombus pratorum*.

*B. hirsutus*, ater, thorace antice sulphureo-flavo, abdominis segmento secundo fascia subinterrupta flava. *Mas* hirsuto flavus, thorace postice nigro marginato; abdomine fascia atra, ano fulvo.

*Bombus pratorum*, *Illig. Mag.* v. 168 ♀ ♂.

*Dahlb. Hym. Scand.* 36.

*Drews. & Schiödte, Kröy. Tidsskr.* ii. 111 (1838).

*Smith, Zool.* ii. 548; *Bees Great Brit.* 220; *Entomol.* ii. 282.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 263.

*Schenck, Nass. Bien.* 155.

*Thoms. Hym. Scand.* ii. 39.

*Apis pratorum*, *Linn. Syst. Nat.* i. 960, et *Cab. Mus. Linn. Soc.* ♀.

*Schrank, Ins. Austr.* 396.

*Kirby, Mon. Apum Angl.* ii. 360 ♂.

*Bremus collaris*, *Panz. Faun. Germ.* 94. 12 ♀ var.

*Apis subinterrupta*, *Kirby, lib. cit.* 356 ♀.

*Bombus subinterruptus*, *Latr. Hist. Nat. des Crust. et Ins.* xiv. 64 ♀.

*Illig. Mag.* v. 167 ♀.

*Dahlb. Bomb. Scand.* 35 ♀.

*St.-Farg. Hym.* i. 461 ♀ ♂.

*Drews. & Schiödte, Kröy. Tidsskr.* ii. 111 (1838).

*Apis burrellana*, *Kirby, lib. cit.* ii. 358 ♂.

*Bombus burrellanus*, *Dahlb. Hym. Scand.* 43 ♂.

*Thoms. Opusc. Ent.* 255.

*Bombus arbustorum*, *Fabr. Syst. Piez.* 347 ♂ (*coll. Havn.*).

*Bombus ephippium*, *Dahlb. Hym. Scand.* 37, tab. fig. 6 ♀.

*Bombus lullianus*, *Nyland. lib. cit.* i. 236 ♂.

*Female.* Length 6–8 lines.—Head, the pubescence entirely black. Thorax with fulvous-yellow pubescence before the wings and black behind; wings subhyaline, with their apical margins clouded. Abdomen—the first, third, and fourth segments with black pubescence, on the second it is yellow, and on the apical segments it is fulvous; the yellow band is sometimes interrupted. B.M.

Var.  $\beta$ . The abdomen without the yellow band.

*Worker.* Length  $3\frac{1}{2}$ –5 lines.—Coloured as in the female. B.M.

Var. The abdomen without a yellow band, the apex rufo-fulvous.

*Male.* Length 5–6 lines.—The pubescence on the head yellow, intermixed with fuscous hairs on the vertex and sides of the face; the mandibles fringed with rufo-fulvous hairs. Thorax, the pubescence before the wings yellow, with sometimes a few yellow hairs on the scutellum. The two basal segments of the abdomen with yellow pubescence; on the fifth and sixth it is fulvous.

Var.  $\beta$ . The black pubescence thickly intermixed with yellow, which in some lights gives the insect the appearance of being entirely yellow. B.M.

This is a very common species, particularly so in the north of England; the male frequently making its appearance as early as the middle of May, it is usually the first *Bombus* of that sex that appears. The sexes are very variable in their colouring, so much so that the

varieties have been described as constituting seven species; the normal colouring of the female is Kirby's *A. subinterrupta*, and his *A. burrellana* that of the male. I have examined many nests of this species, which are frequently found in hay-fields, on mossy banks, and under furze bushes; they make little or no defence of their nests when they are disturbed. *Apathus barbutellus* is parasitic on this species.

### 11. *Bombus cullumanus*.

*B. hirsutus*, ater, thorace antice abdomineque fascia flavis, ano fulvo.  
*Mas pallide fulvus*, thorace inter alas abdominisque fascia atris, ano fulvo.

*Bombus cullumanus*, *Illig. Mag.* v. 168 ♂.

*Smith, Entomol.* iii. 283 ♂ ♀.

*Thoms. Hym. Scand.* ii. 38 ♂ ♀.

*Bombus burrellanus*, *Dahlb. Bomb. Scand.* 43 ♂.

*Thoms. Opusc. Ent.* 255.

*Apis cullumana*, *Kirby, Mon. Apum Angl.* ii. 359 ♂.

*Apis donovanella*, *Kirby, lib. cit.* ii. 357 ♀ nec ♂.

*Female.* Length 5–6½ lines.—The pubescence black; the anterior part of the thorax in front of the insertion of the wings with a dense bright yellow pubescence; wings fusco-hyaline, their apical margins with a fuscous cloud. Abdomen—the basal segment clothed with black pubescence, that on the second of a bright citron-yellow, on the third it is black, and that on the three apical segments bright rufo-fulvous. B.M.

*Male.* Length 5½–6½ lines.—Densely clothed with pale yellow pubescence, with a few black hairs on the face at the insertion of the antennæ; the joints of the latter subarcuate. Thorax—a fascia of black pubescence between the wings; the tegulæ rufo-piceous; the wings as in the female; beneath, with long pale yellow pubescence; that on the legs is a mixture of pale and black. Abdomen—the two basal segments with pale yellow pubescence, the third with black, and the following segments with bright ferruginous. B.M.

I was formerly led to consider the male of this species to be a highly coloured variety of *B. soroënsis*; but having captured specimens I have been enabled, by an examination of the sexual organs, to satisfy myself that they are distinct species. I have not any positive evidence of the female described being really that sex of the species; but as it has been taken at the same time and place as the male, and as no any other species of *Bombus* is known to which this female could be assigned, I have no doubt as to the correctness of my conclusions. The female most closely resembles that of *B. pratorum*, but can always be distinguished by the abdomen being shorter and broader, and by the black band occupying one segment only. The male resembles that of *B. pratorum*; but the general pubescence is shorter,

the joints of the flagellum are subarcuate, the black band on the abdomen only occupies one segment, and the pubescence of the apical portion of the abdomen is bright ferruginous; the yellow pubescence is of a paler and brighter colour. The species is undoubtedly both local and rare. On one occasion I took four males and two females at Southend at the end of August; it must be observed that the male of *B. pratorum* appears in May. The species has also been taken on the Brighton Downs and near Bristol. The worker is probably at present mixed with that of *B. pratorum*.

## 12. *Bombus jonellus*.

*B. hirsutus*, *ater*; thorace antice, scutello abdominisque basi flavis, ano albo; facie brevi, triangulari.

*Bombus scrimshiranus*, *Illig. Mag.* v. 166 ♀.

*Dahlb. Bomb. Scand.* 39 ♀ ♂.

*Drews. & Schiöde, Krøy. Tidsskr.* ii. 118 ♂ ♀ ♂ (1839).

*Smith, Zool.* ii. 547; *Bees Great Brit.* 222; *Entomol.* iii. 283.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 232.

*Thoms. Hym. Scand.* ii. 41.

*Apis scrimshirana*, *Kirby, Mon. Apum Angl.* ii. 342 ♀.

*Apis jonella*, *Kirby, lib. cit.* ii. 338 ♂.

*Female.* Length 7–8 lines.—The pubescence black, that on the margin of the vertex, thorax anteriorly, scutellum, and basal segment of the abdomen yellow, that on the three apical segments white; the scopa on the posterior tibiæ ferruginous; the apical joint of the tarsi rufo-piceous. B.M.

*Worker.* Length 5–6 lines.—Excepting size, there is no difference between this and the female. B.M.

*Male.* Length 5–6 lines.—The pubescence on the face, thorax in front, on the sides, and on the scutellum bright yellow; the antennæ nearly as long as the thorax; beneath, and also the fringe on the femora, pale yellow. Abdomen—the basal segment with yellow pubescence, the second, third, and base of the fourth segments with black and the following with white pubescence; beneath the pubescence is cinereous. B.M.

Var. *β.* The two basal segments yellow.

Var. *γ.* The first and base of the second yellow.

Kirby's type of *A. jonella* has the basal segment entirely yellow. All the sexes were obtained from a nest found on the Grampians, Perthshire. This is a somewhat local species; it has been taken at Coombe Wood, on Purley Downs, Shirley Common, and at Barmouth, North Wales. Mr. Kirby's description is incomplete, so that it was difficult to ascertain to which species this male should be assigned; but having myself seen his own interleaved copy of the 'Monographia,' I found that he had subsequently added, "Facies ante an-

tennas palide villosus." The type is a faded specimen. This species is readily distinguished by its short head from *B. hortorum*, which it otherwise resembles.

### 13. *Bombus nivalis*.

*B. hirsutus*, ater; thorace antice, scutello abdominisque basi et apice flavis, ano flavo vel fulvescente.

*Bombus nivalis*, *Dahlb. Bomb. Scand.* 40, tab. fig. 10 ♀.

*Zett. Ins. Lapp.* 474.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 234 ♀ ♂.

*Smith, Bees Great Brit.* 222 ♂ ♀ ♀.

*Thoms. Hym. Scand.* ii. 35.

*Apis alpina*, *Fabr. (Otho) Faun. Græc.* 199 (*nec Linn.*).

*Bombus balteatus*, *Dahlb. Bomb. Scand.* 36 ♀.

*Bombus montanus*, *St.-Farg. Hym.* i. 463 ♀ ♂.

*Female.* Length 8–9 lines.—The pubescence on the head black, that on the thorax above yellow, more or less inclining to fulvous, with a band of black pubescence between the wings, that on the sides, on the legs, and on the thorax beneath black; wings subhyaline. Abdomen—the pubescence on the two basal segments yellow, on the third it is black, and on the three apical segments of a fulvous yellow. B.M.

*Worker.* Length 6–7 lines.—Only differs from the female in having the pubescence at the apex of the abdomen paler, inclining to white. B.M.

*Male.* Length 6–6½ lines.—The face before the antennæ clothed with yellow pubescence; the thorax has a yellow pubescence, with a black band between the wings; beneath and on the femora it is of a very pale yellow, on the tibiæ it is black. Abdomen—the two basal segments with yellow pubescence; the third and fourth with black, and the apical ones with pale yellowish white; beneath the pubescence is also yellowish white. B.M.

This species must vary greatly in size: Dahlbom's figure measures 12 lines; Nylander gives the Lapland specimen at 16; and the largest I have seen from Shetland measures 9 lines. The colour of the pubescence must depend greatly on the exposure to which the insect has been subjected; a bright yellow soon fades. Prof. Boheman sent a female from Sweden with the apex of the abdomen bright fulvous. All the sexes were obtained from a nest found near Lerwick, Shetland, in 1852, since which time no one has taken the species; the nest contained about a dozen bees only, but fortunately all the sexes. In all probability the insect is not uncommon in Shetland, as the person who took the nest was not an entomologist, and did not know one bee from another.

Section II. *Underground builders.*14. *Bombus lapidarius.*

*B. hirsutus*, *ater*, abdominis segmentis analibus tribus rufo-fulvis, alis hyalinis. *Mas* facie, thorace antice et scutello flavis.

*Bombus lapidarius*, *Illig. Mag.* v. 169 ♀.

*Fabr. Syst. Piez.* 347 ♀.

*Spin. Ins. Ligur.* i. 130.

*Dahlb. Bomb. Scand.* 30 ♂ ♀ ♂.

*St.-Farg. Hym.* i. 460 ♂ ♀ ♂.

*Brullé, Expéd. Sc. de Morée*, 528.

*Drews. & Schödte, Krøy. Tidsskr.* ii. 116 (1838-9).

*Westw. Nat. Libr.* vi. 252, pl. 16. fig. 1 ♂, fig. 2 ♀.

*Smith, Zool.* ii. 549; *Bees Great Brit.* 228; *Entomol.* iii. 285.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 238.

*Schenck, Nass. Bien.* 150.

*Thoms. Hym. Scand.* ii. 37.

*Apis lapidaria*, *Linn. Syst. Nat.* i. 960, et *Cab. Mus. Linn. Soc.*

*Scop. Ent. Carn.* 305, fig. 813 ♀.

*Fabr. Ent. Syst.* ii. 329.

*Schrank, Ins. Austr.* 396.

*Fourc. Ent. Par.* ii. 449.

*Christ. Hym.* 126.

*Donov. Eng. Ins.* iii. 97, tab. 108. fig. 1 ♀.

*Kirby, Mon. Apum Angl.* ii. 363 ♂ ♀ ♂.

*Apis arbustorum*, *Fabr. Ent. Syst.* ii. 320 ♂.

