Inhabits England, near Bristol, Plymouth, and Exeter.
Elytra with the apex of a palish black.

Sp. 3. *Not. glauca.* Elytra grayish, the margin with minute blackish spots: back black, the apex pale brownish. (*Pl.* 5. *fig.* 3.)
Notonecta glauca *of authors.*
Inhabits Britain in almost every pond.

Genus 290. PLEA. *Leach, Trans. of Linn. Soc.* vol. xii.

Body of a squarish oval: *antennæ* with the third and remainder of the joints largest: *anterior tarsi* with the articulations nearly equal: *claws* on the hinder feet large.
The thorax is obscurely hexagonal with the hinder margin prominent and rounded, the head as broad as the broadest part of the thorax: the eyes are rather oblong, without the least tendency to converge behind: the hinder pair of legs not more ciliated than the others, but are terminated by very strong and distinct claws: tips of the elytra acuminated and entire.

Sp. 1. *Not. minutissima.* Gray with a brownish line in the front: thorax and elytra deeply punctured.
Notonecta cinerea, anelytra. *Geoff. Ins. Par.* i. 477. 2. Notonecta minutissima. *Fourc., Latr., Oliv., Fabr.* Plea minutissima. *Leach.*
Length of the body 1½ lin.
Inhabits ponds and stagnant waters near London in profusion.

"This species has been considered by Geoffroy, Fabricius and Olivier, as *Notonecta minutissima* of Linné, which reference undoubtedly belongs to the following species; viz. to *Sigara minutissima.*"

"Geoffroy has described the larvæ, never having seen the perfect insect."

STIRPS 2.—*Body* roundish and depressed: *tarsi*, the anterior with one articulation; the hinder with two; base and margin of the elytra only channelled.

Genus 291. SIGARA. *Leach, Trans. Linn. Soc.* vol. xii.

Scutellum distinct: *thorax* divided by a transverse line: *body* ovate, the posterior part acuminated.
Sp. 1. *Sig. minutissima.* Above cinereous: elytra brownish with very faint spots; the under part and feet yellowish.
Notonecta minutissima. *Linné.* Sigara minutissima. *Leach.*
Inhabits rivers and running waters in England, Ireland, and Scotland.
Length of the body 1 lin.

Genus 292. CORIXA. *Geoffroy, Leach.*

Scutellum none: *thorax* transverse, the posterior part produced: *body* long, the anterior and posterior part rounded.

"The thorax is more or less produced behind in all the species of this genus, but is not evident in the first division of this genus until

the elytra have been elevated. The front, the under parts of the body, and the legs, in all the British species are yellowish."

* *Elytra to the apex gradually decreasing and ending in a point.*

The channel on the anterior margin of the elytra in this division is uninterrupted, and gradually disappears before it reaches to the extremity of the elytra.

Sp. 1. *Cor. coleoptrata.* Thorax reddish-gray: elytra palish yellow, with longitudinal rows of black spots.

Sigara coleoptrata. Elytra wholly coriaceous and brown: the exterior margin yellow. *Fabr. Syst. Rhyng.* 105. 4.

Inhabits ponds and ditches near Norwich. Dr. Leach has observed, that although the character by Fabricius does not accord with that given above, yet as he drew his description from a museum specimen (which generally assumes the colour he mentions) the Doctor has given his synonym without any hesitation; but this insect is distinct from the *Sigara coleoptrata* of Panzer, which is figured with a scutellum, and most probably belongs to the genus *Sigara* as mentioned above.

** *Elytra at the apex rather rounded.*

The channel in the fore part of the elytra, at about two-thirds from its commencement, is interrupted by an oblique, transverse, elevated line, and it terminates abruptly before it reaches to the apex of the elytron, and then it leaves the margin inclining a little inwards or backwards.

a. *Elytra and thorax rough.*

Sp. 2. *Cor. striata.* Thorax and elytra brown with yellow lines and transversely striated: back black, sides pale yellow.

Notonecta striata. *Linn.* Corixa striata. *Leach.*

Inhabits stagnant waters.

Sp. 3. *Cor. stagnalis.* Thorax with numerous transverse yellow lines: elytra brown, besprinkled with minute yellowish dots: anterior part of the margin yellowish; posterior with yellowish lines; back brownish black.

Corixa stagnalis. *Leach, Tr. Linn. Soc.* xii.

Inhabits ponds and stagnant waters.

This species is about half the size of *C. striata.*

Sp. 4. *Cor. fossarum.* Brown: thorax with six transverse yellow lines: elytra brown, with minute yellowish dots, the anterior part yellowish, towards the base of the posterior part yellowish lines: back yellowish. Smaller than *C. stagnalis.*

Inhabits ponds and ditches.

Sp. 5. *Cor. lateralis.* White: thorax with seven black lines: elytra with minute black spots, anterior margin immaculate.

C. lateralis. *Leach, Trans. Linn. Soc.* xii.

This species is considerably smaller than *C. fossarum*, back black, sides yellow.

Sp. 6. *Cor. dorsalis.* Thorax with six transverse black lines on the margin: elytra black and spotted, the anterior margin immaculate.

C. dorsalis. *Leach, Trans. Linn. Soc.* xii.

Rather larger than *C. stagnalis*. Back yellow.

b. *Thorax and elytra smooth and shining.*

Sp. 7. *Cor. Geoffroyi.* Yellow: thorax with numerous transverse black lines: elytra black with minute spots: back wholly black: apex yellowish.

La Corise. *Geoff. Hist. Nat. des Insect.* i. P. 478. *pl.* 9. *fig.* 7. Sigara striata. *Panz. Faun. Ins. Germ. Ins.* 50. 23. Corixa Geoffroyi. *Leach.*

Length of the body half an inch.

Inhabits stagnant waters, and is very common.

"All authors have considered this species as *Notonecta striata* of Linné, although it will not agree with his character. It is figured by Geoffroy and Panzer, and is of the former author the species serving as the type of the genus *Corixa.*"

Sp. 8. *Cor. affinis.* Yellow: thorax with numerous transverse black lines: elytra black with minute dots: back wholly black, sides dentated and yellow.

Cor. affinis. *Leach, Trans. Linn. Soc.* xii.

Inhabits ponds near Plymouth, but is rare. But half the size of *C. Geoffroyi.*

Order VIII. OMOPTERA. *Leach.*

Order HEMIPTERA. *Linn., Cuvier, Lamarck.*

Class RHYNGOTA. *Fabr.*

Order HEMIPTERA. Section 2. *Homoptera.* Latr.

Characters of the Order.

Rostrum attached to the inferior part of the head: *elytra* coriaceous or membranaceous throughout; suture straight: *thorax* composed of two segments, the second as long or longer than the first: *ocelli* three. *Metamorphosis* semicomplete, or incomplete.

Fam. I. CICADIADÆ. *Leach.*

CICADARIÆ I. *Latreille.*

Antennæ composed of six distinct joints: *ocelli* or *little eyes* three: *tarsi* with three joints.

Genus 293. CICADA. *Lamarck, Geoff., Linn., De Geer, Latr.* TETTIGONIA. *Fabr.*

Thighs of the anterior feet thick, dentate.

Sp. 1. ————? (*Pl.* 5. *fig.* 2. *natural size.*)

The only species known to inhabit this country was lately discovered by Mr. Daniel Bydder, near the New Forest in Hampshire.

Fam. II. CERCOPIDÆ. *Leach.*

CICADARIÆ II. *Latreille.*

Antennæ three-jointed: *ocelli* two: *tarsi* with three joints.

STIRPS 1.—*Antennæ* not inserted in the internal sinus of the eyes; the two first joints conjoined shorter than the head.

Genus 294. FLATA. *Fabr., Leach.* FULGORA. *Latr.*

Front as if truncated, vertical, not rostrated: *eyes* globular: *elytra* very broad; the external margin very much dilated: *body* broad, triangular.

Sp. 1. *Fla. reticulata.*

Inhabits Europe, and is common in this country in hedges during the summer months.

Genus 295. ISSUS. *Fabr., Leach.* FULGORA. *Latr., Oliv.* CICADA. *Villers.*

Front as if truncated, not rostrated, vertical: *elytra* at their external base very much dilated, with the apex narrower; *body* short, deltoid: *eyes* globular.

Sp. 1. *Iss. coleoptratus.*

Inhabits hedges.

Genus 296. CIXIUS. *Leach.* FULGORA. *Latr.* FLATA. *Fabr.*

Front as if truncated, not rostrated, vertical: *elytra* with the external margin nearly straight or scarcely arcuate: *body* elongate, quadrate; *eyes* globular.

Sp. 1. *Cix. nervosus.*

Flata nervosa. *Fabr.*

Inhabits hedges.

STIRPS 2.—*Antennæ* inserted in the internal sinus of the eyes, the two first joints as long or longer than the head.

Genus 297. ASIRACA. *Latr., Leach.* DELPHAX. *Fabr.*

Antennæ as long or longer than the thorax, the first joint very long, compressed, angulate.

Sp. 1. *Asi. clavicornis.* Body brown or obscure brown variegated: apex of the four anterior tibiæ white: elytra semihyaline: apex with a fuscous band; nerves spotted with fuscous.

Delphax clavicornis. *Fabr.* Asiraca clavicornis. *Latr., Leach.*

Inhabits France and England in grassy places.

STIRPS 3.—*Antennæ* inserted between the eyes: *thorax* not transverse; hinder margin more or less prominent.

Genus 298. CERCOPIS. *Fabr., Schrank, Latr., Leach.* CICADA. *Linn.* TETTIGONIA. *Oliv.*

Antennæ inserted on the frontlet, the second longer than the first joint, the third joint short-conic: *thorax* not dilated.

Sp. 1. *Cer. sanguinolenta.* Black, shining; each wing-case with a spot at the base, one in the middle, and a flexuous band at the apex blood red. (*Pl. 5. fig. 1.*)

Cicada sanguinolenta. *Linn.* Cercopis sanguinolenta. *Fabr., Leach.*

Inhabits France, Germany, and England in the woods of Kent.

Genus 299. LEDRA. *Fabr., Latr., Leach.* CICADA. *Linn., Geoff.* MEMBRACIS. *Oliv., Lamarck, Schrank.*

Antennæ inserted in the frontlet, the two first joints nearly equally long; the third elongate-conic: *thorax* dilated behind into an auricle.

Sp. 1. *Led. aurata.*

Inhabits the oak and various trees in woods.

Genus 300. MEMBRACIS. *Latr., Fabr., Leach.* CICADA. *Linn.*

Antennæ inserted in the frontlet; the two first joints nearly equally long, the third elongate-conic: *thorax* dilated behind.

Sp. 1. *Mem. cornutus.* Brownish.

Cicada cornuta. *Linn.* Membracis cornuta. *Latr., Leach.*

Inhabits woods and hedges.

STIRPS 4.—*Antennæ* inserted between the eyes: *thorax* transverse, hinder margin straight.

Genus 301. IASSUS. *Fabr., Leach.* TETTIGONIA. *Latr., Oliv., Lamarck.*

Front broad, not longer than broad, on each side above the insertion of the antennæ produced into an angle.

Sp. 1. *Iass. Lanio.* Fabr.

Inhabits England and other parts of Europe.

Genus 302. TETTIGONIA. *Oliv., Lamarck.* CICADA. *Linn., Fabr., Latr., Leach.*

Front elongate-quadrate, the apex truncate, convex, thickened.

Sp. 1. *Tet. viridis.*

Inhabits moist places.

Fam. III. PSYLLIDÆ. *Latreille, Leach.*

Tarsi with two joints distinct: *antennæ* with ten or eleven joints, the last with two setæ: *legs* formed for leaping. Both sexes with wings.

Genus 303. PSYLLA. *Geoff., Oliv., Lam., Latr., Leach.* CHERMES. *Linn., De Geer, Fabr.*

Antennæ filiform or slightly setaceous, as long as the body: *thorax* with the anterior margin arcuate.

Sp. 1. *Psyl. Alni.* Green-yellowish; anterior segment of the thorax, squamula of the elytra, and nervures, green.

Chermes Betulæ Alni. *Linn.* Chermes Alni. *Fabr.* Psylla Alni. *Latr., Leach.*

Inhabits the alder.

Genus 304. LIVIA. *Latr., Leach.* DIRAPHIA. *Illiger.*

Antennæ shorter than the thorax, the base much thickened even to the middle: *thorax* with the anterior segment transverse, straight.

Sp. 1. *Liv. juncorum.* (*Pl. 5. fig. 11.*) *magnified: the line beneath exhibits the natural size.*)

Livia Juncorum. *Latr.*

Inhabits Junci.

Fam. IV. APHIDÆ. *Leach.*

APHIDII. *Latreille.*

Tarsi two-jointed, the first joint very short: *rostrum* in both sexes: *antennæ* with six, seven, or eight joints: females generally apterous: *tarsi* with the last joint vesiculous.

STIRPS 1.—*Antennæ* eight-jointed: *rostrum* minute and horizontal with indistinct joints: *head* elongate-quadrate.

Genus 305. THRIPS. *Linn., Geoff., Latr., Lam., Oliv., Leach.*

Elytra and wings horizontal and linear.

Sp. 1. *Thr. Physapus.* Black, hairy: antennæ, tibiæ, and tarsi pale: middle of the tibiæ pale brown; elytra and wings white. (*Pl. 5. fig. 12. magnified: the line beneath shows the natural size.*)

Inhabits the blossoms of various plants.

STIRPS 2.—*Antennæ* seven-jointed: *elytra* larger than the wings: *rostrum* subperpendicular, with three very distinct joints: *head* transverse.

Genus 306. APHIS. *Linn., Fabr., Latr., Oliv., Lam., Leach.*

Antennæ setaceous or filiform, seven-jointed: *elytra* larger than the wings; elongate triangulate: *abdomen* towards the apex generally tuberculated or horned: *eyes* entire. (*Pl. 5. fig. 9.*)

The animals of this genus are very numerous, and are found on almost every plant. The French call them *Pucerons*, the English Plant-lice. The species require examination; the plant on which they are found should be noticed, as it will afford specific names. The females are generally apterous.