*Bombus arbustorum*, *Fabr. Syst. Piez.* 347.

*Bremus truncorum*, *Panz. Faun. Germ.* 85. 21 ♂.

*Bombus lefebvrei*, *St.-Farg. Hym.* i. 461 var. ♀ (type in coll. Westw.).

*Apicis pertristis*, *Harris, Expos. Eng. Ins.* 137, tab. 40. fig. 14 ♂.

*Apicis opis*, *Harris, lib. cit.* tab. 40. fig. 12 ♂.

*Female.* Length 9-10 lines.—Clothed with black pubescence, the three apical segments of the abdomen with rich rufo-fulvous; wings hyaline, their apical margins faintly clouded. B.M.  
*Var.* A more or less distinct yellow band on the thorax anteriorly.

*Worker.* Length 4-6½ lines.—Only differs in being smaller than the female. B.M.

*Male.* Length 5-7 lines.—Clothed with black pubescence, but with that on the face pale yellow, on the collar and scutellum it is yellow, on the base of the abdomen a mixture of yellow hair; the four apical segments of the abdomen with bright rufo-fulvous pubescence; the posterior tibiæ fringed with fulvous hairs. B.M.

*Var. β.* The scutellum and basal segment of the abdomen black.

This is one of the most abundant of the British *Bombi*; it has its representatives in India, China, Japan, and Mexico. The variety of the female having a yellow collar is of very rare occurrence in England; I have only seen a single example, which was taken near Sandwich, Kent. *St.-Fargeau* has described this variety as a distinct species, naming it *B. lefebvrei*; I have had an opportunity of ex-

amining his typical specimen through the kindness of Prof. Westwood, in whose possession are many of the types of Fargeau's and also of Latreille's bees. The species is common in Wales, Ireland, and Scotland; some of the finest examples have been obtained from the latter country. In Yorkshire this bee frequently constructs its nests in old stone-quarries; but in the south I have usually found them in banks and at the roots of trees. The only instance in which I have observed the sexes of distinct species *in coitu* has been a male of *B. lapidarius* copulating with a female of *B. virginalis*.

### 15. *Bombus lucorum*.

*B. hirsutus*, ater; thorace antice abdominisque fascia flavis, ano albo. *Mas* supra flavus, thoracis fascia nigra, capite antice flavo, abdominis fasciis obsolete nigris, ano albo.

*Bombus lucorum*, *Fabr. Syst. Piez.* 350 ♂.

*Illig. Mag.* v. 166 ♂.

*Dahlb. Bomb. Scand.* 42 ♂.

*Smith, Zool.* ii. 546 ♂ ♀; *Bees Great Brit.* 225; *Entomol.* iii. 286.

*Apis lucorum*, *Linn. Syst. Nat.* i. 960 ♂, et *Cab. Mus. Linn. Soc.* (type).

*Fabr. Ent. Syst.* ii. 322.

*Kirby, Mon. Apum Angl.* ii. 336 ♂.

*Apis terrestris*, *Linn. Syst. Nat.* i. 960 ♀, et *Cab. Mus. Linn. Soc.*

*Scop. Ent. Carn.* 306, fig. 815 ♀.

*Schrank, Ins. Austr.* 395.

*Bombus terrestris*, *Latr. Hist. Nat. des Crust. et Ins.* xiv. 64 ♀.

*Fabr. Syst. Piez.* 343.

*Illig. Mag.* v. 167.

*Zett. Ins. Lapp.* 473.

*St.-Farg. Hym.* i. 467.

*Dahlb. Bomb. Scand.* 34, fig. 5 ♀.

*Drews. & Schiödte, Krøy. Tidsskr.* ii. 118.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 232.

*Schenck, Nass. Bien.* 149 (nec var.).

*Apis cæspitum*, *Panz. Faun. Germ.* 31. 19 ♂.

*Apis virginalis*, *Kirby, lib. cit.* ii. 349 ♂ (nec ♂).

*Bombus virginalis*, *Illig. Mag.* v. 167.

*Bombus ericetorum*, *Curtis, Brit. Ent.* xii. fig. 564 ♂.

*Bombus spodagricus*, *Nyland. lib. cit.* i. 233 ♂ ♀ ♂.

*Female.* Length 8–9 lines.—Densely clothed with black pubescence, the thorax anteriorly and the second segment of the abdomen with lemon-coloured yellow pubescence, the three apical segments snow-white. B.M.

*Worker.* Length 4–6 lines.—Only differs from the female in size. B.M.

*Male.* Length 4–6 lines.—The face densely clothed with yellow pubescence; the mandibles fringed with fulvous hairs; the cheeks

with a pale yellow pubescence. The thorax clothed with yellow pubescence, and having a black band between the wings, which is more or less distinct; the pubescence on the thorax beneath hoary; it is also pale on the legs. Abdomen—the pubescence on the first and second segments yellow, on the third and fourth more or less black, and sometimes crossed by a narrow fringe of yellow pubescence on the apical margin of the third segment; the fifth and sixth segments with white pubescence; the pubescence beneath yellowish white.

Var.  $\beta$ . The four basal segments with yellow pubescence, with faint traces of dark bands. This is the *Bombus ericetorum* figured by Curtis.

The typical specimen, a male, in the Linnean Cabinet is very like the variety  $\beta$ . The typical specimen of Linné's *Apis terrestris*, preserved in the Linnean Cabinet, is the female of this species. In this country *Bombus lucorum* usually appears at an earlier period in the season, according to my observation, than *Bombus virginalis*. The latter is a rather larger insect; its male is readily distinguished from that of *B. lucorum* by its always having the entire head clothed with black pubescence; its maxillary palpi are different, and the second joint is longer in proportion to the first joint. The nests of both species have been taken in autumn, when all the sexes of each species have been obtained. In a nest of *Bombus virginalis* all the females had the apex of the abdomen tawny; but it is probable that when individuals have been long exposed to weather, the tawny apex may become more or less bleached to white; I have found specimens of the female with the apex of the abdomen white. On a female of *Bombus lucorum* being shown to the late Prof. Boheman, he named it *B. terrestris* of Linnæus; whilst he pronounced the bee with the tawny apex of the abdomen to be a species unknown to him, and one not found in Sweden. In the type-collection of Kirby there is a female with a white anus, which, in his remarks on *Bombus terrestris*, he states to have been found by Mr. Trimmer in a nest of the bee with the tawny apex of the abdomen; this specimen is, in my opinion, an example of *B. lucorum*. It is not an unusual occurrence to find individuals of one species in a nest of another; thus I have found *B. sylvarum* in a nest of *B. muscorum*; such occurrences can only be regarded as accidental. The yellow bands in *B. lucorum* are of a lemon-coloured yellow, whilst those of *B. virginalis* are deep orange-yellow.

It should be mentioned that the male organs of *B. lucorum* and of *B. virginalis* have been compared; and although the differences are only slight, yet they are constant, and in my opinion quite justify their separation as distinct species.

16. *Bombus virginalis*.

*B. hirsutus*, ater; thorace antice, abdominis fascia media anoque flavis.

*Bombus terrestris*, *Smith*, *Zool.* ii. 547; *Bees Great Brit.* 224 ♂ ♀ ♀;  
*Entomol.* iii. 285 (nec *Linn.*).

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* ii. 262 (var. 1).  
*Schenck, Nass. Bien.* 138 (var.).

*Apis terrestris*, *Kirby, Mon. Apum Angl.* ii. 350, var. β ♀, var. γ ♀,  
var. δ ♀, var. ε ♀, var. β ♂.

*Apis virginalis*, *Kirby, lib. cit.* ♂ only.

*Female.* Length 9–11 lines.—Densely clothed with black pubescence, the collar orange-yellow; wings subhyaline, their apical margins clouded. Abdomen—the second segment with bright orange-yellow pubescence, that on the third and fourth black; on the apical segments it is fulvous yellow. B.M.

Var. β. The apical segment of the abdomen with white pubescence.

*Worker.* Length  $5\frac{1}{2}$ –7 lines.—Closely resembles the female; but the yellow bands are frequently of a paler tint, arising principally from exposure, and the apex has a white or tawny-white pubescence; it has always in recent examples a mixture of fulvous hairs at the margin of the black fascia. B.M.

*Male.* Length 7–8 lines. The pubescence on the head entirely black; the collar and second segment of the abdomen with orange-yellow pubescence, that at the apex of the abdomen tawny, but paler than in the female, occasionally white at the extreme apex. B.M.

The female is larger than that of *B. lucorum*. This species is found in all parts of the kingdom. Its nests, as far as my experience enables me to judge, are more populous than those of any other species (perhaps *B. lapidarius* excepted); in one nest I found 107 males, 56 females, and 180 workers; and some of the latter sex were probably on the wing when the nest was taken—late in the evening in the month of August. *Apathus vestalis* lives in company with this species.

17. *Bombus hortorum*.

*B. hirsutus*, ater; thorace antice, scutello abdominisque basi flavis, ano albo; capite elongato.

*Bombus hortorum*, *Latr. Hist. Nat. Ins. &c.* xiv. 65 ♀.

*Illig. Mag.* v. 166.

*Dahlb. Bomb. Scand.* 38 ♂ ♀ ♀.

*St.-Farg. Hym.* i. 466.

*Brullé, Expéd. Sc. de Morée*, iii. 328.

*Drews. & Schiödte, Krøy. Tidsskr.* ii. 120 (1839).

*Smith, Zool.* ii. 546; *Bees Great Brit.* 230.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 231.

*Schenck, Nass. Bien.* 139.

*Thoms. Hym. Scand.* ii. 24.



*Apis hortorum*, *Linn. Syst. Nat.* i. 960, and type in *Cab. Mus. Linn.*

*Soc.* ♀.

*Kirby, Mon. Apum Angl.* ii. 339 ♂ ♀ ☿.

*Bombus ruderatus*, *Fabr. Syst. Piez.* 344 ♀.

*Female.* Length 10 lines.—The pubescence black; the collar, scutellum, and basal segment of the abdomen densely clothed with sulphur-yellow pubescence, that on the three apical segments white; the face elongate; the tongue nearly as long as the body. B.M.

*Worker.* Length 5–6½ lines.—The colour as in the female. B.M.

*Male.* Length 6–7 lines. The distribution of colour as in the other sexes, the apical segment having black pubescence; the mandibles bearded with black hairs. B.M.

This species is not subject to vary much in coloration; the yellow pubescence on the scutellum is occasionally less bright or mixed with black. Since the publication of the first edition of this work, I have had an opportunity of comparing the generative organs of specimens of *B. ruderatus* from Madeira with those of the *B. hortorum* of Europe, and have satisfied myself that the insects are identical. The specimen described by Fabricius, from Madeira, is larger than any European one that I have seen; but the series of examples from that island in the British Museum clearly shows that the insular specimens vary in size like the European.

### 18. *Bombus soroënsis*.

*B. hirsutus*, *ater*; abdominis segmento secundo utrinque obsolete flavo, ano albo. *Mas pallidus*, ano roseo-albo, thorace abdomineque singulis fascia atra.

*Bombus soroënsis*, *Fabr. Syst. Piez.* 345 ♀.

*Dahlb. Bomb. Scand.* 38 ♀.

*Drews. & Schiödde, Krøy. Tidsskr.* ii. (1838–39) 112 ♂ ♀ ☿, tab. 2. fig. 9 ♀.

*St.-Farg. Hym.* i. 468.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 239.

*Smith, Bees Great Brit.* 227; *Entomol.* iii. 284.

*Thoms. Hym. Scand.* ii. 36.

*Apis soroënsis*, *Fabr. Ent. Syst.* ii. 318 ♀.

*Panz. Faun. Germ.* 7. 11 ♀.

*Latr. Hist. Nat. des Crust. et Ins.* xiv. 65.

*Apis neutra*, *Panz. Faun. Germ.* 83. 18.

*Bombus neuter*, *Fabr. Syst. Piez.* 347.

*St.-Farg. Hym.* i. 469.

*Bombus neutra*, *Panz. Krit. Revis.* 259.

*Bremus sylvarum*, *Panz. Faun. Germ.* 85. 19 ♂ var.

*Bombus collinus*, *Smith, Zool.* ii. 548 ♂; *Bees Great Brit.* 223.

*Bombus subterraneus*, *Schenck, Nass. Bien.* 153.

*Female.* Length 7–8 lines.—The pubescence black, the tip of the abdomen white; the white pubescence is separated from the black by a mixture of reddish-yellow hairs.

Var.  $\beta$ . The second segment of the abdomen has laterally a little yellow pubescence.

Var.  $\gamma$ . The thorax yellow in front, the second abdominal segment having laterally a tuft of yellow pubescence.

Var.  $\delta$ . The thorax yellow in front; the abdomen black, apex of the abdomen yellowish white.

Var.  $\epsilon$ . The thorax anteriorly obsoletely yellow, the second abdominal segment obsoletely yellow laterally; the apex yellowish white.

*Worker.* Length 5-7 lines.—The pubescence black, apex of the abdomen yellowish white. B.M.

Var.  $\beta$ . The apex of the abdomen fulvous.

Var.  $\gamma$ . The thorax in front and the abdomen on each side at the base yellow; apex reddish yellow.

*Male.* Length 5-6 lines.—The pubescence pale yellow; the vertex and cheeks have a black pubescence; a black fascia between the wings, and the third segment of the abdomen clothed with black pubescence, that on the four apical segments ferruginous; beneath, the pubescence is pale yellow. B.M.

Var.  $\beta$ . The yellow fascia on the abdomen subinterrupted.

This species was first taken, in this country, by the Rev. Mr. Rudd, at Yarm, in Yorkshire; Mr. Heysham subsequently found some numbers of the male near Carlisle. A few specimens have been found on the Downs, near Brighton; and I once took a few males and two females at Southend.

### 19. *Bombus latreillellus*.

*B. hirsutus*, ater; thorace antice, scutello abdominisque basi flavo-fulvescentibus, ano albo. *Mas supra flavescens*, thorace inter alas abdominisque cingulis duobus subnigris.

*Bombus latreillellus*, *Illig. Mag.* v. 165 ♂.

*Dahlb. Bomb. Scand.* 39 ♂.

*Dreus. & Schiödte, Kröy. Tidsskr.* ii. 120 ♂ (1838-39).

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 234 ♂.

*Smith, Bees Great Brit.* 231 ♂ ♀ ♂; *Entomol.* iii. 287.

*Apis latreillella*, *Kirby, Mon. Apum Angl.* ii. 330 ♂.

*Apis tunstallana*, *Kirby, lib. cit.* ii. 346 var.  $\gamma$  ♀ (not of description).

*Bombus tunstallanus*, *Illig. Mag.* v. 166 ♀.

*Nyland. lib. cit.* 231 ♀.

*Schenck, Nass. Bien.* 150 ♂ ♀.

*Female.* Length 10 lines.—The pubescence black, that on the collar and scutellum of a fulvous yellow. The basal segment of the abdomen has on each side a little fulvous-yellow pubescence; the apical margin of the third segment and the fourth and fifth have a little white pubescence, the apical one naked above; the apical margin of the second segment has usually an obscure mixture of pale hairs; beneath, the third, fourth, and fifth segments are fringed with pale pubescence. B.M.

Var.  $\beta$ . The base of the abdomen with an entire fascia of fulvous-yellow pubescence.

Var.  $\gamma$ . The base of the abdomen black.

*Worker.* Length 5–7 lines.—The pubescence black, the collar has a fulvous-yellow band, the scutellum only an obscure yellow fringe; the abdomen white at the apex, the second and third segments have a more or less conspicuous white fringe. B.M.

*Male.* Length 6–8 lines.—The pubescence on the head black; the face has sometimes an obscure mixture of pale hairs. Thorax above yellow, having a broad black fascia between the wings; the sides usually obscurely cinereous. Abdomen—the pubescence yellow, the second and third segments with a band of black pubescence at their base, the second usually narrowest; the sixth segment has a mixture of black pubescence in the middle. B.M.

Var.  $\beta$ . The black fasciæ on the abdomen subobsolete, the abdomen and thorax beneath subcinereous.

The female and worker of this species most closely resemble those of *B. subterraneus*; but their pubescence is shorter, and the apical margin of the second segment has always a more or less distinct fringe of white pubescence; the pubescence on the abdomen of *B. subterraneus* is somewhat shaggy, which is not the case in the other species. The males are readily distinguished; the distinctness of the two species is confirmed by the different form of the male organs. I have taken all the sexes from the nest, and found *Apathus vestalis* living in the communities.

The female described by Kirby is that of *B. subterraneus*; so also is var.  $\beta$ ; var.  $\gamma$  is the female of *B. latreillellus*; var.  $\delta$  is a worker of the same; var.  $\epsilon$  is another female of *B. subterraneus*; but there is a second var.  $\epsilon$ , which is a worker of *B. latreillellus*; in the Kirbyan type-collection are also four other workers of the same species. This insect is not common in the vicinity of London, but very abundant in many localities, particularly so at Folkestone, Dover, and Deal. Several nests were found at Lower Walmer, from which all the sexes were obtained. The nest was situated at the end of a tunnel between three and four feet in length, which ran up a bank, not being more than four or five inches beneath the surface. The nest itself was about a foot and a half from the surface.

## 20. *Bombus subterraneus*.

*B. hirsutus*, ater, thorace antice flavescente ano griseo-fusco aut fusco-lutescente.

*Bombus subterraneus*, *Fabr. Syst. Piez.* 350 ♀.

*Illig. Mag.* v. 170 ♂ ♀.

*Dahlb. Bomb. Scand.* 32 ♂ ♀ ♂.

*Drewns. & Schiödte, Krøyt. Tidsskr.* ii. 116 ?

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 239.

*Smith, Bees Great Brit.* 232.

*Thoms. Hym. Scand.* ii. 26 ?

- Apis subterranea*, Linn. *Syst. Nat.* i. 961, and type in *Cab. Linn. Soc. Fabr. Ent. Syst.* ii. 322.  
*Müller*, *Zool. Danic. Prodr.* 165.  
*Apis soroënsis*, Kirby, *Mon. Apum Angl.* ii. 354 ♀ ♂.  
*Bombus soroënsis*, *St.-Farg. Hym.* i. 468.  
*Zett. Ins. Lapp.* 473.  
*Apis tunstallana*, Kirby, *lib. cit.* ii. 346 ♀, var.  $\beta$  ♀, var.  $\epsilon$  ♀.  
*Apis harrisella*, Kirby, *lib. cit.* ii. 373 ♂ ♀.  
*Bombus harrisellus*, *Westw. Nat. Libr.* vi. 256, pl. 18. fig. 1 ♂.  
*Smith*, *Zool.* ii. 550 ♂ ♀ ♂.  
*Bombus flavo-nigrescens*, *Smith*, *Zool.* iv. 1556.

*Female.* Length 9–10 lines.—Densely clothed with black pubescence, on each side of the collar slightly yellow; the pubescence on the posterior margin of the scutellum yellowish; the apical margin of the third segment of the abdomen and the fourth with fuscous pubescence.

- Var.  $\beta$ . The collar, scutellum, and sides of the basal segment of the abdomen with yellow pubescence; the apex white or pale yellow. (*A. tunstallana*, Kirby, ♀.) B.M.  
 Var.  $\gamma$ . The lateral margins of the scutellum only yellow, and the fourth segment obscurely fuscous, sometimes faintly yellowish.  
 Var.  $\delta$ . Black, with the apex of the abdomen obscurely fuscous.  
 Var.  $\epsilon$ . Entirely black. (*A. harrisellus*.)

*Worker.* Length 5–8 lines.—Differs only in size from the female, all the varieties in coloration being equally numerous. B.M.

*Male.* Length 6–8 lines.—The collar, scutellum, and basal segment of the abdomen with yellow pubescence; the fourth and following segments white, with the extreme apex black. B.M.

- Var.  $\beta$ . The scutellum only more or less yellow; the apex of the abdomen fuscous.  
 Var.  $\gamma$ . The pubescence black, with the apex of the abdomen dirty white.  
 Var.  $\delta$ . Black entirely.

The most highly coloured variety of the female resembles closely that of *B. hortorum*; but the species is larger, the abdomen is not so angular at the apex, and the pubescence is shorter; the tongue is proportionally considerably shorter; every gradation in colour, from the form described to the totally black one, is to be traced; and Kirby's typical specimens prove the correctness of the synonymy given. The pubescence of the species is shorter and also coarser than in *B. hortorum*.

The male is equally variable as the other sexes, its highly coloured form greatly resembling the male of *B. hortorum*; but its pubescence is shorter, and the curled fringe of hair on the mandibles is ferruginous. These hairs are frequently discoloured by the nectar of flowers; but when free from discoloration they are red; in *B. hortorum* the fringe is dark, almost black. The sexual organs of the black and coloured males are identical in form.

This species is common in many localities, and usually all the varieties occur at the same spot; I have taken the black male *in coitu* with the yellow-banded female. This is one of the most protean species of the genus, and a familiar acquaintance with these insects is necessary to enable any one to separate all the sexes from the closely allied species. I have seen St.-Fargeau's typical specimen of his *B. soroënsis*; and it is certainly a female of *B. subterraneus*.

### Genus 17. APATHUS.

*Apis* (pt.), *Fabr. Ent. Syst.* ii. 317 (1793).

*Bombus* (pt.), *Fabr. Syst. Piez.* 342 (1804).

*Bremus* (pt.), *Jurine, Hym.* 257 (1807).

*Apathus*, *Newm. Ent. Mag.* ii. 404 (1834).

*Psithyrus*, *St.-Farg. Hym.* ii. 424, *nec Hübner* (1841).

The generic characters are those of the genus *Bombus*, with the following distinguishing differences. The posterior tibiæ exteriorly convex, pilose, and not furnished with a corbicula for conveying pollen, only slightly widened towards the apex; the basal joint of the posterior tarsi not toothed at its base above; the abdomen incurved more or less at the apex, convex, and subglabrous; the apical ventral segment with its lateral margins elevated. The posterior tibiæ of the male very convex, and only slightly attenuated at the base.

The geographical distribution of the *Apathi* is presumably co-extensive with the *Bombi*; if this is the case, much remains to be discovered, since, at the present time, no species has been brought from India or China, although several species of *Bombus* are known to inhabit those countries. A single species has been found in Brazil, two or three in Mexico, two in British Columbia, one in Vancouver's Island, and seven in North America; in Europe we are acquainted with five species, four of which are found in this country.

St.-Fargeau established this genus under the name of *Psithyrus*, a name preoccupied in Lepidoptera; Newman's name *Apathus* (signifying want of affection, from the circumstance of their leaving their offspring to be nurtured by the industrious *Bombi*) is exceedingly appropriate; it has the priority and is consequently adopted.

The species found in this country do not confine their parasitism to one species of *Bombus*; or, if there is an exception to this, it is in the case of the *Apathus rupestris*, which hitherto has, I believe, only been observed in the nest of *Bombus lapidarius*. *A. campestris* has been found in the nest of *B. hortorum* and *B. latreillellus*; *A. bartellus* frequents the nests of *B. pratorum* and of *B. jonellus*; *A. vestalis* those of *B. virginialis* and of *B. lucorum*.

These bees are the only parasitic ones that greatly resemble their hosts; and this close resemblance is probably requisite to enable them to enter the nests of the *Bombi* without molestation. The structure of these bees marks them out as the aristocracy of the

humble-bees; their legs are not furnished with baskets in which to convey the fruits of labour to the nests, as is the case in the laborious *Bombi*: their race consists of males and females; workers they have none.

The Rev. Mr. Kirby was the first entomologist who recorded his detection of the structural differences observable in the *Apathi*. His statement is\* :—"After my 'Synopsis' was printed I discovered, what had escaped me before, that four different species, one of which had a yellow, two a white, and one a red anus, were deprived of some of the characters of the *Bombinatrices*, having neither corbicula, nor pecten at the apex of the tibiæ, nor auricle at the base of the plantæ of the posterior legs, at the same time exhibiting some peculiar to themselves." Mr. Kirby does not appear to have suspected their parasitism; in his remarks on *Apathus vestalis* he says :—"The posterior tibiæ of one specimen in my cabinet is covered from one end to the other with a thin coat of pale earth, mixed with particles of sand; they probably use this in constructing their nests or cells." He further adds :—"It is remarkable that the females and neuters of these *Apes* should exhibit those characters which are peculiar to the males of the rest of the family." The mention of neuters in the passage quoted is clearly an oversight, as no description of one is to be found in the 'Monographia,' neither is one to be found in Kirby's type-collection.