Genus 307. ERIOSOMA. *Leach's MSS.*

Abdomen without tubercles or horns: *antennæ* short and filiform: *body* tomentose.

"The *Eriosomata* form what are called improperly Galls on the stalks of trees near their joints, and knobs, which are in fact excrescences caused by the efforts of nature to repair the damage done to the old trees by the perforation of those insects, whose bodies are covered with down." *Leach's MSS.*

Sp. 1. *Er. Mali.*

Aphis lanigera *of authors.*

Genus 308. ALEYRODES. *Latr., Lam., Leach.* TINEA. *Linn.* PHALÆNA. *Geoff.*

Antennæ filiform, short, six-jointed: *elytra* and wings equal in size: *body* mealy: *eyes* two, each divided into two.

Sp. 1. *Al. Chelidonii.* Body yellowish, or rosy powdered with white: eyes black; each elytron with a puncture and spot of black.

Inhabits hedges and woods.

Fam. V. COCCIDÆ. *Leach.*

GALINSECTA. *Latreille.*

Tarsi with one joint and one nail: *rostrum* in the female: *wings* in the male, but no elytra: *female* apterous.

Genus 309. COCCUS. *Linn., Geoff., Fabr., Oliv., Latr., Lam., Leach.*

Antennæ of the female eleven-jointed: *abdomen* of the males with two very long setæ at the apex.

Sp. 1. *Coc. Cacti.*

Coccus Cacti. *Linn., De Geer, Fabr., Latr., Leach.*

Inhabits fruit-trees.

This genus requires a minute investigation, which should be conducted by some one possessing a great share of patience, and having a competent knowledge of entomology.

Order IX. APTERA. *Leach.*

Order APTERA. *Linn., Lamarck.*

Order SUCTORIA. *Latr.*

Characters of the Order.

Body somewhat ovate, compressed, covered with a coriaceous skin, and composed of several segments: *trunk* short, consisting of three leg-bearing joints: *head* small, compressed, rounded above, and truncate before: *eyes* minute, orbicular, lateral: *antennæ* lamelliform, small, ciliated with spinules, one-jointed at their base, inserted in two excavations behind the eyes: *palpi* filiform (composed of four rounded joints) scarcely longer than the head, porrect, generally resting on the rostrum: *legs* strong, and formed for jumping, especially the hinder ones: *coxæ* and thighs large, compressed: *tarsi* elongate, cylindric, composed of five simple joints, the last articulation furnished with two long, acute, slender nails.

LARVA without feet.

PUPA folliculate.

Genus 310. PULEX *of authors.*

Sp. 1. *Pul. irritans.* Body brunneous, sometimes inclined to rust colour.

The common bed-flea is found throughout Europe.

"Notwithstanding the inconveniences attending this little insect, there is something pleasing in the appearance of the flea. Its motions are elegant, and all its postures indicate agility. The shell with which it is enveloped is in a state of perpetual cleanliness, while the muscular power which it is capable of exerting is so extraordinary, as to excite our wonder at so much strength confined and concentrated within so small a space; this species being able to spring, on the most moderate computation, to the distance of at least two hundred times its own length, and drag a weight eight times heavier than itself. It has sometimes become a favourite with ladies, who have pleased themselves with keeping, taming, and feeding it. A golden chain has been made for it with a lock and key; and being kept in a box with wool, in a warm place, and fed daily, it has been known to live for six years.

"The *Pulices* of birds and of mammalia ought to be most carefully examined. There are a vast number of species which have been confounded with *P. irritans.*"

Order X. LEPIDOPTERA.

Order LEPIDOPTERA. *Linn., Cuv., Lam., Latr., Leach.*

Class GLOSSATA. *Fabr.*

Characters of the Order.

Wings four, covered with scales: *tongue* spiral, filiform. Linné divided this order into three genera; viz. *Papilio* (butterfly), *Sphinx* (hawk-moth), and *Phalæna* (moth), which were characterized by the form of their antennæ; and these divisions form the three great sections of Latreille, as follow:

Section I. *DIURNA.*

Wings four; all, or at least the superior ones, erect when the insect is at rest: *antennæ* with their points thicker or capitate; in a very few somewhat setaceous, with the extreme apex hooked. The insects of this section, which constituted the Linnean genus *Papilio*, all fly by day. *Caterpillars* with sixteen feet. *Chrysalis* naked, and generally angulated.

Fam. I. PAPILIONIDÆ. *Leach.*

PAPILIONIDES. *Latreille.*

Hinder tibiæ with heels only at their extremities: *wings* all elevated when at rest.

In this section I shall enumerate the whole of the British species.

STIRPS 1.—*Caterpillar* elongate, cylindric: *chrysalis* elongate, angular: *tarsi of the imago* with distinct nails.

Genus 311. PAPILIO. *Fabr., Latr., Leach.*

Antennæ, at their points, furnished with a conic-ovate or lengthened-ovate, somewhat arcuate, club: *palpi* very short, pressed close to the face, scarcely reaching the clypeus; the two first joints of equal length; the third minute, and nearly obsolete: *feet* in both sexes alike, all being formed for walking, and furnished with distinct but simple claws: *anterior* wings generally somewhat falcate; hinder ones often tailed; the internal margin excised or folded to admit of free play to the abdomen.

The caterpillar is tentaculated, fleshy and furcate. The chrysalis angulated, with two processes before; it fastens itself by a transverse thread.

The species of this genus, which constitutes the most beautiful part of the creation, are found chiefly in the warmer regions, very few occurring in the more temperate parts of the world. Their flight is extremely rapid.

Sp. 1. *Pap. Machaon.* Black and yellow; hinder wings tailed; edges of the wings black, with yellow crescents; the tips of the hinder ones with a red spot at their inferior tips. (*Pl. 5. fig. 1.*)

Papilio Machaon. *Linn., Babr., Haworth.*

Inhabits Europe; the larva feeds on umbelliferous plants.

In England it is called the Swallow-tailed butterfly; it is very local, but occurs near Bristol, Beverley in Yorkshire, and has been taken plentifully in Hampshire near the New Forest. It is the most superb of all the British species of this family. The caterpillar is green, banded with black, marked by a row of red spots. It changes into the chrysalis state in July; and the fly is found in August. There are two broods; the first appears in May, having lain in the pupa state all the winter.

Papilio Podalirius of Linné, which belongs to this genus, has been introduced into the British Fauna on very dubious authority. But Mr. Haworth is yet in hopes of receiving indigenous specimens from Yorkshire.

Genus 312. GONEPTERYX. *Leach.* COLIAS. *Fabr., Latr.* PIERIS. *Schrank.*

Antennæ short, gradually thickening into an obconic head: *palpi* short, much compressed; the last joint very short: *feet* alike in both sexes, all with a bifid or unidentate nail: *wings* angulated, large, the hinder ones grooved to receive the abdomen: *chrysalis* angulated with a thread round its middle.

Sp. I. *Gon. Rhamni.* Wings of the male yellow, of the female whitish; with a fulvous spot on each.

Inhabits woods in the spring and autumn. Flight slow.

Genus 313. COLIAS. *Fabr., Latr., Leach.* PAPILIO. *Linné, Haworth.* PIERIS. *Schrank.*

Antennæ short, gradually thickening into an obconic head: *palpi* much compressed; the last joint very short: *feet* alike in both sexes, all with bifid or unidentate nails: *wings* anterior, somewhat trigonate; hinder rounded, with a groove to receive the abdomen: *chrysalis* angulated, fastened by a transverse thread.

Sp. 1. *Col. Hyale* (clouded yellow butterfly).

Inhabits Europe. Occurs in England once in three years, some seasons only locally, at others in the greatest profusion in every part of the country. There is a pale coloured variety of each sex, which have been considered as distinct species.

Sp. 2. *Col. Edusa.*

Genus 314. PONTIA. *Fabr., Leach.* PIERIS. *Schrank, Latr.*

Antennæ elongate, with an abrupt, obconic, compressed head: *palpi* slender, somewhat cylindric; the last joint as long as the preceding: *wings* not very narrow, or much lengthened; hinder ones grooved to admit the abdomen, but not tailed: *feet* alike in both sexes; claws unidentate or bifid: *chrysalis* angulated, fastened by a transverse thread.

" * *Anterior wings somewhat trigonate; hinder ones somewhat orbiculate.*"

Sp. 1. *Pont. Cratægi* (black-veined white). Wings white, with a faint tinge of yellowish and black nervures.

Inhabits Europe. In England it is found in the woods near London; the larva feeds on the white-thorn.

Sp. 2. *Pont. Brassica* (large cabbage butterfly).

Inhabits Europe; the larva on the cabbage.

Sp. 3. *Pont. Rapæ* (small cabbage butterfly).

Inhabits gardens.

Sp. 4. *Pont. Napi* (green-veined white).

Inhabits gardens and woods.

Sp. 5. *Pont. Cardamines* (orange tip butterfly).

Inhabits path-ways in woods.

Sp. 6. *Pont. Daplidice* (Bath white). This has long been doubted whether a native of this country; but that successful and industrious entomologist Mr. Stephens has sufficiently proved the fact, by taking a specimen at Dover in July 1818.

"** *Wings somewhat oval.*"

Sp. 7. *Pont. Sinapis* (wood white). Wings white, with blackish tips.
Inhabits woods.

Genus 315. MELITÆA. *Fabr., Leach.* ARGYNNIS. *Latr.* PAPILIO. *Linn., Haworth.*

Antennæ terminated by a short club: *palpi* very hairy, divaricating, with the last joint acicular, half the length of the preceding joint: *hinder wings* orbicular: *anterior feet* very short in both sexes: *tarsi* with double nails.
Caterpillar pubescent, with fleshy tubercles.
Chrysalis suspended by the tail.

Sp. 1. *Mel. Euphrosyne* (pearly border). Wings indented, tawny, with black spots; nine silvery spots on the under side.
Inhabits waste grounds and heaths.

Sp. 2. *Mel. Silene* (pearly border likeness).
Inhabits woods and waste ground.

Sp. 3. *Mel. Cinxia* (Glanville).
Inhabits Europe: very rare in Britain.

Sp. 4. *Mel. Artemis* (greasy).
Inhabits Europe: seldom taken near London, but is common near Norwich.

Sp. 5. *Mel. Dictynna* (heath).
Inhabits heaths and marshes.

Sp. 6. *Mel. Lucina* (Duke of Burgundy).
Inhabits the borders of woods and hedges, but is local.

Genus 316. ARGYNNIS. *Fabr., Latr., Leach.*

Antennæ terminated by a short club: *palpi* divaricating abruptly, terminated with a minute, slender, acicular, very short joint; the second joint broad, hairy: *hinder wing* orbicular: *anterior feet* very short in both sexes: *tarsi* with double nails.
Chrysalis suspended by the tail.
Caterpillars spiny.

Sp. 1. *Arg. Lathonia* (Queen of Spain fritillary).
Inhabits Europe: is very rare in Britain.

Sp. 2. *Arg. Aglaia* (dark green fritillary).
Inhabits Europe in woods and lanes.

Sp. 3. *Arg. Adippe* (high brown fritillary).
Inhabits heaths and the borders of woods.

Sp. 1. *Arg. Paphia* (silver-washed fritillary).
Inhabits the borders of woods, and the New Forest in Hampshire.

Genus 317. VANESSA. *Fabr., Latr., Leach.* PAPILIO. *Linn., Haworth.*

Antennæ terminated with an abrupt short club: *palpi* contiguous, and terminated gradually in a point; the two combined bearing some resemblance to a rostrum: *anterior pair of feet* in both sexes short and very hairy: *tarsi* with double nails.

Chrysalis suspended by its tail.

Caterpillar spiny.

Sp. 1. *Van. Atalanta* (red admirable). Wings indented, black with white spots; a red fascia in the upper wings, and another on the margin of the under wings.

Inhabits Europe: the larva feeds on the nettle.

Sp. 2. *Van. Cardui* (painted lady). Wings orange, indented; variegated with black and white spots: four ocelli on the under side of the posterior wings.

Inhabits Europe: the larva feeds on the thistle.

Sp. 3. *Van. Antiopa* (Camberwell beauty). Wings angulated and black, the borders whitish.

Cynthia Cardui. *Fabr., Leach.*

Inhabits Europe. This species has become exceedingly rare in this country. Mr. Haworth has observed (in the first part of his *Lepidoptera Britannica*) "There is something very extraordinary in the periodical but irregular appearance of this species, *Papilio Edusa* (*Colias Hyale* of this work) and *Pap. Cardui.* They are plentiful all over the kingdom in some years; after which *Antiopa* in particular will not be seen by any one for eight, ten, or more years, and then appear as plentiful as before. To suppose they come from the Continent, is an idle conjecture; because the English specimens are easily distinguished from all others by the superior whiteness of their borders. Perhaps their eggs, in this climate, like the seeds of some vegetables, may occasionally lie dormant for several seasons, and not hatch until some extraordinary but undiscovered coincidence awake them into active life."

Sp. 4. *Van. Io* (peacock).

Inhabits nettles.

Sp. 5. *Van. polychloros* (large tortoise-shell).

Inhabits Europe: the larva on the elm.

Sp. 6. *Van. Urticæ* (small tortoise-shell).

Inhabits Europe: the larva feeds on nettles.

Sp. 7. *Van. C. album* (comma).

Inhabits woods: the larva feeds on the nettle, hop, willow, and the currant.

Genus 318. APATURA. *Fabr., Leach.* NYMPHALIS. *Latr.* PAPILIO. *Linn., Haworth.*

Antennæ with an elongate-obconic thickened club: *palpi* with the second joint not much compressed, the anterior margin broad: *anterior pair of feet* very short in both sexes.

Sp. 1. *Apa. Iris* (purple emperor). Wings indented, brownish, shining, with blue or purple; on both surfaces a whitish interrupted fascia and a single ocellus on the under wing.

The following account of this interesting and elegant insect is given by Mr. Haworth.