Although these bees very closely resemble the working *Bombi*, they are much less pubescent, their abdomen being smooth and shining; they live in perfect harmony together, and issue from and enter the nests without let or hindrance. Shuckard says they have two broods in the year. Upon what data this statement is made does not appear; my own observations have not led me to adopt this opinion. Like the *Bombi*, the females hibernate during the winter months in a torpid state, and reappear in spring—usually, according to my experience, a little later than the *Bombi*, these being consequently the brood of the previous season. No males are developed until the middle of summer, their number increasing until the autumn, when they are frequently found in great numbers: at this time the great brood of females appear, which, after being fertilized, soon retire to winter quarters. The *Apathi* are principally found in the nests of such species of *Bombi* as construct their nests underground. Although one species (*A. barbutellus*) has only been found in the nests of *B. pratorum* and *B. jonellus*, it probably frequents other communities; but it has not been observed to do so. *Apathi* have not been found in nests of *B. venustus* or of *B. sylvarum* to my knowledge; it is therefore apparent that their presence cannot be necessary for carrying out any phase in the economy of the *Bombi*.

\* Mon. Apum Angl. vol. i. p. 209.

1. *Apathus rupestris*.

*A. hirsutus*, ater, alis nigricantibus, ano rufo-fulvo.

*Apathus rupestris*, *Smith, Zool.* ii. 543 ♂ ♀; *Bees Great Brit.* 234.

*Thoms. Opusc. Ent.* 259; *Hym. Scand.* ii. 44.

*Apis rupestris*, *Fabr. Ent. Syst.* ii. 320 ♀.

*Kirby, Mon. Apum Angl.* ii. 369 ♀.

*Bombus rupestris*, *Fabr. Syst. Piez.* 348 ♀

*Latr. Hist. Nat. Ins.* xiv. 1.

*Dahlb. Bomb. Scand.* 51, tab. fig. 21 ♀.

*Psithyrus rupestris*, *St.-Farg. Hym.* ii. 426 ♀.

*Dreus. & Schiödte, Krøy. Tidsskr.* ii. 125 ♂ ♀.

*Curtis, Brit. Ent.* x. tab. 234 ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 241 ♀.

*Apis albinella*, *Kirby, lib. cit.* 361 ♂.

*Apis arenaria*, *Panz. Faun. Germ.* 74. 12 ♀ var.

*Apis frutetorum*, *Panz. lib. cit.* 75. 18 ♂.

*Bombus frutetorum*, *Fabr. lib. cit.* 350 ♂.

*Psithyrus frutetorum*, *St.-Farg. lib. cit.* ii. 436.

*Female.* Length 9–10 lines.—Black, with black pubescence; the wings dark brown with a violet iridescence. The abdomen shining, nearly glabrous on the disk; the three apical segments with rufo-fulvous pubescence; beneath, the basal half of the segments smooth and shining; the apical margin of the fifth fringed with fulvous hairs. B.M.

Var.  $\beta$ . The collar and scutellum with the pubescence more or less yellow. (*A. arenaria*, *Panz.*)

*Male.* Length 6–7 lines.—The pubescence black; the four apical segments with rufo-fulvous pubescence; the tarsi and posterior tibiae fringed with fulvous hairs; wings fusco-hyaline. B.M.

Var.  $\beta$ . The second segment of the abdomen with a lateral tuft of cinereous pubescence.

Var.  $\gamma$ . The thorax anteriorly with a mixture of cinereous hairs, and the first and second segments of the abdomen with a lateral tuft of cinereous pubescence. (*A. albinella*, *Kirby.*)

Var.  $\delta$ . The pubescence on the thorax anteriorly and posteriorly cinereous; the base of the abdomen also with cinereous pubescence. (*A. frutetorum*, *Kirby.*)

The variety of the female, *Apis arenaria* of Panzer, is very rare in this country: the late Mr. Wing had a specimen; and Mr. Bridgman, of Norwich, has recently taken specimens of the same variety near that city. The species is plentiful in Norfolk; it is not common in the vicinity of London; but it is found in all parts of the country in greater or less abundance.

2. *Apathus vestalis*.

*A. hirsutus*, ater, thorace antice flavo, ano albo, apice nigro.

*Apathus vestalis*, *Smith, Bees Great Brit.* 238 ♂ ♀.

*Thoms. Opusc. Ent.* 259; *Hym. Scand.* ii. 46.

*Apis vestalis*, *Fourc. Ent. Par.* ii. 450.

*Kirby, Mon. Apum Angl.* ii. 347, tab. 18. fig. 3 ♀.

*Bombus vestalis*, *Latr. Hist. Nat. des Crust. et Ins.* xiv. 65.

*Illig. Mag.* v. 174.

*Psithyrus vestalis*, *St.-Farg. Hym.* ii. 430 ♂ ♀.

*Schenck, Nass. Bien.* 164.

*Bremus æstivalis*, *Panz. Faun. Germ.* 89. 16 ♀.

*Bombus æstivalis*, *Dahlb. Bomb. Scand.* 51, tab. fig. 22 ♀.

*Psithyrus æstivalis*, *Drews. & Schiödte, Krøy. Tidsskr.* ii. 124.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 241.

*Psithyrus rossiellus*, *Drews. & Schiödte, lib. cit.* ii. 123 ♂.

*Female.* Length 9–10 lines.—Clothed with black pubescence, the thorax having anteriorly a fulvous-yellow band; sometimes there are a few yellowish hairs on the posterior margin of the scutellum. Abdomen shining; the third segment has on each side a yellow pubescence, which inclines obliquely inwards to the middle of its apical margin; beyond this narrow yellow margin the apical segments are clothed with white pubescence; the middle of the fifth segment is thinly covered with dark fuscous hair; the sixth naked, its lateral margins bordered with short ferruginous pubescence.

B.M.

*Male.* Length 6–8 lines.—The pubescence similar to that of the female, with usually a little yellow pubescence at the base of the abdomen; the body more slender than that of the other sex, and the antennæ longer; the apex of the abdomen with a little fuscous pubescence.

B.M.

Var.  $\beta$ . The pubescence on the scutellum entirely black and a little yellow at the base of the abdomen laterally.

Var.  $\gamma$ . The pubescence on the scutellum and base of the abdomen entirely black.

This insect is placed in the Banksian cabinet to represent the *Bombus nemorum* of Fabricius; it does not, however, answer the description of that species.

This species is found in all parts of the kingdom; several were taken on Lundy Island in the Bristol Channel; it was found in the nest of *Bombus virginialis* at Southend in the autumn of 1854.

### 3. *Apathus barbutellus*.

*A. hirsutus*, ater, thorace antice scutelloque flavis; abdomine subglobo, ano albo. *Mas* apice fulvo.

*Apathus barbutellus*, *Smith, Zool.* ii. 543; *Bees Great Brit.* 237 ♂ ♀.

*Apis barbutella*, *Kirby, Mon. Apum Angl.* ii. 343, tab. 18. fig. 4 ♂.

*Psithyrus quadricolor*, *St.-Farg. Hym.* ii. 428 ♀.

*Thoms. Opusc. Ent.* 260.

*Apathus sylvestris*, *Thoms. Hym. Scand.* ii. 49.

*Female.* Length 7–9 lines.—Clothed with black pubescence; a tuft on the vertex, the thorax anteriorly, and the scutellum with fulvous-yellow pubescence; wings fusco-hyaline. Abdomen shining,



convex, with usually a little yellow pubescence on the basal segment; the fourth and fifth segments with white pubescence. B.M.  
 Var.  $\beta$ . The scutellum and basal segment of the abdomen with black pubescence. (Rare.)

*Male*. Length 6–7 lines.—The pubescence black, with the thorax anteriorly and the posterior margin of the vertex yellow; the margin of the scutellum usually with a little yellow pubescence; the abdomen convex and shining, with a thin yellow pubescence at the base; that on the third, fourth, and the lateral margins of the fifth yellowish white; on the sixth it is black, and on the seventh fulvous. B.M.  
 Var.  $\beta$ . The pubescence entirely black on the scutellum.

This is a very common species, and found in all parts of the kingdom.

#### 4. *Apathus campestris*.

*A. hirsutus, ater*; thorace antice, scutello anoque flavis; abdominis apice acuminato inflexo.

*Apathus campestris*, *Smith, Zool.* ii. 543 ♂ ♀; *Bees Great Brit.* 235.

*Thoms. Hym. Scand.* ii. 45.

*Apis campestris*, *Panz. Faun. Germ.* 74. 11 ♀.

*Kirby, Mon. Apum Angl.* ii. 335 ♀, tab. 18. fig. 2.

*Bombus campestris*, *Fabr. Syst. Piez.* 344 ♀.

*Illig. Mag.* v. 174.

*Dahlb. Bomb. Scand.* 52, tab. fig. 23 ♀.

*Psithyrus campestris*, *St.-Farg. Hym.* ii. 433 ♀.

*Drews. & Schiödte, Krøy. Tidsskr.* ii. 123 ♂ ♀.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 242 ♀

*Apis rossiella*, *Kirby, lib. cit.* ii. 331 ♂, tab. 18. fig. 1 ♂.

*Bombus rossiellus*, *Dahlb. Bomb. Scand.* 40 ♂.

*Psithyrus rossiellus*, *Drews. & Schiödte, Krøy. Tidsskr.* ii. 123 ♂, tab. ii. fig. h ♂.

*Nyland. lib. cit.* i. 242.

*Apathus rossiellus*, *Thoms. Hym. Scand.* ii. 47.

*Apis francisana*, *Kirby, lib. cit.* ii. 334 ♂ var.

*Bombus francisanus*, *Illig. Mag.* v. 165 ♂.

*Psithyrus francisanus*, *Drews. & Schiödte, Krøy. Tidsskr.* ii. 125 ♂ ♀.

*Nyland. lib. cit.* 241 ♂.

*Apis leeana*, *Kirby, lib. cit.* ii. 333 ♂ var.

*Apis subterranea*, *Kirby, lib. cit.* ii. 371 ♂ var.

*Female*. Length 8–9 lines.—The pubescence black, with the thorax anteriorly and the scutellum clothed with yellow pubescence; wings fusco-hyaline. Abdomen shining, the fourth and fifth segments with yellow pubescence laterally. B.M.

Var.  $\beta$ . The pubescence on the scutellum black.

Var.  $\gamma$ . The entire pubescence black, excepting a little yellow at the sides of the fourth and fifth segments of the abdomen.

Var.  $\delta$ . The pubescence entirely black, with a few fuscous hairs at the apex of the abdomen.

*Male*. Length 6–8 lines.—The pubescence bright yellow, that on the head, a broad band between the wings, that on the second seg-

- ment of the abdomen, on its apical segment, and on the femora, tibiæ, and first joint of the tarsi above black. (*A. rossiella*, Kirby.) B.M.
- Var.  $\beta$ . The thorax yellow anteriorly, the scutellum obscurely so; the two basal segments of the abdomen with black pubescence, the following with fulvous-yellow; a little black also at the apex, and also a little black in the middle of the third segment. (*A. leeana*, Kirby.) B.M.
- Var.  $\gamma$ . The pubescence entirely black, except the fourth, fifth, and sixth segments of the abdomen, which have a deep-yellow pubescence, which is usually more or less interrupted; the collar has also frequently a mixture of obscure yellow hairs, as is the case in Kirby's type specimen. (*A. francisana*, Kirby.) B.M.
- Var.  $\delta$ . The pubescence entirely black, that at the apex of the abdomen being slightly fuscous. (*A. subterranea*, Kirby.) B.M.

Kirby, in his remarks upon his *Apis francisana*, observes, "I suspect one of the three species that I have described last (*A. rossiella*, *A. leeana*, and *A. francisana*) to be the male of that which I am next to notice; but as I know not which to fix upon I must leave that point undecided till I can meet with the nidus." The first and the last of these have been taken *in coitu* with the bee that Kirby suspected to be the female of one of them (*Apathus campestris*); and the four varieties given of this species are so linked together by intermediate examples that no doubt of their being varieties of the same insect can possibly exist. The black variety of the female is rare; but I have met with it five or six times, as well as with intermediate varieties that link the whole to the normal form. The black variety of the male closely resembles the corresponding variety of the male of *Bombus subterranea*, but it is readily distinguished by its shorter and rounder head, and by its very convex pubescent posterior tibiæ.

This species is generally distributed, being very plentiful to the south of the Thames; all the specimens of the black variety of the female were taken in Kent and Surrey. The species has been found also in Scotland, Wales, and Ireland.

#### Genus 18. APIS.

*Apis* (pt.), *Linn. Syst. Nat.* i. 953 (1766).

Communities consisting of males, a single female or queen, and working bees.