"In the month of July he makes his appearance in the winged state, and invariably fixes his throne upon the summit of a lofty oak, from the utmost sprigs of which, on sunny days, he performs his aërial excursions; and in these ascends to a much greater elevation than any other insect I have ever seen, sometimes mounting higher than the eye can follow, especially if he happens to quarrel with another emperor, the monarch of some neighbouring oak: they never meet without a battle, flying upwards all the while and combating with each other as much as possible, after which they will frequently return again to the identical sprigs from whence they ascended. The wings of this fine species are of a stronger texture than those of any other in Britain, and more calculated for that gay and powerful flight which is so much admired by entomologists. The Purple Emperor commences his aërial movements from ten to twelve o'clock in the morning, but does not perform his loftiest flights till noon, decreasing them after this hour until he quite ceases to fly about four in the afternoon; thus emulating the motions of that source of all his strength, the sun. The females, like those of many other species, are very rarely seen on the wing: the reason of which is both interesting and but little known. It is their being destitute of a certain *spiral socket* which the males possess, near the base of the main tendon of their upper wings; which socket receives and works a strong elastic spring arising from the base of the under wings, thereby enabling them to perform a stronger, longer, and more easy flight than it is possible for the females to do."——

"The males usually fly very high, and are only to be taken by a bag-net fixed to the end of a rod twenty or thirty feet long. There have been instances, though very rare, of their settling on the ground near puddles of water, and being taken there. When the Purple Emperor is within reach, no fly is more easily taken than he; for he is so very bold and fearless that he will not move from his settling place until you quite push him off: you may even tip the ends of his wings, and be suffered to strike again."

Genus 319. LIMENITIS. *Fabr., Leach.* NYMPHALIS. *Latr.*

Antennæ gradually clubbed; club slender, round obconic: *palpi* as long as the head, with the second joint not very much compressed; the anterior margin not remarkably broader: *anterior pair of feet* in both sexes very short and spurious: *wings* not much longer than broad: *Four hinder feet* with double nails.

Larva elongate.

Chrysalis suspended by the tail.

Sp. 1. *Lim. Camilla* (white admirable).

Inhabits Europe. This is considered a rare insect in Britain, but I have observed them in certain years in Bedstile-wood near Finchley, and Birch-wood in Kent, in tolerable abundance.

Genus 320. HIPPARCHIA. *Fabr., Leach.* MANIOLA. *Schrank.* SATYRUS. *Latr.* PAPILIO. *Linn., Haworth.*

Antennæ with a slender somewhat fuciform, or trigonate-orbicular club: *palpi* meeting above the tongue, with the second joint very much compressed, and much longer than the first: *anterior pair of legs* shorter than the rest, and often very hairy; feet of the other legs with double nails: *hinder wings* somewhat orbicular or orbiculate-triangulate, with the external margin excavated to receive the abdomen; the middle cell closed behind, from which part the nervures radiate; the other margin entire, or with acute or obtuse indentations.

Caterpillar downy, with a globular head somewhat compressed in front; the abdomen bimucronate behind.

Chrysalis angulated, with the front bimucromate suspended by the tail. *Leach's Zool. Misc.* vol. i. p. 27.

Sp. 1. *Hipp. Galathea* (marbled).
Inhabits woods and fields.

Sp. 2. *Hipp. Hyperanthus* (the ringlet).
Inhabits woods and fields.

Sp. 3. *Hipp. Pamphilus* (small heath).
Inhabits heaths.

Sp. 4. *Hipp. blandina* (Scotch Argus).
Inhabits the isles of Bute and Arran.

Sp. 5. *Hipp. Pilosella* (small meadow brown).
Inhabits fields and the borders of woods.

Sp. 6. *Hipp. Janira* (meadow brown).
Papilio Jurtina. *Haworth, Linn.*
Inhabits fields and lanes.

Sp. 7. *Hipp. Megæra* (gate-keeper).
Inhabits fields and the borders of woods.

Sp. 8. *Hipp. Ægeria* (speckled wood, or wood Argus).
Inhabits the borders of woods and fields.

Sp. 9. *Hipp. Semele* (grayling, or rock underwing).
Inhabits heaths, commons, and rocky wastes.

STIRPS 2.—*Larvæ* oval, depressed: *pupa* short, contracted, obtuse at both extremities: *tarsi* with very small nails.

Genus 321. THECLA. *Fabr., Leach.* POLYOMMATUS. *Latr.*
Feet in both sexes all alike: *nails* scarcely produced beyond the pulvilli, which are large: *antennæ* gradually clubbed; the club elongate, cylindric oval: *hinder wings* tailed.

* *Antennæ gradually clavated.*

Sp. 1. *The. Betulæ* (brown hair streak.)
Inhabits the borders of woods.

Sp. 2. *The. Pruni* (black hair streak).
Inhabits the borders of woods.

Sp. 3. *The. Quercus* (purple hair streak).
Inhabits oak woods, flying on the highest branches of the trees.

** *Antennæ abruptly clavated.*

Sp. 4. *The. Rubi* (green underside, or hair streak).
Inhabits the skirts of woods.

Genus 322. LYCÆNA. *Fabr., Leach.* POLYOMMATUS. *Latr.*
Legs alike in both sexes: *nails* projecting beyond the pulvilli, which are small: *antennæ* with an abrupt club, somewhat ovate, compressed, or spoon-shaped.

* *Hinder wings more or less tailed.*

Sp. 1. *Lyc. dispar* (large copper).
Papilio Hypothöe. *Donovan.*
Inhabits the fens of Cambridgeshire, and has been observed near Aberdeen in Scotland.

Sp. 2. *Lyc. Chryseis* (purple-edged copper).
Inhabits Europe: in Britain it is extremely rare.

Sp. 3. *Lyc. Virgaureæ* (scarce copper).
Inhabits Europe: very local in Britain. It is found in some parts of Huntingdonshire.

Sp. 4. *Lyc. Phlæas* (small copper).
Inhabits woods and heaths.

** *Hinder wings with the posterior margin entire.*

Sp. 5. *Lyc. Corydon* (chalk-hill blue).
Inhabits chalky districts.

Sp. 6. *Lyc. Adonis* (Clifden blue).
Inhabits chalky districts.

Sp. 7. *Lyc. Dorylus* (common blue).
Inhabits heaths, commons, and lanes.

Sp. 8. *Lyc. Argus* (studded blue).
Inhabits fields and marshes.

Sp. 9. *Lyc. Idas* (black-spot brown).
Inhabits grassy places.

Sp. 10. *Lyc. Artaxerxes* (white-spot, brown or Scotch Argus).
Inhabits Arthur's Seat and the base of Kirk-hill, (one of the Pentland range near Edinburgh) in great plenty.

Sp. 11. *Lyc. Alsus* (Bedford blue).
Inhabits clover fields, &c.

Sp. 12. *Lyc. Argiolus* (azure blue).
Inhabits meadows.

Sp. 13. *Lyc. Cymon.*
Inhabits Europe: in Britain it is very local. It is found near Sherborne in Dorset in great abundance.

Fam. II. HESPERIDÆ. *Leach.*

HESPERIDES. *Latreille.*

Hinder tibiæ with two pair of heels or spurs, one pair at the middle, the other at the usual place: *antennæ* distinctly terminated with a club, hooked at their extremities: *palpi* short, thick, and squamose in front: *hinder wings* elevated when the insect is at rest.

Genus 323. HESPERIA. *Fabr., Cuv., Lam., Latr., Walck., Leach.* PAPILIO. *Linn., Haworth.*

Palpi with the third joint cylindric or cylindric-conic.

* *Antennæ ending in an abrupt very acute hook.*

Sp. 1. *Hes. Comma* (pearl skipper).
Inhabits Europe: in England, near Lewes in Sussex.

Sp. 2. *Hes. Sylvanus* (wood skipper).
Inhabits the borders of woods.

** *Antennæ with their points arcuate.*

Sp. 3. *Hes. Tages* (dingy skipper).
Inhabits Europe, on dry heaths and banks.

Sp. 4. *Hes. Malvæ* (mallow skipper).
Inhabits dry banks.

*** *Antennæ with straight points.*

Sp. 5. *Hes. Linea* (small skipper).
Inhabits the skirts of woods.

Sp. 6. *Hes. Paniscus* (scarce skipper).
Inhabits meadows: very rare in Britain, excepting in some parts of Bedfordshire, where it is common.

Section II. *CREPUSCULARIA.* Latreille.

Wings horizontal in repose: *antennæ* prismatic or fusiform.
The insects of this section constitute the Linnean genus *Sphinx*, which has been divided by later writers into a number of genera.

Fam. III. Sphingidæ. *Leach.*

Sphingides. *Latreille.*

Palpi short, covered with very short close scales; the last joint tuberculiform and very short.

Stirps 1. Anus not tufted.

Genus 324. SMERINTHUS. *Latr., Leach.* Laothöe. *Fabr.*, Sphinx. *Linn., Haworth.* Spectrum. *Scopoli.*

Antennæ somewhat prismatic, serrated towards the middle, gradually thicker: *tongue* very short: *anterior wings* angulated: *palpi* contiguous.

Sp. 1. *Sme. ocellata* (eyed hawk-moth).
Inhabits Europe. The larva on the willow and poplar.

Sp. 2. *Sme. Tiliæ* (lime hawk-moth).
Inhabits the lime in the larva state.

Sp. 3. *Sme. Populi* (poplar hawk-moth).
Inhabits Europe. The larva feeds on the poplar.

Genus 325. SPHINX. *Linn., Fabr., Latr., Haworth, Leach.* Spectrum. *Scopoli.*

Palpi contiguous above the tongue: *tongue* long, very distinct, convoluted: *antennæ* prismatic, thicker towards their middle, in the males slightly ciliated.

Obs.—This genus has lately been divided into the following genera: I. Deilophila, *Ochsheimer.* Sp. 1. Elpenor. 2. Porcellus. 3. Lineata. 4. Euphorbiæ. 5. Galii.—II. Sphinx, *Och.* Sp. 1. Pinastri. 2. Ligustri. 3. Convolvuli.—III. Acherontia, *Och.* Sp. 1. Atropos.

Sp. 1. *Sph. Porcellus* (small elephant hawk-moth).
Inhabits Europe: is very rare in Britain.

Sp. 2. *Sph. Elpenor* (elephant hawk-moth).
Inhabits Europe. The larva feeds on the ladies bed-straw, and is found in the autumn in drills or ditches in marshes near London.

Sp. 3. *Sph. lineata* (silver line hawk-moth).
Inhabits Europe, and is exceeding rare in this country. *Sphinx lineata*

of Donovan is distinct, and must be considered as a doubtful inhabitant of Britain.

Sp. 4. *Sph. Galii* (scarce spotted elephant).

Inhabits Europe: it is very rare in Britain. Two specimens have been taken in Cornwall near Penzance, one near Kingsbridge in Devon, and another near London.

Sp. 5. *Sph. Euphorbiæ* (spotted elephant).

Inhabits Europe: it is very rare in Britain. The larva has occurred near Plymouth.

Sp. 6. *Sph. Pinastri* (pine hawk-moth).

Inhabits Europe: it has been taken near London, and in Ravelston-wood near Edinburgh.

Sp. 7. *Sph. Convolvuli* (convolvulus hawk-moth).

Inhabits Europe: it has been taken near London, and in the most remote parts of Britain, even in the Shetland Islands, but does not make a regular appearance.

Sp. 8. *Sph. Ligustri* (privet hawk-moth).

Inhabits Europe. The larva feeds on the privet and ash in gardens and woods.

Sp. 9. *Sph. Atropos* (death's head hawk-moth).

Inhabits Europe. It must be considered as a valuable acquisition to the British cabinet; for although it occasionally occurs in the larva state, yet it is bred with extreme difficulty, and the fly when taken on the wing is generally very much mutilated and rubbed. The caterpillar feeds on the blossom of the potatoe.

STIRPS 2.—*Anus* tufted.

Genus 326. MACROGLOSSUM. *Scopoli, Leach.*

Palpi contiguous above the tongue: *tongue* very long, distinct and convoluted: *antennæ* prismatic, thicker towards their middle, (of the males ciliated); *wings* opaque.

Sp. 1. *Macro. Stellatarum* (humming-bird hawk-moth).

Inhabits gardens. The perfect insect feeds on the wing, extracting the honey of stellated plants.

Genus 327. SESIA. *Fabr., Leach.* MACROGLOSSA. *Ochsheimer.*

Palpi contiguous above the tongue: *tongue* very long; distinct, and convoluted: *antennæ* prismatic, thicker towards their middle (of the males ciliated): *wings* transparent.

Sp. 1. *Ses. bombyciformis* (narrow-bordered bee hawk-moth).

Inhabits open places in woods.

Sp. 2. *Ses. fusiformis* (broad-bordered bee hawk-moth).

Inhabits the borders of woods.

Fam. IV. ZYGÆNIDÆ. *Leach.*

ZYGÆNIDES. *Latreille.*

Palpi long, separate, covered with long scales or porrected hair.

Genus 328. ÆGERIA. *Fabr.*, *Leach.* SESIA. *Latr.*, *Laspeyres.* TROCHILUM. *Scopoli.*

Antennæ fusiform: *abdomen* with the anus bearded.

Sp. 1. *Æg. apiformis* (bee hornet sphinx).
Inhabits Europe: is rare in Britain.

Sp. 2. *Æg. crabroniformis* (hornet sphinx).
Inhabits Europe: the larva feeds on the wood of the lime-tree.

There are several other species of this genus found in Britain, but their synonyms have never been satisfactorily ascertained.

Genus 329. ZYGÆNA *of authors.* SPHINX. *Linn.*

Antennæ abruptly flexuous-clavate: *palpi* cylindric-conic.

Sp. 1. *Zyg. Filipendulæ* (six-spot burnet).
Inhabits fields.

Genus 330. INO. *Leach.* PROCRIS. *Fabr.*, *Latr.* ZYGÆNA. *Panz.*, *Walckenaer.* SPHINX. *Linn.*

Antennæ of the male bipectinate, of the female simple: *palpi* short.

Sp. 1. *Ino Statices* (forester).
Inhabits the margins of woods in meadows.

Section III. *NOCTURNA.* Latreille.