*Worker*.—Head as wide as the thorax; *eyes* lateral, oblong-ovate and pubescent; *ocelli* in a triangle on the vertex; *labial palpi* 4-jointed; the basal joint three times as long as the second, the two apical joints minute and attached to the second near its extremity, outside; *maxillary papi* consisting of a single joint; *anterior wings* with one marginal and three submarginal cells; the anterior and intermediate tibiæ with a spine at their apex, the posterior tibiæ not spined, externally smooth and shining, the edges longitudinally fringed with long hair curving inwards and forming the sides of

the corbiculum; the first joint of the tarsi produced at its base above into a spine, fringed above with long loose hair, outside subglabrous, inside furnished with ten rows of short stiff hairs. Abdomen retuse at the base, convex and subcylindrical; the sting curved.

*Female*.—Differs in the head being narrower than the thorax; the posterior tibiæ convex externally and not fringed at the sides with hair; the first joint of the tarsi not furnished with transverse rows of rigid hair, and destitute of the spine at its base above. The abdomen in proportion considerably longer, and the sting is straight.

*Male*.—Robust; the head and thorax very pubescent; head much narrower than the thorax; eyes large and meeting at the summit, occupying the entire vertex, very pubescent; the ocelli situated on the face just above the insertion of the antennæ, the posterior tibiæ smooth and shining externally, convex and much narrower at their base, the first joint of the tarsi oblong, wider than the tibiæ, smooth and shining, convex externally. Abdomen as wide as the thorax, cylindrical, its apex obtuse.

The genus *Apis* of Linnæus included the whole of the modern family of these insects; it now, however, is restricted to the social honey-bees agreeing generically with the *Apis mellifica*.

Volumes have been written on the economy of the honey-bee; Swammerdam, Réaumur, Huber, Bevan, Schirach, and many other eminent observers have made us acquainted with many marvels of the hive; and even yet fresh discoveries are being made.

In the entire range of the history of the Apidæ nothing is to be met with that excites our wonder in a greater degree than the fact of the hive-bees being able to replace the loss of their queen. This is accomplished by transferring the recently developed larva of a worker bee into a queen's cell, and supplying it with the same food as is used to nourish queens. This transforms the larva that would have developed into a sterile worker into a fruitful female, an insect structurally different. This is only one of the marvels of the hive; others equally startling are to be found in the works of writers on the hive-bee; and the above is only referred to in consequence of our not having observed any difference in the food upon which both sexes of solitary species of many genera of Hymenoptera feed. The larvæ of both sexes of the Pompilidæ feed upon spiders; the larvæ of many parasitic Hymenoptera are nourished by the larvæ of bees, and also by those of innumerable species of Lepidoptera: all these, according to their varied habit, subsist upon the same aliment, and yet both sexes are evolved. The question hence arises, what force is it that in such cases produces difference of sex?

*Apis mellifica*, in the present day, is a cosmopolitan insect; and it would appear that it has been spread over most parts of the Old World from remote ages. The effect of climate has no doubt in some localities produced permanent varieties; and these have been described as distinct species. On this interesting subject great difference of opinion exists: in the general catalogue of the Apidæ,

published by the Trustees of the British Museum, fifteen species of the genus *Apis* are enumerated. Subsequent investigation and much additional material has led to a careful revision of the species, by which the number has been reduced to nine; however, in the absence of the male and female, I am not yet satisfied as to the propriety of including the Egyptian *Apis fasciata* in the synonymy of *Apis mellifica*. *A. fasciata* was introduced into this country by the late Mr. Woodbury, of Exeter; but it proved to be so extremely pugnacious and so annoying to his neighbours that he was compelled to destroy his swarms. This fact, taken in connexion with certain differences from the *Apis mellifica*, renders it doubtful whether it is specifically identical with that insect.

The species of the genus *Apis*, in my opinion, are as follows:—*Apis dorsata*, India, Borneo, and islands in the eastern archipelago; *A. zonata*, Celebes; *A. indica*, India, Java, Sumatra, Malacca, Borneo, &c.; *A. nigro-cincta*, Celebes, Borneo, &c.; *A. sinensis*, China; *A. florea*, India, Ceylon, Borneo, &c.; *A. adansonii*, Africa (Congo, &c.); *A. unicolor*, Madagascar, Rodriguez; *A. mellifica*.

### 1. *Apis mellifica*.

*A. corpore pubescente, thorace subgriseo; abdomine elongato; alis dimidio brevioribus. Neutra plantis posticis intus transverse striatis. Mas corpore pubescente; thorace tomentosofulvescente; oculis postice conniventibus.*

*Apis mellifica*, *Linn. Syst. Nat.* i. 955.

*Scop. Ent. Carn.* 303.

*Fabr. Syst. Ent.* 383.

*Sulz. Ins.* tab. 19. fig. 183.

*Schrank, Ins. Austr.* 813.

*Rossi, Faun. Etrus.* ii. 103.

*Christ. Hym.* 73, tab. 1. figs. 1-5.

*Donov. Brit. Ins.* xiv. 63. 492. fig. ♂ ♀ ☿.

*Kirby, Mon. Apum Angl.* ii. 312, tab. 17. fig. 10 ♀, 11 ♂, 12 ☿.

*Panz. Faun. Germ.* 85. 16 ♂, 85. 17 ♀, 85. 18 ☿.

*Latr. Hist. Nat. Ins.* xiv. 66.

*Spin. Ins. Ligur.* i. 35.

*Jurine, Hym.* 244, tab. 12. gen. 35.

*Curtis, Brit. Ent.* xvi. tab. 769 ♂ ♀ ☿.

*Brullé, Expéd. Sc. de Morée*, iii. 327.

*St.-Farg. Hym.* i. 401.

*Lucas, Explor. Sc. Algér.* iii. 141.

*Spin. Faun. Chilí*, vi. 161.

*Smith, Bees Great Brit.* 241.

*Nyland. Notis. ur Sällsk. pro Faun. et Flo. Fenn.* i. 226.

*Schenck, Nass. Bien.* 134.

*Thoms. Hym. Scand.* ii. 14.

*Apis cerifera*, *Scop. Ann. Hist. Nat.* iv. 16.

*Apis gregaria*, *Geoff. Ins.* ii. 407.

*Apis domestica*, *Ray, Hist. Ins.* 240.

*Apis ligustica*, *Spin. Ins. Ligur.* i. 35 (var.).

*Latr. Ann. Mus. Hist. Nat.* v. 172.

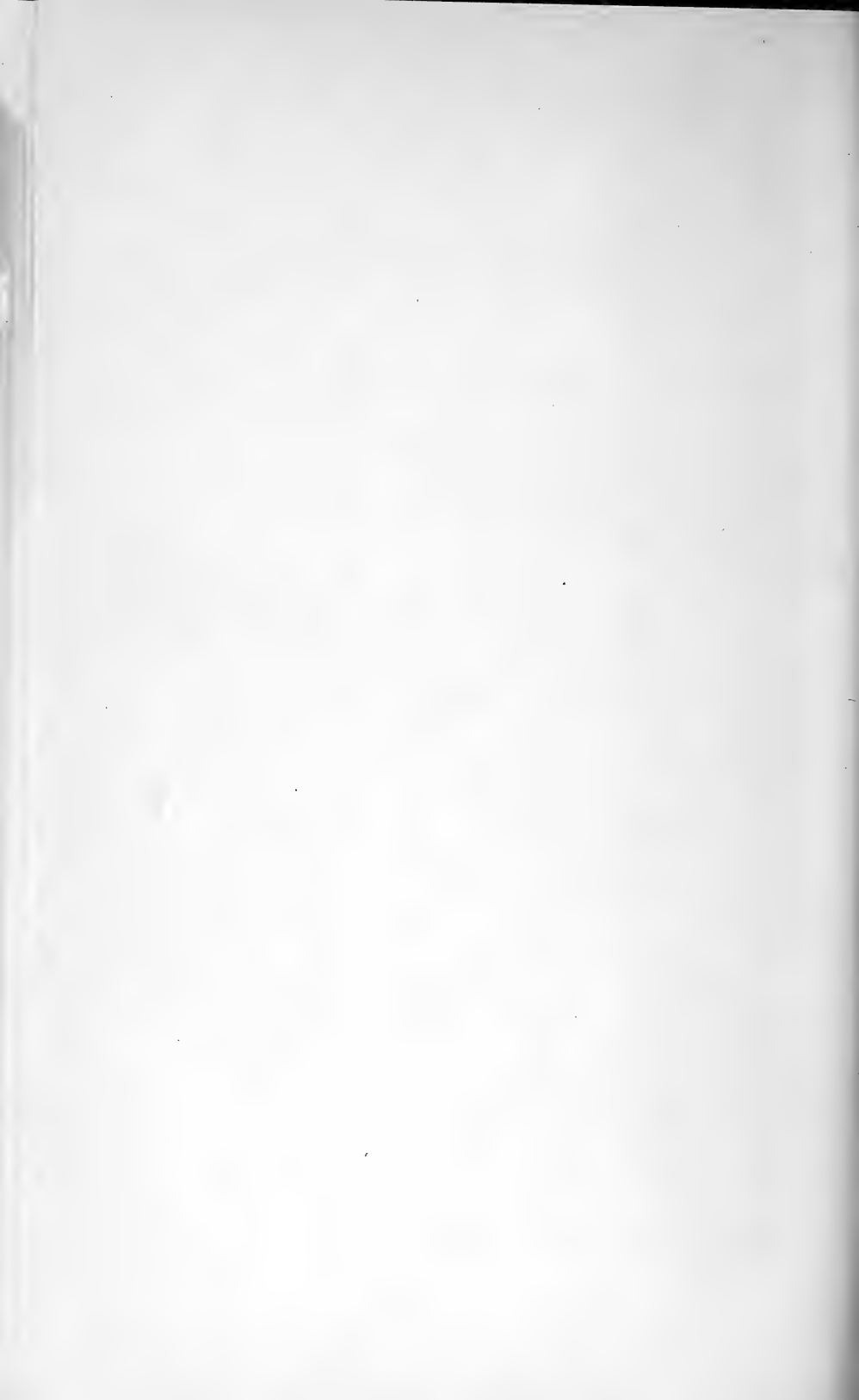
*Humb. & Bonp. Voy.* i. 287, tab. 19. fig. 4 ♂, 5 ♀, 6 ☿.

*St.-Farg. Hym.* i. 402.

*Female.* Length 7-8 lines.—Fuscous, the pubescence rufo-fuscous, that on the vertex fuscous; the antennæ, labrum, and mandibles rufo-testaceous; the posterior tibiæ and tarsi pale rufo-testaceous; the wings shorter than the body; the margins of the segments of the abdomen more or less rufo-testaceous. B.M.

*Worker.*—Closely resembling the female, but uniformly of a darker colour, the legs being concolorous; the wings as long as the body. B.M.

*Male.* Length 8 lines.—Robust; coloured as in the worker, the eyes ferruginous and approximate; the head, the thorax, and also the base of the abdomen thickly covered with short rufo-fuscous pubescence, palest on the abdomen and metathorax; the fourth and apical segments have a long thin fuscous pubescence; the apex inflexed, the seventh segment concealed. B.M.