Wings horizontal in repose: *antennæ* setaceous, gradually narrowing towards their extremities.

Fam. V. BOMBYCIDÆ. *Leach.*

BOMBYCITES. *Latreille.*

Antennæ with a single series of ciliæ (of the male at least serrated): *tongue* none: *palpi* two, short, cylindric, very hairy: *thorax* not crested: *wings* elongate undivided.

STIRPS 1.—*Wings* deflexed, long and narrow: *larvæ* naked: *pupa* with its segments laterally denticulated.

Genus 331. HEPIALUS. *Fabr.*, *Latr.*, *Leach.* PHALÆNA (Noctua). *Linné.*

Antennæ moniliform, shorter than the thorax: *palpi* very small, and very hairy: *wings* elliptic, equal, long.

Sp. 1. *Hep. Humuli* (ghost swift). Sp. 2. *Hep. Mappa* (map-winged swift). Sp. 3. *Hep. Hectus* (golden swift), &c.

Genus 332. COSSUS. *Fabr.*, *Latr.*, *Cuv.*, *Leach.* PHALÆNA (BOMBYX). *Linné.*

Antennæ as long as the thorax, setaceous, furnished with a single series of short transverse obtuse teeth: *palpi* very distinct, thick cylindric, and squamous: *anterior wings* larger than the posterior.

Sp. 1. *Cos. Ligniperda* (goat moth).
Phalæna (Bombyx) *Cossus.* Linné.
Inhabits Europe. The larva feeds on the internal parts of the willow, ash, and oak. The celebrated Lyonnett has immortalized himself by his laborious work on the anatomy of the larva and perfect insect. The caterpillar diffuses a scent, by which its residence may frequently be made known to those passing such trees as are much infested by it. It remains three years in this state, when it spins a strong web intermixed with particles of wood, and changes into the chrysalis, which it does in the month of May; and in June the perfect insect may be found sticking to the trunks of trees (generally willows) early in the morning and in the evening.

I once found the larva in an old oak near Norwood, in the month of January. Mr. Standish informs me, that those which feed on the wood of the oak are paler in colour than those which feed on the willow.

Genus 333. ZEUZERA. *Latr., Leach.* BOMBYX. *Hübner.* HEPIALUS. *Schrank.* PHALÆNA (Noctua). *Linné.* COSSUS. *Fabr.*
Antennæ setaceous, of the males pectinated at their base; of the females entirely simple, with the exception of their base, which is tomentose.
Sp. 1. *Zeu. Æsculi* (wood leopard-moth).
Inhabits Europe. In England it is rather rare; but may be found against trees in St. James's Park in July, if industriously sought after.

STIRPS 2.—*Wings* broad and spreading: *larva* more or less hairy, its hinder legs formed for walking: *pupa* with its segments simple.

Genus 334. SATURNIA. *Schrank, Leach.* PHALÆNA (Attacus). *Linné.* BOMBYX. *Fabr., Hübner, Latr.*
Wings horizontal; *antennæ* subcylindric: of the male doubly pectinated: *hinder wings* simple.
Sp. 1. *Sat. Pavonia minor* (emperor moth).

STIRPS 3.—*Wings* deflexed: *larvæ* more or less hairy, its hinder legs formed for walking: *pupa* with its segments simple.

"* *Antennæ in both sexes pectinated.*"

Genus 335. LIPARIS. *Och., Germ., Leach's MSS.* HYPOGYMNA. *Hüb.*
Palpi porrected, hairy, composed of two joints, the last of which is incrassated at its extremity: *tongue* obsolete: *antennæ* setaceous.
Sp. 1. *Lip. Monacha* (black arches). Sp. 2. *Lip. dispar* (gipsy moth).

Genus 336. LARIA. *Schrank, Leach, Germar.* ORGYA. *Och.*, DASYCHIRA. *Hübner.*
Palpi very hairy, three-jointed: last joint minute linear and almost naked: *tongue* obsolete: *antennæ* filiform.

Sp. 1. *Lar. pudibunda* (pale tussock). Sp. 2. *Lar. fascelina* (dark tussock).

Genus 337. GASTROPACHA. *Och., Germ., Leach's MSS.*

Palpi porrected, three-jointed, hairy, subcylindric, with obtuse points: *tongue* obsolete: *antennæ* filiform.

Sp. 1. *Gas. quercifolia* (lappet moth).

"** *Antennæ of the male alone pectinated.*"

Genus 338. ODENESIS. *Germar, Leach's MSS.*

Palpi porrect, hairy and three-jointed, dilated in the middle, attenuated and reversed at their extremities: *tongue* very short: *antennæ* filiform.

Sp. 1. *Od. potatoria.* (*Pl.* 12. *fig.* 3.)

Genus 339. LASIOCAMPA. *Schrank, Leach, Germar.*

Palpi compressed, porrected, very hairy, two-jointed; the second joint elongate obtuse: *tongue* obsolete: *antennæ* filiform.

Sp. 1. *Las. Quercus* (egger moth). Sp. 2. *Las. trifolia,* &c.

Genus 340. ERIOGASTER. *Germar, Leach's MSS.*

Palpi very short and very hairy, subglobose: *tongue* obsolete: *antennæ* filiform.

Sp. 1. *Eri. lanestris.* Sp. 2 *Eri. Populi.*

Genus 341. ENDROMIS. *Och., Germ., Leach's MSS.* DIMORPHA. *Hüb.*

Palpi compressed, recurved, very hairy; second joint obtuse: *tongue* very obsolete: *antennæ* filiform.

Sp. 1. *End. versicolor* (Kentish glory).

OBS.—Bombyx rubra, &c. forms the Genus PENTHROPHERA. *Germ.*

Genus 342. STAUROPUS. *Germ., Leach's MSS.* HARPYIA. *Och.*

Palpi reflexed, compressed, hairy and biarticulated; last joint minute: *tongue* obsolete: *antennæ* filiform (of the male naked at their extremities).

Sp. 1. *Stau. Fagi* (lobster moth).

Genus 343. NOTODONTA. *Och., Germar, Leach's MSS.* PTILODONTIS. *Hüb.*

Palpi short, very hairy, two-jointed; first joint very short, second compressed and truncate: *tongue* short: *antennæ* filiform.

Sp. 1. *Not. Tritopus.* Sp. 2. *Ziczac.* Sp. 3. *Dromedarius.* Sp. 4. *Trepida.*

Genus 344. PYGÆRA. *Och., Germar, Leach's MSS.* MELALOPHA. *Hüb.*

Palpi very hairy, two-jointed; first joint incurved, second reversed obtuse: *tongue* abbreviated, but spiral: *antennæ* setaceous.

Sp. 1. *Pyg. Bucephala* (buff-tip).

OBS.—Bombyx curtula, 2. reclusa, form the genus CLOSTERA *of Hoffmansegg.*

STIRPS 4. *Wings* deflexed: *larva* with its hinder legs converted into a furcate tail.

Genus 345. CERURA. *Schrank, Leach, Germar.* ANDRIA. *Hübner.*
Palpi cylindrical, hairy obtuse, with their joints confluent: *tongue* spiral but abbreviated: *antennæ* filiform pectinated.
Sp. 1. *Cer. Vinulia* (puss moth). Sp. 2. *Cer. Furcula* (kitten moth).
The caterpillar of both the above feeds on leaves: the first may frequently be found in August and September on willows and poplars; the latter species is not common in Britain.

Fam. VI. ARCTIADÆ: *Leach.*

NOCTUO-BOMBYCITES. *Latr.*

Palpi two; *antennæ* pectinated or ciliated: *tongue* visible, but often short and somewhat membranaceous: *wings* trigonate, deflexed, undivided: *caterpillar* with sixteen feet.

Genus 346. ARCTIA. *Schrank, Latreille, Leach.* BOMBYX: *Fabr.*
Palpi with long scales: *antennæ* of the males (at least) with a double series of pectinations: *tongue* often short, composed of two separate filaments.

* *Antennæ ciliated.*

Sp. 1. *Arc. villica* (cream spot tyger). Sp. 2. *Arc. Caja* (tyger moth). Sp. 3. *Arc. Plantaginis* (wood tyger). Sp. 4. *Arc. russula* (clouded buff). Sp. 5. *Arc. mendica* (muslin). Sp. 6. *Arc. Menthrastri* (ermine). Sp. 7. *Arc. papyritia* (water ermine). Sp. 8. *Arc. lubricipeda* (buff ermine).

** *Antennæ pectinated.*

Sp. 1. *Arc. Salicis* (satin moth). Sp. 2. *Arc. chrysorrhœa* (yellow-tail). Sp. 3. *Arc. phœorrhœa* (brown-tail moth).

Genus 347. CALLIMORPHA. *Latr., Leach.* BOMBYX. *Fabr.* LITHOSIA. *Fabr.*
Palpi with short not porrect scales: *antennæ* simple or slightly ciliated: *tongue* long, the two filaments conjoined.
Sp. 1. *Cal. Dominula* (scarlet tyger moth).

OBS.—Bombyx; 2. *Rosea* (red arches). 3. *Jacobeæ* (cinnabar); are referable to this genus.

Fam. VII. TINEIDÆ. *Leach.*

TINEITES. *Latreille.*

Antennæ setaceous, simple: *tongue* distinct: *palpi* two, cylindric: *wings* long, oblong, somewhat elliptic, incumbent or convolute: inferior ones much folded, all undivided.

STIRPS 1.—*Antennæ* distant from each other: *eyes* separate, divided by a frontlet: *tongue* elongate: *palpi* not longer than the head.

Genus 348. LITHOSIA. *Fabr., Latr., Leach.*

Wings horizontal: *palpi* shorter than the head, last joint cylindric, distinctly shorter than the second: *back* much flattened: *antennæ* simple or but slightly ciliated.

Sp. 1. *Lit. quadra* (four-spotted footman). Sp. 2. *Lit. complana*, &c.

Genus 349. YPONOMEUTA. *Latr., Leach.* TINEA. *Fabr., Hübner, Haworth.*

Wings rolled or convoluted: *palpi* as long as the head; the third joint obconic, as long or longer than the one before it: *antennæ* simple.

Sp. 1. *Ypo. Evonymella.*

STIRPS 2.—*Antennæ* separate: *eyes* separate: *tongue* elongate: *palpi* much longer than the head, over which they are recurved.

Genus 350. ÆCOPHORA. *Latr.* NEMAPOGON. *Schrank, Leach.* PHALÆNA (Tinea). *Linné.* TINEA. *Fabr.* ALUCITA. *Oliv.*

Wings broadly fringed, lying on the back: *palpi* twice as long or more than the body; the second joint longer than the head, the last joint almost naked, recurved beyond the head.

OBS.—To this genus TINEA 1. *Linneella.* 2. *Flavella.* 3. *Roesella*, and their congeners belong.

STIRPS 3.—*Tongue* not distinct, very short: *front* very hairy: *palpi* longer than the head, the second joint hairy.

Genus 351. EUPLOCAMUS. *Latr., Leach.* TINEA. *Fabr.* PYRALIS. *Hübner.*

Palpi two; the second joint with numerous elongate scales, the third joint naked and ascending: *antennæ* much pectinated.

Sp. 1. *Eup. Guttella.* Fabr.

Genus 352. PHYSIS. *Fabr., Hübner, Leach.* PHALÆNA (Tinea). *Linné.*

Palpi four, distinct; upper ones small, inflexed: *antennæ* simple, or slightly ciliated.

Sp. 1. *Phy. Pelionella* (clothes moth).

Inhabits houses.

OBS.—All the cloth moths, of which there are several species, belong to this genus.

STIRPS 4.—*Antennæ* very long, contiguous: *eyes* subcontiguous: *tongue* elongate: *palpi* very hairy, ascending not longer than the head.

Genus 353. ADELA. *Latr., Leach.* NEMOPHORA. *Hoffmanscgg.* NEMAPOGON. *Schrank.* ALUCITA. *Fabr.* TINEA. *Hübner.* PHALÆNA (Tinea). *Linné.*

Sp. 1. *Ad. Degeerella* (Japan-moth).

Inhabits the borders of woods.

Obs.—All the long-horned Japan moths, as they are called by English collectors, belong to this genus.

Fam. VIII. Noctuadæ. *Leach.*

Noctuælites. *Latreille.*

Antennæ setaceous in the males, sometimes pectinated or ciliated: *tongue* distinct: *palpi* much compressed: *wings* horizontal or incumbent, not divided: *thorax* thick, often crested: *palpi* with the last joint much shorter than the preceding, squamose.

Genus 354. NOCTUA. *Fabr., Latr., Hübner, Leach.* Bombyx. *Fabr., Hüb.* Phalæna (Bombyx). *Linné.* Phalæna (Noctua). *Linné.* Pæcilia. *Schrank.* Cucullia. *Schrank.*

The genus *Noctua* requires a minute investigation. It contains several natural genera, as exhibited in the following divisions.

A. Caterpillars with sixteen feet.

* *Caterpillars half loopers, their anterior feet membranaceous, evidently shorter than the others. Wings horizontal.*

Sp. 1. *Noc. sponsa* (crimson underwing). Sp. 2. *Noc. nupta, &c.*

** *Caterpillars with membranaceous feet of conformable size.*

1. Wings horizontal.

Sp. 1. *Noc. fimbria* (broad-bordered yellow underwing). Sp. 2. *Noc. pronuba.* 3. *Noc. Orbona.* 4. *Noc. janthia, &c.*

2. Wings deflexed.

a. Sp. 1. *Noc. Rumicis* (common knot grass). 2. *Noc. Psi, &c.*
b. Sp. 1. *Noc. Ligustri* (coronet). 2. *Noc. Pisi* (broom moth), &c.
c. Sp. 1. *Noc. Verbasci.* 2. *Noc. Tanaceti* (shark moths), &c.
d. Sp. 1. *Noc. Batis* (peach blossom moth).
e. Sp. 1. *Noc. meticulosa* (angle shades).
f. Sp. 1. *Noc. palpina* (pale prominent moth).
g. Sp. 1. *Noc. camelina.*

B. Caterpillar with fourteen feet.

Sp. 1. *Noc. chrysites* (burnished brass). *Noc. festucæ* (gold spot), &c.

Notice of the following genera has lately reached this country from the Continent: the undermentioned indigenous species, which may be considered as types, are selected from the MSS. of Dr. Leach: I have added the English names, as it may enable those who have small collections of *Lepidoptera* to proceed in the natural arrangement.

Genus Colocasia. *Och.* Jaspidia. *Hüb.*

Sp. 1. *Noc. bombyx coryli* (nut-tree tussock).

Genus POECILIA. *Schrank, Och.* JASPIDIA. *Hüb.*
Sp. 1. *Noc. lichensis* (marbled green). 2. *Noc. perla* (marbled beauty).

Genus TETHEA. *Och.*
Sp. 1. *Noc. retusa* (double kidney). 2. *Noc. subtusa* (olive). 3. *Noc. ridens* (the frosted green).

Genus AGROTIS. *Hüb., Och.*
Sp. 1. *Noc. Ruris* (rufous dart). 2. *Noc. Segetum* (brown heart and club).

Genus GRAPHIPHORA. *Hüb., Och.*
Sp. 1. *Noc. Augur* (double dart). *Fabr.*

Genus AMPHIPYRA. *Och.* PYROPHILA. *Hüb.*
Sp. 1. *Noc. Tragopogonus* (the mouse). 2. *Noc. tetra* (the mahogany).

Genus MORMO. *Ochen.* LEMUR. *Hüb.*
Sp. 1. *Noc. maura* (great brown bar). *Fabr.*

Genus HADENA. *Schrank, Och.*
Sp. 1. *Noc. Cucubali* (campion). 2. *Noc. Pteridis.* Fabr.

Genus MISELIA. *Hüb., Sch.*
Sp. 1. *Noc. compta* (marbled coronet).

Genus POLIA. *Hüb., Och.*
Sp. 1. *Noc. Chi* (Chi moth). 2. *Noc. flavocincta* (large ranunculus).

Genus TRACHEA. *Och.* ACHATIA. *Hübn.*
Sp. 1. *Noc. atriplicis* (arrach moth). 2. *Noc. præcox* (Portland moth)

Genus APAMEA. *Och.*
Sp. 1. *Noc. basilinea* (rustic shoulder knot). *Fabr.*

Genus MAMESTRIA. *Och.*
Sp. 1. *Noc. Pisi* (broom). 2. *Noc. Chenopodii* (nutmeg).

Genus THYATIRA. *Och.*
Sp. 1. *Noc. Batis* (peach blossom). 2. *Noc. derasa* (buff arches).

Genus MYTHIMNA. *Och.*
Sp. 1. *Noc. turca* (double line).

Genus CARADRINA. *Och.*
Sp. 1. *Noc. Morpheus.*

Genus LEUCANIA. *Och.* HELIOPHILA. *Hüb.*
Sp. 1. *Pha. comma* (shoulder stripe wainscot).

Genus NONAGRIA. *Och.*
Sp. 1. *Noc. Typhæ* (bull-rush). 2. *Noc. Arundinis.*

Genus GORTYNA. *Och.*

Sp. 1. *Noc. flavago.* Hüb. *Rutilago* (frosted orange). *Fabr.*

Genus XANTHIA. *Hüb., Och.*

Sp. 1. *Noc. Luteago.* 2. *Noc. Croceago* (orange upper wing).

Genus COSMIA. *Hüb., Och.*

Sp. 1. *Noc. affinis* (lesser spotted pinion). 2. *Noc. diffinis* (white spotted pinion). *Fabr.*

Genus CERASTIS. *Och.* GLÆA. *Hüb.*

Sp. 1. *Noc. Vaccinii* (chesnut). 2. *Satellitia* (satellite.)

Genus XYLENA. *Hüb., Och.*

Sp. 1. *Noc. exoleta* (large second grass). 2. *Noc. putris* (flame). 3. *Noc. hepatica* (clouded bordered brindle). 4. *Noc. Pinastri* (bird's wing).

Genus CUCULLIA. *Schrank, Och.* TRIBONOPHORA. *Hüb.*

Sp. 1. *Noc. Artemisiæ.* 2. *Noc. Absinthii* (wormwood). 3. *Noc. Umbraticæ* (large pale shark). 4. *Noc. Scrophularia* (water betony).

Genus ABROSTOLA. *Och.*

Sp. 1. *Noc. triplacea.* 2. *Noc. Asclepiades.*

Genus ANARTA. *Och.*

Sp. 1. *Noc. Myrtilli* (beautiful yellow underwing).

Genus HELIOTHIS. *Och.* HELIOCENTIS. *Hüb.*

Sp. 1. *Noc. dipsaceæ* (marbled clover).

Genus ERASTRIA. *Och.* EROTYLA. *Hüb.*

Sp. 1. *Unca. Pyralis unca* (silver hook).

Genus BREPHA. *Hüb.* BREPHOS. *Och.*

Sp. 1. *Noc. Parthenias* (orange underwing). 2. *Noc. notha* (light orange underwing).

Genus EUCLIDIA. *Hüb., Och.*

Sp. 1. *Noc. Mi* (Shipton). 2. *Noc. triquetra.*

Fam. IX. PHALÆNIDÆ. *Leach.*

PHALÆNITES. *Latreille.*

Antennæ approximating at their base; those of the male often pectinated or ciliated: *clypeus* scarcely prominent: *feet* slender, rarely hairy: *palpi* two: *wings* undivided.

STIRPS 1.—*Larva* with twelve feet.

Genus 355. PHALÆNA. *Linné, Fabr., Latr., Leach.* GEOMETRA. *Haworth, Hübner.*

Antennæ setaceous of the male pectinated.

Sp. 1. *Pha. margaritaria* (large emerald moth), &c.

STIRPS 2.—*Larva* with ten feet.

Genus 356. HIPPARCHUS. *Leach.* PHALÆNA. *Fabr., Latr., Linn.* GEOMETRA. *Hübner, Haworth.*

Wings extended obliquely, the upper wing covering the lower ones: *body* slender: *palpi* slightly hirsute: *antennæ* of the male pectinated.

Sp. 1. *Hip. papilionarius* (large emerald). 2. *Hip. prunata, &c.*

Genus 357. BUPALUS. *Leach.* PHALÆNA. *Linné, Fabr., Latr.* GEOMETRA. *Hübner, Haworth.*

Antennæ pectinated in the male: *body* slender: *palpi* slightly hirsute: *wings* horizontally extended, not angulated or indented.

Sp. 1. *Bup. pinarius* (the bordered white).

Inhabits pine forests.

Genus 358. GEOMETRA. *Hübner, Haworth, Leach.* PHALÆNA. *Fabr., Latr., Linné.*

Antennæ of the male pectinated: *body* slender: *palpi* but little or not at all hairy: *wings* horizontally extended; hinder margin very angular.

Sp. 1. *Geo. lunaria* (the lunar thorn). Sp. 2. *Geo. dolabraria* (scorched wing), &c.

Genus 359. OURAPTERYX. *Leach.* PHALÆNA. *Latr., Linné, Fabr.*

Antennæ somewhat ciliated: *body* slender: *palpi* but little hairy. *wings* horizontally extended; inferior ones prolonged, truncate, and terminated by a tail.

Sp. 1. *Our. sambucaria* (swallow-tail moth).

Genus 360. BISTON. *Leach.* PHALÆNA. *Linné, Fabr., Latr.* GEOMETRA. *Hübner, Haworth.*

Antennæ of the male much pectinated: *body* thick: *palpi* very hairy.

Sp. 1. *Bis. prodromaria* (oak beauty). 2. *Bis. betularia* (the peppered). 3. *Bis. hirtaria* (the brindled beauty), &c.

Genus 361. ABRAXAS. *Leach.* PHALÆNA. *Linné, Fabr., Latr., Hüb., Haworth.*

Antennæ simple, not ciliated: *body* slender: *palpi* scarcely hirsute: *wings* extended horizontally, not angulated or indented.

Sp. 1. *Abr. grossulariata* (common magpie moth). 2. *Abr. ulmaria* (scarce magpie moth), &c.

STIRPS 3.—*Caterpillars* with fourteen feet; the anal ones distinct; the first pair of membranaceous ones wanting.

Genus 362. HERMINIA. *Latr., Leach.* PHALÆNA (Pyralis). *Linné.* CRAMBUS. *Fabr., Bosc.* PYRALIS. *Hub.*

Wings triangulate, nearly horizontal: anterior margin of the upper wings straight: *palpi* two, recurved, compressed, often very large: *antennæ* ciliated.

Sp. 1. *Her. proboscidalis* (the snout), &c.

STIRPS 4.—*Caterpillars* with fourteen feet, anal ones wanting; the first pair of membranaceous ones distinct.

Genus 363. PLATYPTERYX. *Laspeyeres, Latr., Leach.* PHALÆNA. *Fabr.*

Anterior wings falcate: *antennæ* of the male pectinate: *palpi* very short, somewhat conic: *tongue* short.

Sp. 1. *Pla. falcataria* (pebble hooktip). 2. *Pla. lacertanaria* (the scolloped hooktip), &c.

OBS.—The last species has the anterior wings dentate.

Genus 364. CILIX. *Leach.* BOMBYX. *Fabr.* PLATYPTERYX. *Latr.*

Anterior wings rounded: *antennæ* of the male pectinated: *palpi* very short, somewhat conic: *tongue* none.

Sp. 1. *Cil. compressa* (goose-egg moth).

Bombyx compressus. *Fabr.*

STIRPS 5.—*Caterpillars* with sixteen feet: *wings* with the body forming a broad short triangle, dilated on each side anteriorly.

Genus 365. TORTRIX. *Hübner, Leach.* PHALÆNA (Tortrix). *Linné.* PYRALIS. *Latr., Fabr.*

Palpi with the second joint distinctly longer than the third, and more squamous; third joint short, truncate or obtuse, not recurved over the head.

Sp. 1. *Tor. Fagana.*

Genus 366. SIMAËTHIS. *Leach.* TORTRIX. *Hübner.* PYRALIS. *Latr.*

Palpi short, rising; the last joint not recurved over the head; with the second and third joints nearly equally long and equally squamose: *inferior wings* not completely covered by the upper ones.

Sp. 1. *Sim. dentana.*

Tortrix dentana. *Hübner.*

Genus 367. NOLA. *Leach.* PYRALIS. *Hüb., Latr.*

Palpi short, porrect, last joint not recurved over the head; the second and third joints nearly equally long and equally squamose: *under wings* completely covered by the upper ones.

Sp. 1. *Nola palliolatis.*

Pyralis palliolatis. *Hübner, Latr.*

Fam. X. PYRALIDÆ. *Leach.*

CRAMBITES. *Latreille.*

Palpi four: *larva* (as far as has been ascertained) with sixteen feet.

STIRPS 1.—*Superior wings* forming with the body a nearly horizontal depressed triangle.

Genus 368. BOTYS. *Latr., Leach.* PHALÆNA (Pyralis). *Linné.* PYRALIS. *Hübner, Schrank, Scopoli, Haworth.* NYMPHALA. *Schrank.* SCOPULA. *Schrank.* PYRAUSTA. *Schrank.* CRAMBUS. *Fabr.*

Tongue distinct, conspicuous: *palpi* exserted.

Sp. 1. *Bot. purpuraria.*

Genus 369. PYRALIS. *Hübner, Schrank, Schiffermuller, Leach.* PHALÆNA (Pyralis). *Linné.* CRAMBUS. *Fabr.* AGLOSSA. *Latr.*

Tongue none: *inferior palpi* largest, the second joint very squamous, the squamæ porrected in bundles.

Sp. 1. *Pyr. pinguinalis* (the large tabby).

Crambus pinguinalis. *Fabr.*

STIRPS 2.—*Superior wings* very long, enveloping the sides of the body.

Genus 370. GALLERIA. *Fabr., Latr., Leach.* PHALÆNA (Tinea). *Linné.* TINEA. *Geoffroy.*

Tongue very short: *palpi* short: *inferior palpi* largest, with close scales; upper ones concealed by the scales of the clypeus: *wings* narrow, covering and pressing against the sides of the body.

Sp. 1. *Gal. alvearia.*

Genus 371. CRAMBUS. *Fabr., Latr., Leach.* PHALÆNA (Tinea). *Linné.* TINEA. *Geoffroy.*

Wings narrow, convoluted round the body: *palpi* exserted, inferior ones largest: *head* with short close-applied scales: *tongue* distinct.

Sp. 1. *Cram. Pineti.*

Genus 372. TINEA. *Hübner, Geoff., Scop., Leach.* ALUCITA. *Latr.* PHALÆNA (Tinea). *Linné.* YPSOLOPHUS. *Fabr.*

Wings narrow, abruptly deflexed, behind and above ascending: *inferior palpi* with the second joint covered with numerous fasciculi of scales; the last erect, conic, naked: *head* with a bifid crest in front.

Sp. 1. *Tin. Nemorum.*

Fam. XI. ALUCITADÆ. *Leach.*

PTEROPHORITES. *Latreille.*

Wings divided, or formed of feathers united at their base.

Genus 373. PTEROPHORUS. *Geoff., Latr., Fabr., Leach.* ALUCITA. *Hübner, Schrank, Scopoli.* PHALÆNA (Alucita). *Linné.*

Palpi small, from their base ascending, not longer than the head, shortly and nearly equally squamose: *anterior wings* composed of two, *posterior* of three feathers: *pupa* naked, suspended by a hair.

Pter. pentadactylus.

Genus 374. ALUCITA. *Hübner, Scopoli, Leach.* PTEROPHORUS. *Geoff., Fabr.* PHALÆNA (Alucita). *Linn., Villers.* ORNEODES. *Latr.*

Palpi produced much longer than the head; the second joint very squamous; the last joint naked, erect: *pupa* folliculate.

Sp. 1. *Alu. hexadactyla.*

Order XI. TRICHOPTERA.

Order TRICHOPTERA. *Kirby, Leach.*

Order NEUROPTERA. *Linn., Cuv., Latr., Lam., &c.*

Characters of the Order.