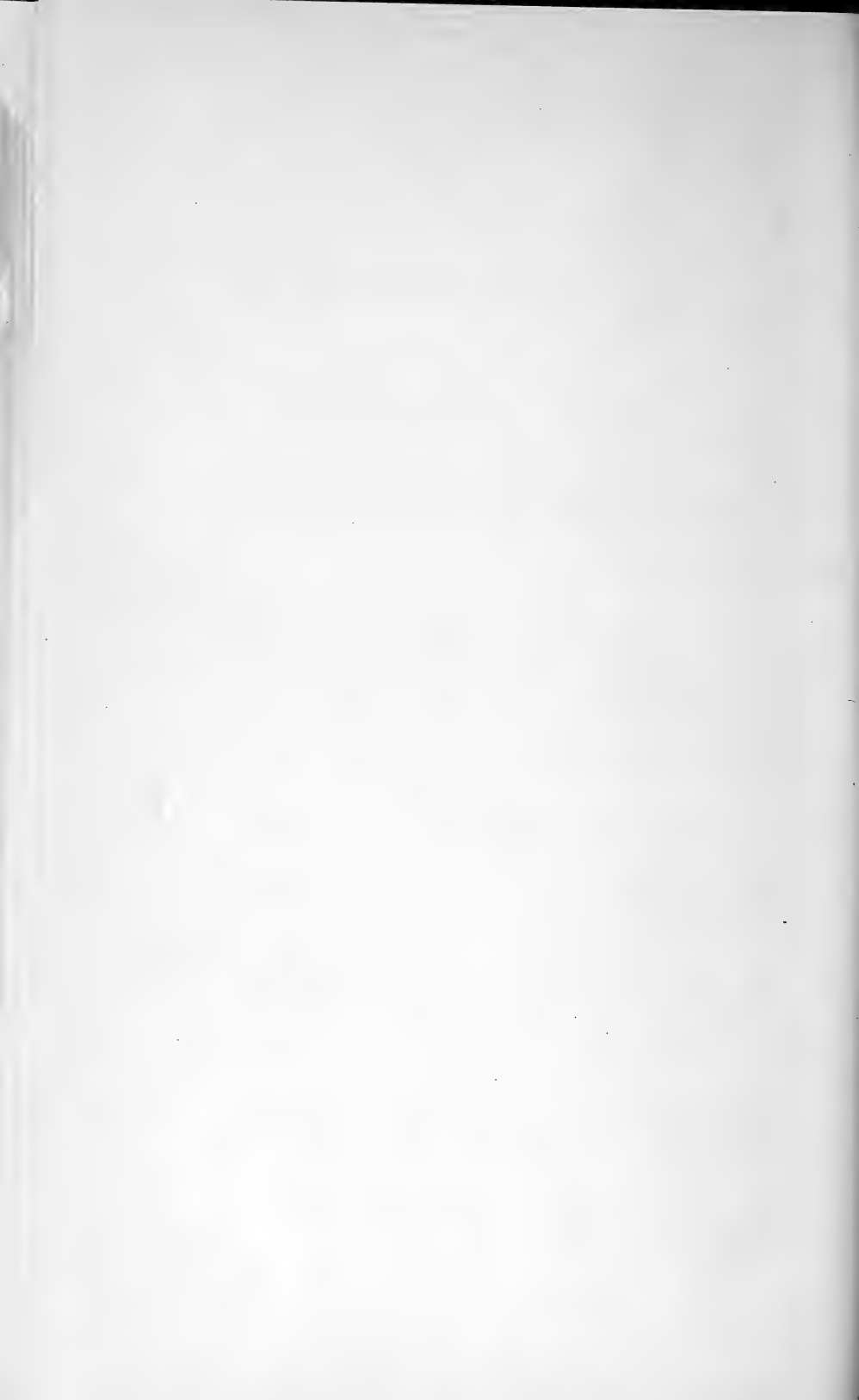
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## EXPLANATION OF THE PLATES.

All the drawings of the tongues were made from specimens of those organs when recently extracted from fresh specimens of the Bees, before any of the parts became distorted by shrivelling up, as is the case in dried specimens.

The letters indicate the same parts in all the figures; they are as follows:—*a*, the mentum; *b*, labium; *c*, the labial palpi; *d*, the paraglossæ; *e*, the maxilla; *f*, the lobe of the maxilla; *g*, the maxillary palpus.

## PLATE A.—Fig. 1.

- |   |  |
|---|--|
| <i>a</i> . The costal nerve.            | <i>h</i> . The radial nerve.             |
| <i>b</i> . The apical margin.           | <i>i</i> . The cubital nerve.            |
| <i>c</i> . The posterior margin.        | <i>k</i> . The discoidal nerve.          |
| <i>d</i> . The postcostal nerve.        | <i>l</i> . The subdiscoidal nerve.       |
| <i>e</i> . The externo-median nerve.    | <i>m</i> . The transverso-median nerves. |
| <i>f</i> . The anal nerve.              | <i>n</i> . The recurrent nerves.         |
| <i>g</i> . The transverso-median nerve. | <i>o</i> . The stigma.                   |

## PLATE A.—Fig. 2.

- |                                 |                                 |
|---------------------------------|---------------------------------|
| 1. The costal cell.             | 8. The third submarginal cell.  |
| 2. The externo-median cell.     | 9. The fourth submarginal cell. |
| 3. The interno-median cell.     | 10. The first discoidal cell.   |
| 4. The anal cell.               | 11. The second discoidal cell.  |
| 5. The marginal cell.           | 12. The third discoidal cell.   |
| 6. The first submarginal cell.  | 13. The first apical cell.      |
| 7. The second submarginal cell. | 14. The second apical cell.     |

## PLATE I.

Fig.

1. *Prosopis cornuta* ♀.
- 1a. Antenna of *Prosopis cornuta* ♂.
- 1b. Intermediate leg of *Prosopis cornuta* ♂.
- 1c. Wing of *Prosopis*.
- 1d. Head of *Prosopis dilatata* ♂.
2. *Sphecodes fuscipennis* ♀.
3. *Halictus sexnotatus* ♀.

Fig.

- 3a. Labrum of *Halictus* ♂.
- 3b. Labrum of *Halictus* ♀.
- 3c. Wing of *Halictus*.
4. *Macropis labiata* ♀.
5. *Nomada armata* ♀.
6. *Dasygoda hirtipes* ♀.
- 6a. Wing of *Dasygoda*.

## PLATE II.

- |   |   |
|---|---|
| Fig.  | Fig.  |
| 1. <i>Andrena ferox</i> ♂.                                  | 5. <i>Celioxys vectis</i> ♀.                                      |
| 2. <i>Andrena ferox</i> ♀.                                  | 6. <i>Megachile maritima</i> ♂.                                   |
| 2a. Wing of <i>Andrena</i> , first type of<br>neururation.  | 6a. Anterior tarsus of <i>Megachile</i><br><i>maritima</i> ♂.     |
| 2b. Wing of <i>Andrena</i> , second type<br>of neururation. | 7. Anterior tarsus of <i>Megachile</i><br><i>willughbiella</i> ♂. |
| 3. Wing of <i>Cilissa</i> .                                 | 8. Anterior tarsus of <i>Megachile</i><br><i>circumcincta</i> ♂.  |
| 4. <i>Panurgus calcaratus</i> ♂.                            |   |
| 4a. Wing of <i>Panurgus</i> .                               |   |

## PLATE III.

- |  |   |
|--|---|
| 1. <i>Osmia pilicornis</i> ♂.                                    | 9. Apical segment of <i>Osmia auru-</i><br><i>lenta</i> ♂.  |
| 2. <i>Osmia pilicornis</i> ♀.                                    | 10. Profile of the abdomen of<br><i>Osmia spinulosa</i> ♂.  |
| 3. <i>Melecta luctuosa</i> ♀.                                    | 11. Apical segment of <i>Osmia spi-</i><br><i>nulosa</i> ♂. |
| 4. Apical segment of <i>Megachile</i><br><i>pyrina</i> ♂.        | 12. Wing of <i>Celioxys</i> .                               |
| 5. Apical segment of <i>Megachile</i><br><i>argentata</i> ♂.     | 13. Wing of <i>Anthidium</i> .                              |
| 6. Apical segment of <i>Megachile</i><br><i>centuncularis</i> ♂. | 14. Wing of <i>Nomada</i> .                                 |
| 7. Apical segment of <i>Megachile</i><br><i>lignisecca</i> ♂.    | 15. Wing of <i>Melecta</i> .                                |
| 8. Apical segment of <i>Osmia pili-</i><br><i>cornis</i> ♂.      | 16. Wing of <i>Stelis</i> .                                 |
|  | 17. Wing of <i>Megachile</i> .                              |

## PLATE IV.

- |  |  |
|--|--|
| 1. <i>Anthidium manicatum</i> ♂.   | 3. <i>Stelis octomaculata</i> ♀.             |
| 2. <i>Chelostoma florissomne</i> ♀.  | 4. <i>Saropoda bimaculata</i> ♂.             |
| 2a. Mandible of <i>Chelostoma flori-</i><br><i>somne</i> ♀.                | 4a. Face of <i>Saropoda bimaculata</i><br>♀. |
| 2b. Labrum of <i>Chelostoma flori-</i><br><i>somne</i> ♂.                  | 5. <i>Ceratina cyanea</i> .                  |
| 2c. Apical segment of <i>Chelostoma</i><br><i>florissomne</i> ♂.           | 5a. Wing of <i>Ceratina</i> .                |
| 2d. Profile of the abdomen of <i>Che-</i><br><i>lostoma florissomne</i> ♂. | 6. Wing of <i>Saropoda</i> .                 |
|  | 7. Wing of <i>Eucera</i> .                   |
|  | 8. Wing of <i>Ammobates</i> .*               |

## PLATE V.

- |  |                                |
|--|--------------------------------|
| 1. <i>Epeolus variegatus</i> ♀.                              | 2. Underside of the Hermaphro- |
| 2a. Hermaphrodite. — <i>Anthophora</i><br><i>acervorum</i> . | dite.                          |
|  | 3. <i>Bombus lapponicus</i> ♀. |

\* The genus *Ammobates* is not described in this work; it is reported to have been taken in England, but the circumstance requires confirmation.

## PLATE V. (continued).

- |  |  |   |
|--|--|---|
| Fig.   |  | Fig.                                      |
| 4. <i>Apathus vestalis</i> ♀.                |  | 9. Labrum of <i>Bombus virginalis</i> ♀.  |
| 5. Wing of <i>Apis mellifica</i> .           |  | 10. Labrum of <i>Apathus campestris</i> . |
| 6. Wing of <i>Anthophora</i> .               |  | 11. Posterior leg of <i>Bombus</i> ♀.     |
| 7. Posterior leg of <i>Apis mellifica</i> ♀. |  | 12. Posterior leg of <i>Apathus</i> ♀.    |
| 8. Posterior leg of <i>Apis mellifica</i> ♀. |  |   |

## PLATE VI.

- |   |   |
|---|---|
| 1. Labium of <i>Colletes daviesana</i> ♀.   | 8. Maxilla of <i>Halictus leucozonius</i> ♀.    |
| 2. Maxilla of <i>Colletes daviesana</i> ♀.  | 9. Labium of <i>Andrena labialis</i> ♀.         |
| 3. Labium of <i>Sphecodes gibbus</i> ♀.     | 10. Maxilla of <i>Andrena labialis</i> ♀.       |
| 4. Maxilla of <i>Sphecodes gibbus</i> ♀.    | 11. Posterior leg of <i>Andrena atriceps</i> ♀. |
| 5. Labium of <i>Prosopis signata</i> ♀.     | 12. Labium of <i>Macropis labiata</i> ♀.        |
| 6. Maxilla of <i>Prosopis signata</i> ♀.    | 13. Maxilla of <i>Macropis labiata</i> ♀.       |
| 7. Labium of <i>Halictus leucozonius</i> ♀. |   |

## PLATE VII.

- |   |   |
|---|---|
| 1. Labium of <i>Cilissa leporina</i> ♀.     | 8. Maxilla of <i>Megachile maritima</i> ♀.  |
| 2. Maxilla of <i>Cilissa leporina</i> ♀.    | 9. Mandible of <i>Megachile maritima</i> ♀. |
| 3. Labium of <i>Dasygaster hirtipes</i> ♀.  | 10. Antenna of <i>Megachile maritima</i> ♀. |
| 4. Maxilla of <i>Dasygaster hirtipes</i> ♀. | 11. Labium of <i>Osmia bicornis</i> ♀.      |
| 5. Labium of <i>Panurgus banksianus</i> ♀.  | 12. Maxilla of <i>Osmia bicornis</i> ♀.     |
| 6. Maxilla of <i>Panurgus banksianus</i> ♀. |   |
| 7. Labium of <i>Megachile maritima</i> ♀.   |   |