"*Wings* much deflexed, with strong nervures, hispid or hairy, the lower wings plicate: *antennæ* inserted between the eyes, often very long, composed of an infinity of joints: *feet* elongate, spinulose: *tarsi* elongate, five-jointed; the last joint with two small nails: *larva* elongate, agile, somewhat cylindric, composed of twelve joints, the three first harder than the rest, and each bearing a pair of feet; the last segment with two hooked processes. It inhabits tubes constructed of sand, bits of wood, stones, or grass, glued together by a cement impenetrable to water: *pupa* somewhat resembling the perfect insect, shut up in the tube it inhabited whilst a larva, but having the power of motion prior to its emerging from the water (in which it resides), for the purpose of changing into the fly-state."

Genus 375. PHRYGANEA. *Linné, Fabr., Geoff., Latr., Leach.*

Dr. Leach has paid the greatest attention to the insects of this Order, having collected them with unexampled assiduity in various parts of England, Ireland, Scotland, and Wales. The Doctor will probably publish a work on this Order. When published, I must refer the student to it for a further account of the genera.

Fam. I. LEPTOCERIDÆ. *Leach.*

Antennæ much longer than the whole body.

Genus 376. LEPTOCERUS. *Leach.*

Antennæ simple, not denticulated.

Sp. 1. *Lept. interruptus.*

Phryganea interrupta. *Fabr.*

Inhabits Great Britain. It is found in great plenty near Luss, on the banks of Loch Lomond, on the margins of rivulets at Dreghorn near Edinburgh, and near Carlisle in northern England. It occurs during the day-time on the smaller branches of trees, and in the afternoon flies about in great abundance, in flocks.

Genus 377. ODONTOCERUS. *Leach.*

Antennæ with the inner edge denticulated.

Sp. 1. *Odon. griseus.* Leach.

Inhabits Ireland and England.

Fam. II. PHRYGANIDÆ. *Leach.*

Antennæ as long as the body.

Genus 378. PHRYGANEA. *Leach.*

Anterior wings soft, villose.

Sp. 1. *Phr. grandis.*

Inhabits woods.

Genus 379. LIMNEPHILUS. *Leach.*

Anterior wings slightly coriaceous, nervures hispid or hairy.

Sp. 1. *Lim. rhombicus.* Leach.

Phryganea rhombica. *Linn.*

Inhabits trees in woods and marshes.

Order XII. NEUROPTERA. *Leach, Linn., Latr., Cuv.*

Class ODONATA. *Fabr.*

Class SYNISTATA. *Fabr.*

Wings four, naked, reticulated, and divided into a vast number of areolæ.

Section I. *SUBULICORNES.*

Antennæ subulate, very short, the last joint setiform: *maxillary palpi* very short: *wings* extended horizontally or erect, very much reticulated: *metamorphosis* semicomplete: *larva and pupa* aquatic, somewhat resembling the perfect insect.

Fam. I. LIBELLULIDÆ. *Leach.*

LIBELLULINÆ. *Latreille.*

Tarsi three-jointed: *mandibles* strong, corneous: *maxillæ* corneous, strong: *wings* equal, or the hinder ones a little larger at their base: *abdomen* not terminated with setæ or filaments: *eyes* very large.

STIRPS 1.—*Wings* horizontal: *head* hemispheric, with a distinct vesicle on which the little eyes are placed in a triangle: *abdomen* more or less depressed: *lip* with the middle lamella smallest.

Genus 380. LIBELLULA. *Linn., Fabr., Latr., Leach.*

Posterior wings alike in both sexes.

Sp. 1. *Lib. depressa.* All the wings blackish at the base; the abdomen depressed; of the male blueish, the female yellowish.

Libellula depressa. *Linn., Fabr., Latr., Leach.*

Inhabits gardens and woods, flying over them in pursuit of insects.

Genus 381. CORDULIA. *Leach.* LIBELLULA. *Linn., Don., Panz., Latr.*

Posterior wings of the male produced into an angle at the anal edge.

Sp. 1. *Cor. ænea.* Wings pellucid: thorax and abdomen of a brassy green.

Inhabits marshy places on Epping Forest and the New Forest of Hampshire in June and July.

STIRPS 2.—*Wings* horizontal: *head* hemispheric, without a distinct vesicle for the little eyes, which are arranged in a straight line: *abdomen* cylindric, sometimes clavate: *lip* with the middle lamella not much smaller than the others.

Genus 382. CORDULEGASTER. *Leach.* LIBELLULA. *Linn., Don.* ÆSHNA. *Latr.*

Hinder wings of the male angulated at their anal edge: *abdomen* of the male clavate, of the female with an acuminated process.

Sp. 1. *Cor. annulatus.* Leach.

Libellula forcipata. *Harris.* Æshna annulata. *Latr.* Libellula Boltonii. *Don.*

Inhabits Yorkshire, Devonshire, Dorsetshire, Somersetshire, Hampshire, and Cornwall. It likewise occurs amongst the Lakes, in the North of England; amongst the Pentland Hills, near Edinburgh; and on Loch Lomond and Lock Katrine.

Genus 383. GOMPHUS. *Leach.* LIBELLULA. *Linn., Don.*

Hinder wings of the male angulated at their anal edge: *abdomen* clavate in both sexes.

Sp. 1. *Gom. vulgatissimus.* Leach.

Libellula vulgatissima. *Linn.* Libellula forcipata. *Don.*

Inhabits Europe. It occasionally occurs on Epping Forest, and at Coombe Wood in Surry.

Genus 384. ÆSHNA. *Leach, Fabr.* LIBELLULA. *Linn., Don.*

Hinder wings of the male angulated at their anal edge: *abdomen* cylindric in both sexes, not clavate.

Sp. 1. *Æsh. grandis.* Fabr., Leach.

Libellula grandis. *Linn., Don.*

Inhabits the fields near London; Hackney and Plaistow Marshes; but is difficult to catch unless in windy weather, when it may be found on the water plants growing in ditches. It may also be taken at the dusk of fine evenings in the months of June and July, flying in pursuit of various insects which appear only at these times.

Genus 385. ANAX. *Leach.*

Hinder wings of the male not angulated at their anal edge, but resembling those of the female: *abdomen* cylindric in both sexes; not clavate.

Sp. 1. *Anax Imperator.*

Inhabits England in the New Forest of Hampshire. It is necessary to inform the young entomologist, that the insects of the first and second stirpes of this family require, whilst in a recent state, that the contents of the abdomen should be extracted, and filled with either a piece of paper or cotton, rolled up as near as possible to the natural size of the body, as without this precaution the insects will lose their colour and turn entirely black. For further directions see Instructions for Killing and Preserving.

STIRPS 3.—*Wings* erect: *head* transverse: *abdomen* cylindric, linear: *ocelli* or little eyes placed in a triangle.

Genus 386. AGRION. *Fabr., Latr., Leach.* LIBELLULA. *Linn.*

Wings membranaceous, with a rhomboidal stigma: *abdomen* of the male not armed with a forceps-like appendage.

Sp. 1. *Agrion sanguineus.*

Inhabits marshes.

Genus 387. LESTES. *Leach.*

Wings membranaceous with an oblong-quadrate parallelopiped stigma: *abdomen* of the male armed with a forceps-like appendage.

Sp. 1. *Lestes autumnalis.*

Inhabits marshy places.

Genus 388. CALEPTERYX. *Leach.* AGRION. *Fabr., Latr.*

Wings coriaceo-membranaceous, without a real stigma, in place of which is sometimes an irregular transparent spot: *abdomen* of the male furnished with a forceps-like appendage.

Sp. 1. *Cal. Virgo.*

Inhabits the banks of rivers.

Fam. II. EPHEMERIDÆ. *Leach.*

EPHEMERINÆ. *Latreille.*

Tarsi four-jointed: *mouth* not distinct: *inferior wings* much smaller than the others, sometimes wanting: *abdomen* with the extremity furnished with filaments. *Metamorphosis* quadruple.

STIRPS 1.—*Tail* with two filaments.

Genus 389. BAËTIS. *Leach.* EPHEMERA. *Linn., Fabr., Latr.*

Wings four.

Sp. 1. *Baëtis bioculata.*

Inhabits near water.

Genus 390. CLOEON. *Leach.*

Wings two.

Sp. 1. *Clo. pallida.*

Ephemera diptera. *Linn., Fabr.*

Inhabits Norfolk and Cumberland, near large pieces of water.

STIRPS 2.—*Tail* with three filaments.

Genus 391. EPHEMERA *of authors.*

Sp. 1. *Eph. vulgata.* (*Pl. 7. fig. 2.*)

Inhabits marshes, and the banks of rivers.

Section II. *FILICORNES.*

Antennæ longer than the head, not subulate: *wings* generally deflexed, or incumbent.

Fam. III. PANORPIDÆ. *Leach.*

PANORPATÆ. *Latreille.*

Head anteriorly produced into a rostrum: *wings* equal, ovate-elliptic, lying one over the other: *ocelli* three, approximate, arranged in a triangle.

Genus 392. PANORPA. *Linn., Fabr., Lam., Latr., Leach.*

Tarsi with two bent claws, denticulated beneath, having a spongy pulvillus between them: *palpi* nearly equal, filiform; the last joint cylindric-ovate: *mandibles* with their points distinctly bidentate: *abdomen* of the male with the three last joints forming a tail armed with a forceps.

Sp. 1. *Pan. communis.* (*Pl. 7. fig. 5. a. chela magnified.*)

Inhabits hedges, and is very abundant in this country.

Fam. IV. HEMEROBIADÆ. *Leach.*

HEMEROBINI. *Latreille.*

Antennæ filiform or setaceous: *palpi* four: *wings* equal: *tarsi* five-jointed.

STIRPS 1.—*Ocelli* or little eyes not distinct.

Genus 393. CHRYSOPA. *Leach.* HEMEROBIUS *of authors.*

Antennæ (at least as long as the body) with cylindric joints longer than broad.

Sp. 1. *Chrys. Perla.*

Hemerobius Perla. *Linné, Fabr., Latr.* Chrysopa Perla. *Leach.*

Inhabits woods, and is a common species.

Genus 394. HEMEROBIUS. *Leach, &c.*

Antennæ as long or shorter than the body, with moniliform joints.

Sp. 1. *Hem. variegatus.*

Inhabits ——: is rare near London.

STIRPS 2.—*Ocelli* three, distinct.

Genus 395. OSMYLUS. *Latr., Leach.* HEMEROBIUS. *Fabr. Villers, Roemer, Don.*

Antennæ moniliform.

Sp. 1. *Osm. maculatus.* Fuscous; head and feet testaceous: wings hairy, the upper ones and the costal margin of the inferior ones spotted with black. (*Pl. 7. fig. 4.*)

Inhabits France, Germany, and England, in trees and hedges by the sides of running brooks.

Fam. V. SIALIDÆ. *Leach.*

MEGALOPTERA. *Latreille.*

Thorax with the first segment large, not much longer than broad: *tarsi* five-jointed: *wings* of equal size: *feet* resembling each other.

Genus 396. SIALIS. *Latr., Leach.* HEMEROBIUS. *Geoff., De Geer, Oliv.* SEMBLIS. *Fabr.*

Wings deflexed: *tarsi* with the last joint but one bifid: *ocelli* none.
Sp. 1. *Si. niger.*
Inhabits trees; the larva in water.

Fam. VI. RAPHIDIADÆ. *Leach.*

RHAPHIDINÆ. *Latreille.*

Wings of equal size: *thorax* with the first segment large: *tarsi* with four distinct joints, the last but one bilobate: *antennæ* nearly setaceous: *ocelli* three, arranged in a triangle.

Genus 397. RAPHIDIA. *Linn., Geoff., De Geer, Fabr., Oliv., Lam., Latr., Leach.*

Head oval, narrowed behind, inflexed: *thorax* with the first segment very long, narrow, and somewhat cylindric: *anus* of the female with two united setæ.
Sp. 1. *Raph. ophiopsis.* (*Pl. 7. fig. 6.*)
Inhabits trees and bushes near rivulets.

Fam. VII. PSOCIDÆ. *Leach.*

PSOQUILLÆ. *Latreille.*

Inferior wings smaller than the superior ones: some are apterous: *palpi* two, composed of four joints.

STIRPS 1.—*Tarsi* two-jointed.

Genus 398. PSOCUS. *Latr., Leach.*

Wings four.
Sp. 1. *Pso. bipunctatus.* Latr.
Inhabits woods.

STIRPS 2.—*Tarsi* three-jointed.

Genus 399. ATROPOS. *Leach.* TERMES. *Linn., De Geer.* PSOCUS. *Fabr., Latr.* PEDICULUS. *Geoff.*

Wings none.
Sp. 1. *Atr. lignaria.*
Termes pulsatorium. *Linn.* Atropos lignaria. *Leach.*
Inhabits old books, and the paper on walls, often beating like a watch.

Order XIII. HYMENOPTERA.

Order HYMENOPTERA. *Linn., Latr., Lam., Cuv., Leach.*

Class PIEZATA. *Fabricius.*

Characters of the Order.

Wings nervured (the areolæ large and unequal in size), the inferior ones smaller than the upper: *anus* of the female with an oviduct.

Section I. *TEREBRANTIA.*

Oviduct lamelliform or filiform; in a few resembling a sting and valved; the vagina bivalve, received in a canal beneath, before the anus: the valves compressed, in some compressed-lamelliform, in others elongate-cylindric, setaceous.

Division I.—*Abdomen united to the thorax along its whole breadth, without any distinct peduncle.*

Fam. I. TENTHREDINIDÆ. *Leach.*

TENTHREDINETÆ. *Latreille.*

Abdomen sessile: *oviduct* composed of two lamellæ which are serrated: *mandibles* more or less long, terminated by two strong teeth: *wings* with the marginal cells complete: *labrum* distinct.

LARVÆ with membranaceous feet.

In the third volume of the *Zoological Miscellany* Dr. Leach has given an excellent essay on this very interesting family of insects. "The object of which is to give the external character of the genera of this family, to enable the student to distinguish them without examining the parts of the mouth."

STIRPS 1.—*Antennæ* short and clavated; with the third joint very long: *superior wings* with two marginal and three submarginal cells.

Genus 400. CIMBEX. *Oliv., Fabr., Spinoli, Latr., Leach.* TENTHREDO. *Linné, Jurine, Panz., De Geer.* CRABRO. *Geoffroy.* CLAVELLARIA. *Lamarck.*

Body slightly hairy: *abdomen* with the first articulation (of the male especially) on the upper part emarginated: the four posterior thighs of the male very thick, of the female simple; *tarsi* of the male with the last joint on the under part with a small horn or protuberance.

Sp. 1. *Cim. europæa.* Head and thorax black: abdomen blueish-black; the apex only yellow or ferruginous: antennæ and tarsi yellow: femora and tibiæ blueish-black: wings brownish at the apex.

Tenthredo femorata. *Linné, Panzer.* Cimbex femorata. *Fabr., Latr.* Crabro lunulatus. *Fourc.* Cimbex europæa. *Leach.*

Inhabits Europe: is rare in Britain, but has been taken near Dartford in Kent, and at Windsor.

Genus 401. TRICHIOSOMA. *Leach, Zool. Misc.* vol. iii.

Body hairy: *abdomen* with the first articulation (especially in the male) but slightly emarginated, the four posterior *thighs* dentated (in the male thick).

Sp. 1, *Tri. sylvaticum.* Black, and slightly shining: abdomen of a dull yellow or brownish, the base and apex black: femora blueish-black: tibiæ and tarsi yellowish: wings with the apex brownish.

Inhabits woods near London, but is rare.

Genus 402. CLAVELLARIA. *Lamarck, Leach.*

Body hairy or but slightly hairy: *abdomen* with the first articulation scarcely marginated: *femora of the four posterior legs* without dentations (of the male thickened).

Sp. 1. *Cla. marginata.* Black; apex of the antennæ, tibiæ, and tarsi yellow: abdomen with the margins of the posterior segments white.

Tenthredo marginata. *Linn., Panz.* Cimbex marginata *of authors.*

Inhabits woods in Europe: and has once occurred at Windsor.

Genus 403. ZARÆA. *Leach.*

Eyes of the male joining at the posterior part.

Sp. 1. *Zar. fasciata.* Black; tibiæ and tarsi yellow, the superior wings with a brownish band (abdomen of the female with the base white).

Tenthredo fasciata. *Linné, Panz.* Cimbex fasciata *of authors.*

Inhabits woods: is rare in Britain.

Genus 404. ABIA. *Leach.*

Abdomen of the male with an elongated, silky spot on the posterior part: *eyes* of the male nearly joining.

Sp. 1. *Abia nigricornis.* Antennæ black: wings from the middle to the apex with light brown spots: feet light red; thighs black and shining.

Tenthredo nitens (female). *Linn.* Cimbex sericea, var. *Fabr.* Abia nigricornis. *Leach.*

Inhabits woods.

Sp. 2. *Abia sericea.*

Tenthredo sericea. *Linné.*

Inhabits woods and furze on heaths.

Genus 405. AMASIS. *Leach.*

Body without spots: *abdomen* with the first articulation undivided.

Sp. 1. *Am. læta.* Back of the abdomen pale yellow, the first segment wholly black: wings at the base blackish.

Tenthredo læta. *Fabr., Panz.* Cimbex læta *of authors.* Amasis læta. *Leach.*

Inhabits England and Germany. It has once occurred near Bristol.

STIRPS 2.—*Antennæ* of a moderate length, composed of three articulations, filiform, the last joint increasing towards the apex (in the males ciliated or furcated): *wings* with one marginal and three submarginal cells: *body* short, and increasing towards its apex.

Genus 406. HYLOTOMA. *Fabr.*, *Leach.*

Upper wings with the marginal cell emitting a small branch: *antennæ* of the male ciliated: *tibiæ*, the four hinder ones furnished with a spine situated near the middle on the inner side.

Larva with fourteen spurious feet.

Sp. 1. *Hyl. pilicornis.* Body blueish-black: wings at the apex clouded: feet black, with white bands: antennæ rather lengthened, black and ciliated: the third submarginal cell increasing towards the apex.

Length of the body 2½ lines, expansion of the wings 6 lines.

Found in Coombe Wood, Surry, by Mr. Stephens.

OBS.—Of this genus we have several indigenous species.

Genus 407. CRYPTUS. *Jurine*, *Leach.*

Upper wings without the branch to the marginal cells: *antennæ* of the male divided and ciliated: the whole of the *tibiæ* simple.

Sp. 1. *Cryp. Villersii.* Bright yellow: head, antennæ, (and thorax of the male) black: wings brownish and transparent.

Tenthredo furcata. *Vill. Ent.* 3. 86. *t.* 7. *f.* 16. ♂ *f.* 17. ♀.—*Panz. Faun. Insect. Germ.* 46. 1. Tenthredo Rubi Idæi. *Illig.*, *Rossi*, *Fn. Etr.* 2. 31. Hylotoma furcata. *Fabr.*, *Latr.*, *Spinol.*, *Klug.* Cryptus furcatus. *Jurine.* Cryptus Villersii. *Leach*, *Zool. Misc.* vol. iii. 124.— ♀ Hylotoma Angelicæ. *Fabr. Syst. Piezat.* 25.—*Klug*, *Berl. Mag.* 1814, *p.* 302. Tenthredo melanocephala. *Panz.*

Inhabits France, Germany, and Italy. In England it is very rare.

STIRPS 3.—*Antennæ* short, with nine or ten articulations, increasing in thickness in the middle, but ending in a point, the third articulation longer than the fourth: *body* short, and increasing towards the apex.

Genus 408. MESSA. *Leach.*

Upper wings with one marginal and four submarginal cells: *antennæ* with nine joints.

Sp. 1. *Messa hortulana.*

Tenthredo hortulana. *Klug.* Messa hortulana. *Leach.*

Inhabits

Genus 409. ATHALIA. *Leach.*

Upper wings with two marginal and four submarginal cells: *antennæ* with ten joints.

Sp. 1. *Ath. spinarum.* 2. *Ath. Rosæ.* 3. *Ath. annulata.*

Genus 410. SELANDRIA. *Leach.* TENTHREDO, *Fam.* I. *Klug.*

Upper wings with two marginal and four submarginal cells: *antennæ* with nine joints.

Sp. 1. *Sel. serva.* 2. *Sel. cineripes.* 3. *Sel. ovata.*

Genus 411. FENUSA. *Leach.* TENTHREDO, *Fam.* II. †. *Klug.*

Upper wings with two marginal and three submarginal cells: *antennæ* composed of nine joints.

Sp. 1. *Fen. pumila.*

Tenthredo pumila. *Klug.* Fenusa pumila. *Leach.*

STIRPS 4.—*Antennæ* composed of nine joints, moderately long: *body* moderately long: *upper wings* with two marginal cells.

Genus 412. ALLANTUS. *Panz., Jurine, Leach.* TENTHREDINES ALLANTI. *Klug.*

Upper wings with four submarginal cells: *antennæ* with the third joint longer than the fourth.

Sp. 1. *All. semicincta.* 2. *All. notha.* 3. *All. zonata, &c.*

Genus 413. TENTHREDO. *Leach.* TENTHREDINES ALLANTI. *Klug.*

Upper wings with four submarginal cells: *antennæ* with the third joint of the same length with the fourth.

Sp. 1. *Tenth. Rapæ.* 2. *Tenth. dimidiata.* 3. *Tenth. nasata, &c.*

Genus 414. DOSYTHEUS. *Leach.* TENTHREDINES DOLERI. *Klug.*

Upper wings with three submarginal cells: *antennæ* with the first joint short, the third longer than the fourth.

Sp. 1. *Dos. Elanteriæ.* 2. *Dos. Junci, &c.*

Genus 415. DOLERUS. *Jurine, Latreille, Leach.* TENTHREDINES DOLERI. *Klug.* DOLERUS. *Jurine.*

Upper wings with three submarginal cells: *antennæ* with the first joint short; the third and fourth of equal length.

Sp. 1. *Dol. opacus.* 2. *Dol. Gonagra, &c.*

Genus 416. EMPHYTUS. *Leach.* TENTHREDINES EMPHYTI. *Klug.*

Upper wings with three submarginal cells: *antennæ* with the first and second joints equal; third and fourth equal.

Sp. 1. *Emph. cincta.* 2. *Emph. cerea.* 3. *Emph. tibiulis, &c.*

STIRPS 5.—*Superior wings* with but one marginal cell: *body* short; of the males narrower towards the apex: *antennæ* simple, nine-jointed, slightly ciliated, gradually increasing in the middle, and decreasing towards the apex.

Dr. Leach has observed that from the shortness of the body, the one marginal cell, &c. it is probable that this is nearly allied to the second stirps.

Genus 417. CRÆSUS. *Leach.*

Upper wings with four submarginal cells: *antennæ* in both sexes longer than the body (especially in the females) with very short ciliæ: *posterior tarsi* with the first joint elongated and compressed.

Sp. 1. *Cræs. septentrionalis.*

Nematus Septentrionalis. *Jurine, Latr., Leach.* Cræsus Septentrionalis. *Leach, Zool. Misc.* vol. iii. p. 129.

Inhabits woods.

Genus 418. NEMATUS. *Leach.*

Superior wings with four submarginal cells: *antennæ* simple, nine-jointed; longer than the body in the males, the last articulation generally increasing, or internally a little produced: *tarsi* simple.

Sp. 1. *Nem. niger.* 2. *Nem. luteus.* 3. *Nem. lucidus, &c.*

Genus 419. CLADIUS. *Leach.*

Upper wings with three submarginal cells: *antennæ* of the same length as the body or scarcely longer; of the males with very long ciliæ; the 3d, 4th, and 5th joints from the apex, or the 6th and 7th (especially) a little produced; the third joint from the base with a small protuberance: *tarsi* simple.

Sp. 1. *Cla. difformis.*

Inhabits England, but is rare; it has occurred at Coombe Wood in Surry, and near Bristol.

Stirps 6.—*Antennæ* with many articulations: *body* rather depressed: *wings* with two marginal and four submarginal cells.

Genus 420. TARPA. *Fabr., Klug, Leach.* Megalodontes. *Latr., Spinola.* Diprion. *Schrank.*

Tibiæ, the four posterior armed on the inside with two spurs or spines.

Obs.—Abdomen with the posterior part of the first articulation with a membranaceous margin; the membrane pale.

Sp. 1. *Tar. Fabricii.* Black; head with two spots on the inner margin between the eyes: thorax with the anterior part angular; two stripes near the scutellum, and punctured; the membrane of the abdomen with two fasciæ, and a puncture on each side: anus with a white band: antennæ brown; the first two joints black: feet yellow; base of the coxæ of the four anterior feet black.

Tarpa Fabricii. *Leach.*

Length of the body 7 lines; expansion of the wings 12¼ lines. In the museum of Dr. Leach.

Sp. 2. *Tar. Klugii.* Black, with three spots between the eyes; those placed on the margin of the eyes broken: thorax with the anterior margin divided; two stripes near the scutellum, and punctured: abdomen with the 1st, 4th, 5th, 6th, 7th, and 8th joints at the posterior margins, with two yellow bands: antennæ with the second and last joint black, the others brown; feet reddish brown; tibiæ yellow; thighs of the four anterior legs black at their base.

Tenthredo cephalotes. *Fabr. Ent. Syst.* 2. 111. Tarpa cephalotes. *Fabr. Syst. Piezat.* 19. Tarpa plagiocephala. *Klug, Berl. Mag.* 1808, 270. *t.* 8. Tarpa Klugii. *Leach, Zool. Misc.* iii. 131.

Length of the body 5—5¼ lines, expansion of the wings 10—11 lines.
Inhabits Germany and England: in the latter it is very rare, and has only been found near Bristol.

Genus 421. LYDA. *Fabr., Spinol., Klug., Leach.* PAMPHILIUS. *Latr., Leach, Edinb. Encycl.* vol. ix. 141. CEPHALEIA. *Jurine.*

Tibiæ, the four posterior furnished on the inside with a single spine near the middle and a double one beneath.
Larva with no spurious feet.
Lydæ. *Klug.*
Sp. 1. *Lyda Betulæ.* 2. *Lyda erythrocephala, &c.*

Genus 422. LOPHYRUS. *Latr., Leach.* PTERONUS. *Jurine.* HYLOTOMA. *Fabr.* TENTHREDO. *Linn., De Geer, Oliv., Lam., Panz.*

Antennæ pennated in the males; serrated in the females: *superior wings* with one marginal and three submarginal cells: *mandibles* tridentate.
Sp. 1. *Loph. Pini.*
Inhabits Europe: is very rare in Britain.

Fam. II. XIPHYDRIADÆ. *Leach.*

Abdomen sessile: *oviduct* composed of two lamellæ, which are serrated: *mandibles* more or less long, terminated by two strong teeth: *wings* with the three marginal cells complete: *labrum* obscure.
Larvæ with scaly feet, or at least not membranaceous.

Genus 423. CEPHUS. *Latr., Fabr., Panz., Leach.* SIREX. *Linn.* ASTATUS. *Klug.* TRACHELUS. *Jurine.*

Mandibles exserted, longer than wide: *neck* long: *oviduct* exserted: *antennæ* inserted in the front between the eyes, gradually thicker externally.
Sp. 1. *Cephus pygmæus.* Latr.
Inhabits flowers in fields and hedges.

Genus 424. XIPHYDRIA. *Latr., Fabr., Panz., Leach.* SIREX. *Linn.*

Mandibles exserted, longer than wide: *neck* long: *oviduct* exserted: *antennæ* setaceous, inserted above the clypeus.
Sp. 1. *Xiph. Camelus.*
Inhabits willow grounds.

Fam. III. UROCERIDÆ. *Leach.*

Abdomen sessile: *oviduct* filiform, exserted, or inclosed in a groove beneath the abdomen: *mandibles* short.