## PLATE VIII.

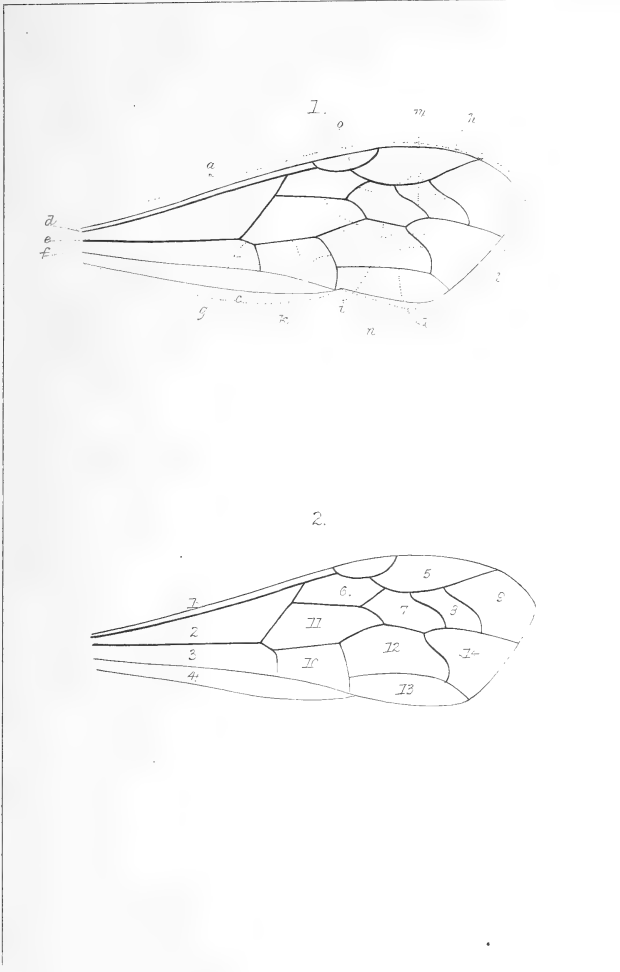
- |  |   |
|--|---|
| 1. Labium of <i>Anthidium manicatum</i> ♀.       | 9. Labium of <i>Nomada sexfasciata</i> ♀.   |
| 2. Maxilla of <i>Anthidium manicatum</i> ♀.      | 10. Maxilla of <i>Nomada sexfasciata</i> ♀. |
| 3. Mandible of <i>Anthidium manicatum</i> ♀.     | 11. Labrum of <i>Nomada sexfasciata</i> ♀.  |
| 4. Labium of <i>Chelostoma florissomne</i> ♀.    | 12. Labium of <i>Ceratina cyanea</i> ♀.     |
| 5. Maxilla of <i>Chelostoma florissomne</i> ♀.   | 13. Maxilla of <i>Ceratina cyanea</i> ♀.    |
| 6. Labial palpus of <i>Heriades truncorum</i> ♀. | 14. Labium of <i>Epeolus variegatus</i> ♀.  |
| 7. Mandible of <i>Chelostoma florissomne</i> ♀.  | 15. Maxilla of <i>Epeolus variegatus</i> ♀. |
| 8. Labrum of <i>Chelostoma florissomne</i> ♀.    | 16. Labium of <i>Stelis phaeoptera</i> ♀.   |
|  | 17. Maxilla of <i>Stelis phaeoptera</i> ♀.  |

## PLATE IX.

- Fig.
1. Labium of *Cœlioxyx* ♀.
  2. Maxilla of *Cœlioxyx* ♀.
  - 2a. Labrum of *Cœlioxyx* ♀.
  - 2b. Superior plate of the apical segment of *C. rufescens* ♀.
  - 2c. Inferior plate of the apical segment of *C. rufescens* (typical form) ♀.
  - 2d. Inferior plate of the apical segment of *C. rufescens* (variety) ♀.
  - 2e. Lateral view of the apical segment of *Cœlioxyx rufescens* ♀.
  - 2f. Lateral view of the apical segment of *C. rufescens* ♂.
  - 2g. Inferior plate of the apical segment of *C. elongata* ♀.
  - 2h. Underside of the head of *C. elongata*, var. *mandibularis* ♀.
  - 2i. Lateral view of the apical segment of *C. vectis* ♀.
  - 2k. Lateral view of the apical segment of *C. vectis* ♂.
  - 2l. Superior plate of the apical segment of *C. vectis* ♀.
  - 2m. Inferior plate of the apical segment of *C. vectis* ♀.
  - 2n. Inferior plate of the apical segment of *C. vectis*, var. ♀.
- Fig.
- 2o. Inferior plate of the apical segment of *C. quadridentata* ♀.
  - 2p. Superior plate of the apical segment of *C. quadridentata* ♀.
  - 2q. Lateral view of the apical segment of *C. quadridentata* ♀.
  - 2r. Inferior plate of the apical segment of *C. umbrina* ♀.
  - 2s. Superior plate of the apical segment of *C. umbrina* ♀.
  - 2t. Superior plate of the apical segment of *C. elongata* ♀.
  - 2u. Inferior plate of the apical segment of *C. elongata* ♀.
  - 2v. Lateral view of the apical segment of *C. elongata* ♀.
  - 2w. Lateral view of the apical segment of *C. umbrina* ♀.
  3. Labium of *Melecta punctata* ♀.
  4. Maxillary palpus of *Melecta punctata* ♀.
  5. Labium of *Eucera longicornis* ♀.
  6. Maxilla of *Eucera longicornis* ♀.
  7. Labium of *Saropoda bimaculata* ♀.
  8. Maxilla of *Saropoda bimaculata* ♀.

## PLATE X.

1. Labium of *Anthophora acervorum* ♀.
2. Maxilla of *Anthophora acervorum* ♀.
3. Labium of *Bombus hortorum* ♀.
4. Labium of *Apis mellifica* ♂.
5. Labium of *Bombus virginalis* ♀.
6. Maxilla of *Bombus virginalis* ♀.
7. Maxillary palpus of *Bombus lapidarius* ♀.
8. Maxillary palpus of *Bombus derhamellus* ♀.
9. Labium of *Apathus campestris* ♀.
10. The relative proportions of the labium and labial palpi of *Bombus lapidarius*.
11. The relative proportions of the labium and labial palpi of *Bombus derhamellus* ♀.

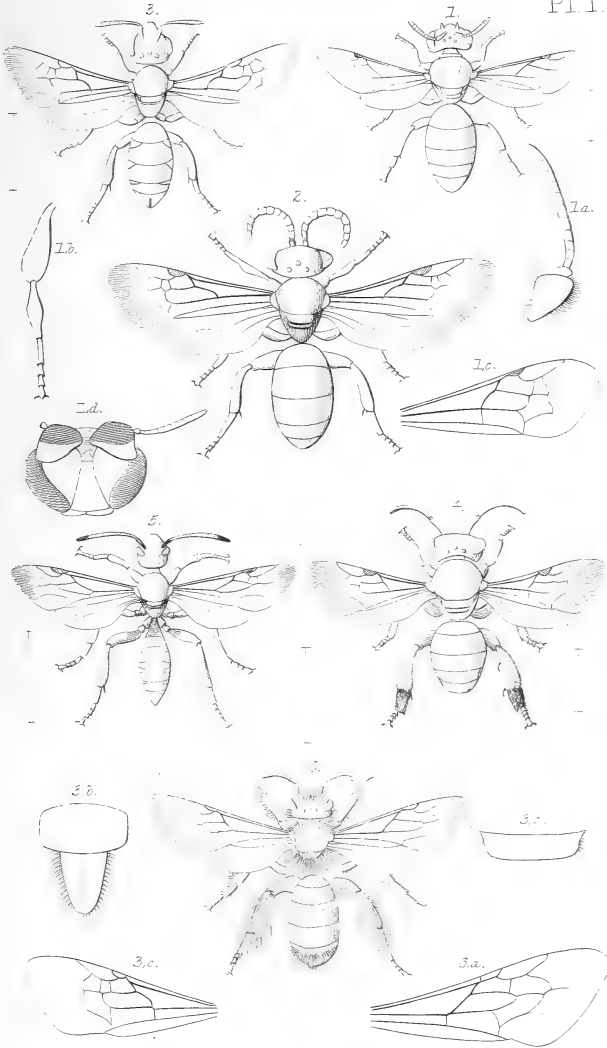






HYMENOPTERA.

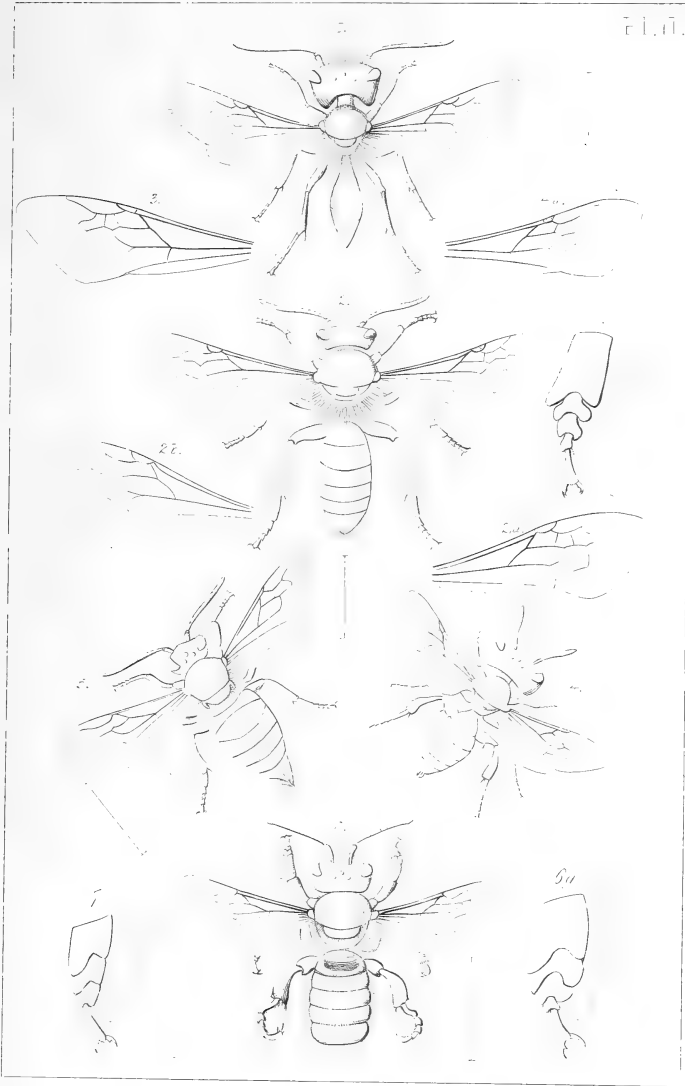
Pl. 1.





LEPIDOPTERA.

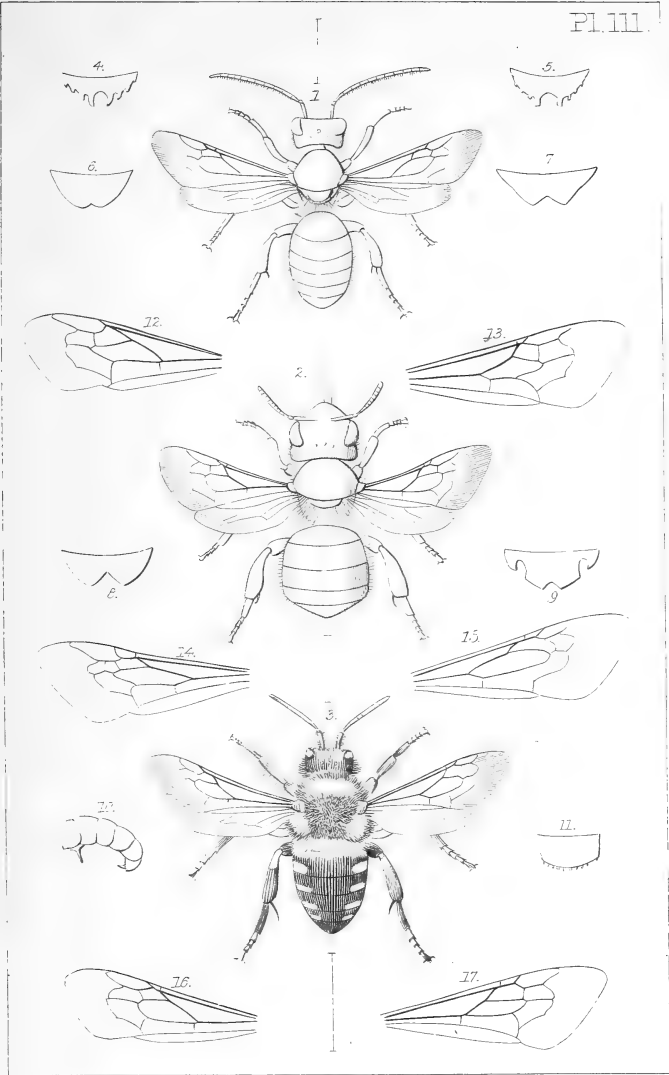
PL. II.





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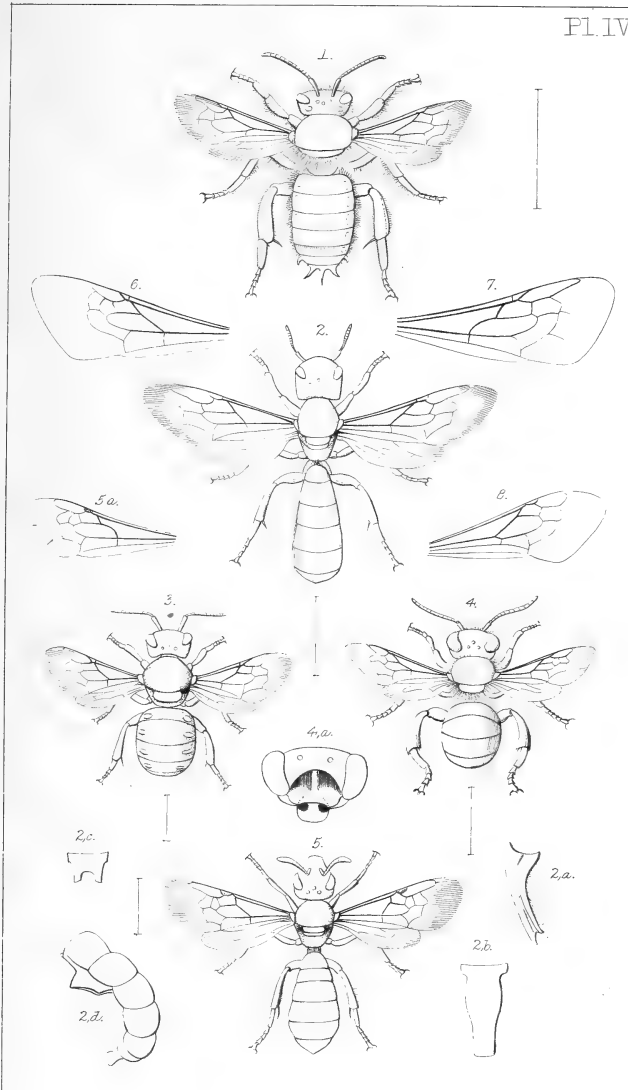
Pl. III.





HYMENOPTERA.

PL. IV.

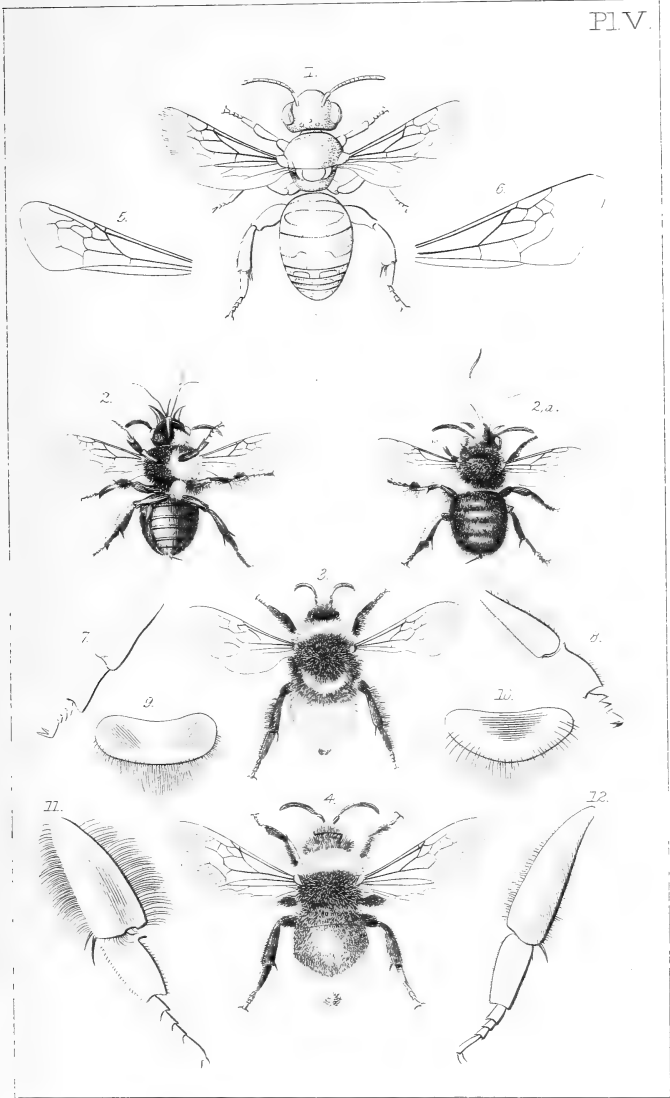






HYMENOPTERA.

Pl. V.





HYMENOPTERA.

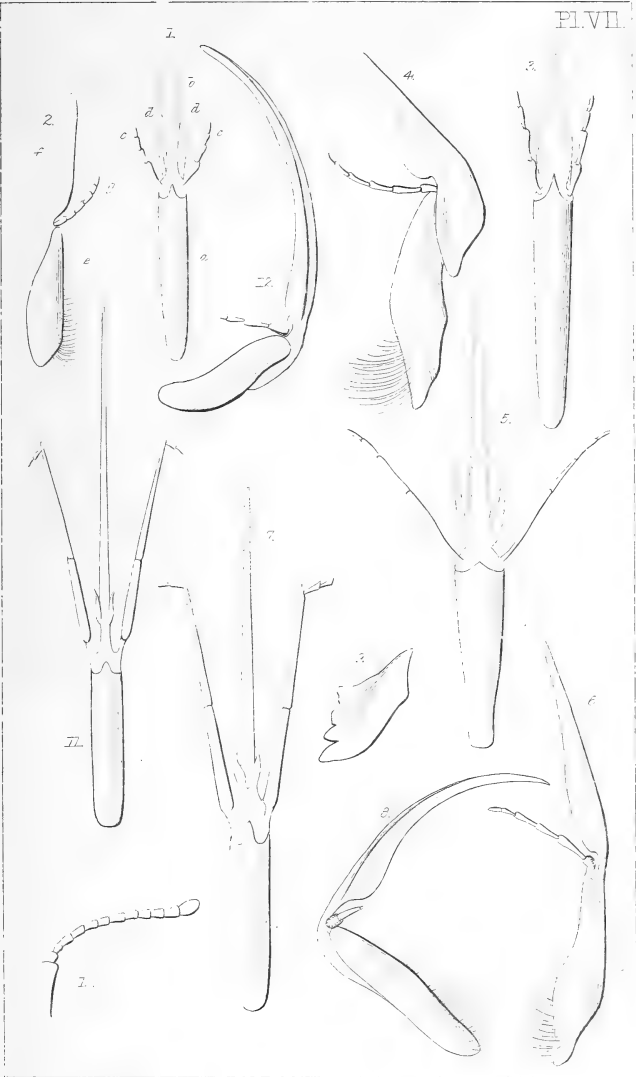
PL VI.





HYMENOPTERA.

PL. VII.





HYMENOPTERA.

Pl. VIII.







HYMENOPTERA.

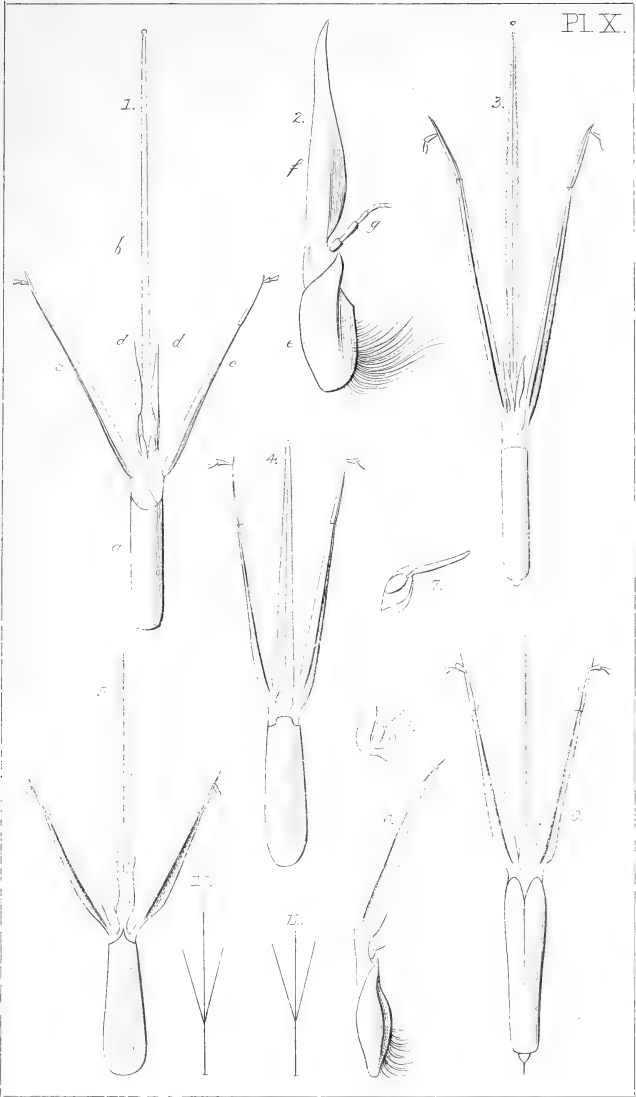
PL. IX.





HYMENOPTERA.

PL. X.





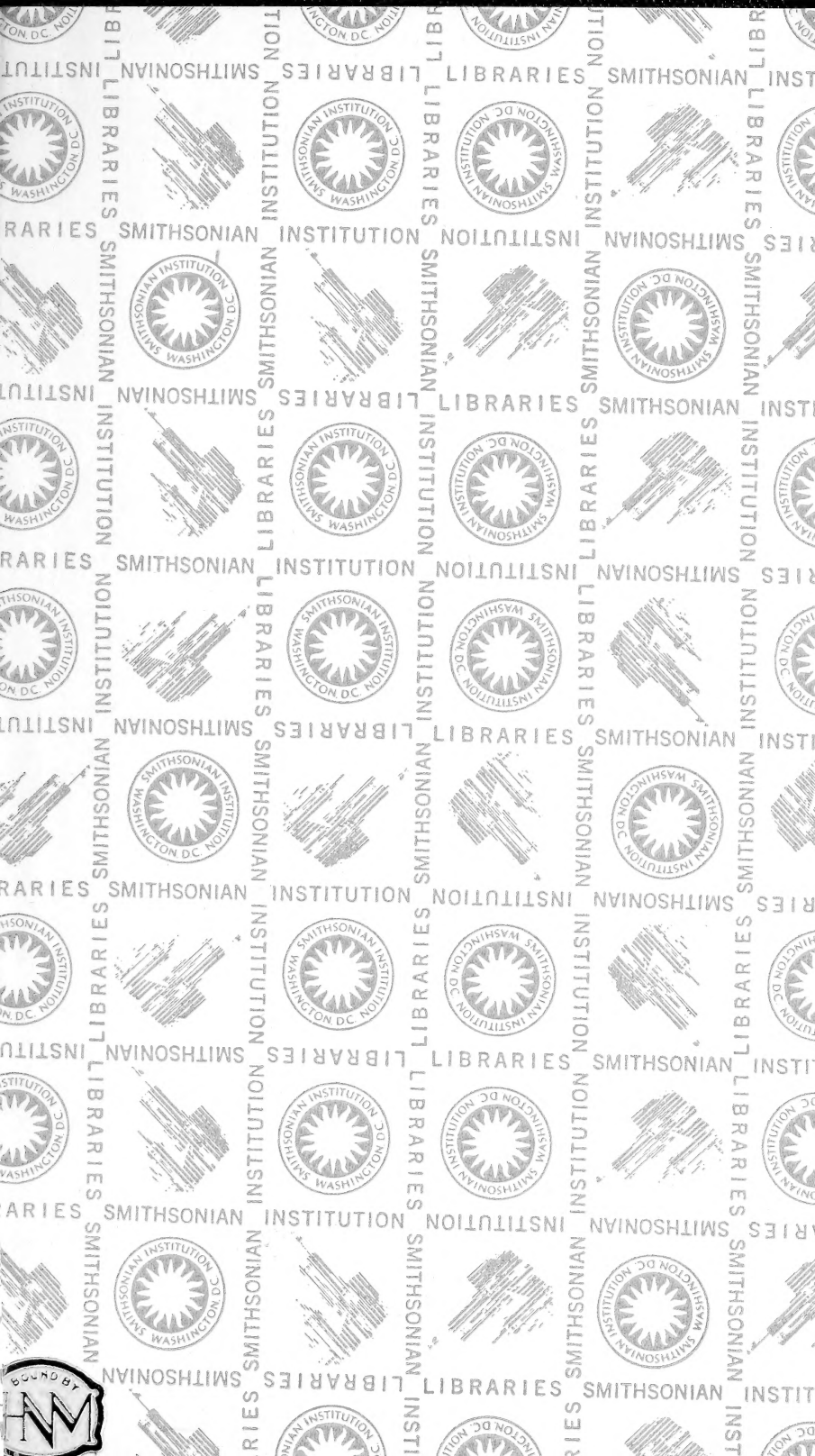












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