Genus 425. ORYSSUS. *Latr., Fabr., Jurine, Lam., Klug, Panz., Leach.* SPHEX. *Scopoli.*

Mandibles with their internal edge not dentated: *maxillary palpi* long and pendulous: *antennæ* filiform, compressed, inserted under the anterior margin of the clypeus: *superior wings* with one marginal cell,

and two submarginal, the last incomplete: *oviduct* capillary, hidden in a longitudinal groove.

Sp. 4. *Orys. coronatus.*

Oryssus coronatus. *Fabr., Latr., Coquebert, Leach.* Oryssus Vespertilio. *Klug, Panz.* Sphex abietina. *Scopoli.*

Inhabits sandy places: taken by Dr. Leach in Darent wood in July.

Genus 426. UROCERUS. *Geoff., Oliv., Lam., Latr., Leach.* SIREX. *Linn., Fabr., Jurine, Panz.*

Mandibles dentated on their internal edge: *maxillary palpi* very small: *labial palpi* terminated by a very thick, hairy joint: *antennæ* gradually narrowing externally, inserted in the front, longer than the thorax: *superior wings* with two marginal and two submarginal cells complete: *abdomen* terminating in a point: *oviduct* exserted, composed of three parts, the outer ones valviform.

Sp. 1. *Uro. Gigas.* (*Pl. 8. fig. 3.*)

Sirex Mariscus. *Fabr.*(Male). Sirex Gigas Linné. *Fabr., Latr.*(Female).

Inhabits Europe: is rare in Britain.

Division II.—*Abdomen united to the thorax by a peduncle.*

Fam. IV. EVANIADÆ. *Leach.*

EVANIALES. *Latreille.*

Inferior wings with very distinct nervures: *antennæ* with 13 or 14 joints.

Genus 427. EVANIA. *Fabr., Oliv., Lam., Jurine, Panz., Leach.* SPHEX. *Linn.* ICHNEUMON. *De Geer.*

Abdomen very small, much compressed, triangular or ovoid; abruptly pedunculated and inserted behind the metathorax.

Sp. 1. *Ev. appendagaster.* Fabr., Latr.

Found near Bristol and Swansea, but is very rare.

Genus 428. FŒNUS. *Fabr., Latr., Jurine, Panz., Leach.* ICHNEUMON. *Linn., Geoff., De Geer.* GASTERUPTION. *Latr.* (obsolete).

Neck elongate: *hinder tibiæ* clavate: *abdomen* a lengthened club.

Sp. 1. *Fœn. Jaculator.*

Fœnus Jaculator. *Fabr., Panz., Latr., Leach.* Ichneumon Jaculator. *Linn.*

Inhabits woods and hedges.

Fam. V. ICHNEUMONIDÆ. *Leach.*

ICHNEUMONIDES. *Latreille.*

Abdomen attached to the thorax by a part of its transverse diameter: *inferior wings* with very distinct nervures: *antennæ* with 21 joints or more: *mandibles* bidentate, or notched at their extremity.

Division I.—*Abdomen with five very distinct segments.*

Subdivision 1.—*Superior wings with the first submarginal cell very large, the two discoidal cells situated longitudinally, one above the other.*

Genus 429. ICHNEUMON. *Latr., Leach.*

Maxillary palpi with very unequal joints; *oviduct* with its base not covered by a large scale, exserted.

[This Genus consists of several natural genera; but the characters are obscure, and are not yet fully understood. The following divisions are proposed by Latreille, who has submitted these insects to a scrupulous and daily investigation.

DIVISION A.

Abdomen but little or not at all compressed.

Subdivision a.

Extremity of the abdomen of the female compressed and obliquely truncated: *oviduct* exserted.

1. * *Abdomen cylindric, with a very short peduncle.*

Genus PIMPLA *of Fabricius.*

2. ** *Abdomen somewhat ovoid, with the peduncle long, slender, and arcuate.*

Genus CRYPTUS *of Fabricius.*

Subdivision b.

Extremity of the abdomen of the female slightly compressed, not obliquely truncated: *oviduct* scarcely prominent or exserted.

3. * *Abdomen cylindric, almost sessile.*

Genus METOPIUS *of Panzer.* PELASTES *of Illiger.*

4. ** *Abdomen almost fusiform or cylindric, gradually narrower towards the base; the peduncle not slender or arcuate.*

Genus ALOMYA *of Panzer.*

5. *** *Abdomen ellipsoid or ovalate, with the peduncle slender and arcuate.*

Genus ICHNEUMON *of Fabricius.*

DIVISION B.

Abdomen very much compressed.

6. * *Apex truncate in the females.*

Genus OPHION *of Fabricius.*

7. ** *Abdomen with the apex pointed.*

Genus BANCHUS *of Fabricius.*]

Subdivision 2.—*Superior wings with the first submarginal cell small, or of a moderate size; the two discoidal cells placed in a transverse line by the side of each other.*

Genus 430. BRACON. *Jurine, Fabr., Panz., Illiger, Spinoli, Latr., Leach.* ICHNEUMON. *Linn., Scopoli, Schrank.* VIPIO. *Latr.* (rejected name.)

Mouth produced into a rostrum: *superior wings* with the two first submarginal cells nearly equal, square.

Sp. 1. *Br. Desertor.*

Bracon Desertor. *Fabr., Latr., Leach.*

Inhabits woods.

Division II.—*Abdomen almost inarticulate, with but three distinct segments.*

Genus 431. SIGALPHUS. *Latr., Spinoli, Leach.* SPHÆROPYX. *Hoffmansegg.* CRYPTUS. *Fabr.* ICHNEUMON. *Fabr.* CHELONUS. *Jurine, Panz., Illiger.* BRACON. *Jurine.*

Sp. 1. *Sig. Irrorator.*

Sigalphus Irrorator. *Latr., Leach.* Cryptus Irrorator. *Fabr.*

Inhabits ————.

Fam. VI. DIPLOLEPIDÆ. *Leach.*

DIPLOLEPARIÆ. *Latreille.*

Abdomen inserted to the thorax by a part only of its transverse diameter: *inferior wings* without distinct nervures: *body* not contractile into a sphere: *abdomen* compressed or depressed, scarcely pedunculated: *oviduct* filiform: *palpi* very short: *antennæ* filiform, straight, from 13 to 16 joints.

Genus 432. DIPLOLEPIS. *Geoff., Oliv., Panz., Illig., Leach.* CYNIPS. *Linné, Scopoli.*

Abdomen with the inferior part compressed, triangular-ovoid: *antennæ* filiform, joints cylindric.

Sp. 1. *Dip. Quercus-folii.*

Cynips Quercus-folii. *Linné.* Diplolepis Quercus-folii. *Latr.*

Inhabits the oak.

Genus 433. FIGITES. *Latr., Jurine, Leach.* CYNIPS. *Rossi.*

Abdomen with its inferior part compressed, triangular-ovoid: *antennæ* moniliform, thicker towards their extremities.

Sp. 1. *Fig. scutellaris.*

Figites scutellaris. *Jurine, Latr.* Cynips scutellaris. *Rossi.*

Inhabits France and England.

Fam. VII. CYNIPSIDÆ. *Leach.*

CYNIPSERA. *Latreille.*

Abdomen attached to the thorax by a part only of its transverse dia-

meter: *inferior wings* without distinct nervures: *body* not contractile into a ball: *abdomen* compressed or depressed: *oviduct* filiform: *palpi* very short: *antennæ* broken, clavate, or gradually thicker externally, from six to twelve-jointed: *hinder feet* formed for leaping.

STIRPS 1.—*Hinder tibiæ* arcuated.

Genus 434. CHALCIS. *Fabr., Oliv., Panz., Jurine, Illig., Latr., Leach.* SPHEX. *Linné.* VESPA. *Linné.*

Abdomen ovoid-triangular, not sessile, terminated by a point: *superior wings* not folded, with the marginal and submarginal cells none, or obliterated: *maxillary palpi*, with the last joint but one shorter than the one before it.

Sp. 1. *Chal. clavipes.* (*Pl.* 8. *fig.* 6.)

Inhabits Europe. Is found on aquatic plants in Battersea fields in the month of June.

STIRPS 2.—*Hinder tibiæ* straight.

Genus 435. CYNIPS. *Geoff., Schæff., Fabr., Oliv., Walck., Latr., Leach.* ICHNEUMON. *Linné.*

Antennæ with cylindric joints: *abdomen* compressed; *oviduct* exserted.

Sp. 1. *Cyn. capræa.*

Inhabits?

Fam. VIII. CHRYSIDIDÆ. *Leach.*

CHRYSIDIDES. *Latreille.*

Abdomen attached to the metathorax by a portion only of its transverse diameter: *inferior wings* without distinct nervures: *body* not contractile into a ball.

STIRPS 1.—*Abdomen* semicylindric or semicircular, with five segments in the male, and four in the female: *thorax* attenuated in front, divided transversely by four segments.

Genus 436. CLEPTES. *Latr., Fabr., Panz., Jurine, Illiger, Spinoli, Leach.* SPHEX. *Linné, Vill.* CHRYSIS. *Oliv.* VESPA. *Geoff.* ICHNEUMON. *Rossi, Walck.*

Sp. 1. *Cle. semi-aurata.* Fabr., Latr.

Inhabits sand-banks.

STIRPS 2.—*Abdomen* semicylindric, truncated or rounded behind, often dentated, composed of three, sometimes of four joints: *thorax* semicylindric, divided by three transverse sutures: *metathorax* with the middle not elongated into a scutellum.

Subdivision 1.—*Metathorax with the middle produced into a scutellum.*

* *Abdomen with the second segment larger than the others: palpi many-jointed.*

Genus 437. ELAMPUS. *Spinoli, Latr., Leach.* CHRYSIS. *Fabr., Jurine.* HEDYCHRUM. *Panz., Lepeletier.*

Mandibles dentated: *abdomen* terminated by an obtuse point; the second segment larger than the others.

Sp. 1. *El. Panzeri.*

Elampus Panzeri. *Spinoli.* Chrysis Panzeri. *Fabr.*

Inhabits walls. Taken at Exeter by Dr. Leach.

Subdivision 2.—*Metathorax with the middle not elongated into a scutellum.*

** *Abdomen with the third or fourth segment larger than the others: palpi two-jointed (and very small).*

Genus 438. CHRYSIS *of authors.* VESPA. *Geoff.*

Mandibles with one tooth on their internal edges: *abdomen* semicylindric, elongate; the last segment abruptly divided by an impression, with a transverse row of impressed dots.

Sp. 1. *Chr. ignita.* (*Pl.* 8. *fig.* 7.)

Inhabits sand-banks, posts, and walls. We have several species in this country that have been confounded with *Chr. ignita, &c.*

Genus 439. HEDYCHRUM. *Latr., Panz., Spin.* CHRYSIS, *Linn., Fabr., Illig., Lamarck.*

Mandibles bidentate on their internal edge: *abdomen* semicircular, with the extremity rounded; all the segments united.

Sp. 1. *Hed. auratum.*

Chrysis aurata. *Fabr.* Hedychrum auratum. *Leach.*

Inhabits sand-banks.

Section II. *ACULEATA.*

Oviduct none: *sting* or aculeus in the females having a communication with poisonous glands: *abdomen* attached to the thorax in all by a part only of its transverse diameter.

DIVISION I.—*Hinder feet not pollinigerous; their tarsi with the first joint cylindric, not much larger than the others, nor much compressed.*

LARVÆ omnivorous.

Subdivision 1.—*Ocelli or stemmata not distinct. Wings often wanting in the females and neuters.*

Fam. IX. FORMICADÆ. *Leach.*

FORMICARIÆ. *Latreille.*

Abdomen with a peduncle abruptly formed, with a scale on two knots:

antennæ thicker towards their extremities, the first joint very long, more so in the females and neuters: *labrum* large, perpendicular, corneous.

These insects live in societies consisting of vast numbers. The males and the females are furnished with wings, the neuters being apterous.

Huber has written a work on the œconomy of these animals.

Genus 440. FORMICA *of authors.* Lasius. *Fabr.*

Peduncle of the abdomen formed of one simple scale: *sting* not punctorious: *poisonous glands* in the female and neuters: *antennæ* inserted in the front.

Sp. 1. *For. herculanea.*

Formica herculanea. *Latr., Leach.*

Inhabits woods, building a large nest with bits of sticks.

Fam. X. Mutilladæ. *Leach.*

Mutillariæ. *Latreille.*

Head large: *abdomen* somewhat conic or ovoid: *tibiæ* spinose: *maxillary palpi* as long or longer than the maxillæ: *antennæ* filiform, inserted in the middle of the face, longer than the head, the first joint not receiving the second: *superior wings* with three submarginal cells.

The insects of this family are solitary. The males are winged, the females apterous, and there are no neuters.

Genus 441. MUTILLA. *Linn., Fabr., Panz., Jurine, Illig., Spinola, Leach.* Sphex. *De Geer.* Apis. *Christus, Harris.*

Abdomen (of both sexes) ovoid and convex; the second segment large, somewhat campanulated: *thorax* of the females cubical, with no transverse sutures.

Sp. 1. *Mut. Europæa.* Linn., Fabr., Panz., Latr., Leach.

Inhabits sandy places.

Genus 442. MYRMOSA. *Latr., Jurine, Panz., Leach.* Mutilla. *Rossi.* Hylæus. *Fabr.*

Abdomen depressed, elliptic in the males, conic in the females: *thorax* composed of two segments, the anterior segment transverse.

Sp. 1. *Myrm. melanocephala.*

Myrmosa melanocephala. *Latr., Leach.*

Inhabits ———

Subdivision 2.—*Ocelli distinct, smooth: wings never wanting.*

Fam. XI. Scoliadæ. *Leach.*

Scolietæ. *Latreille.*

Thorax with the first segment transverse-quadrate, or forming an arc: *feet* short, or moderately long; the hinder ones thick, spinulose, or

strongly ciliated: *antennæ* shorter than the head and trunk: *superior wings* with the marginal cell detached from the apex, not doubled longitudinally: *maxillary palpi* long; with the joints very unequal.

Genus 443. TIPHIA. *Fabr., Panz., Illig., Jurine, Spinola, Leach.* SPHEX. *Scopoli, Christus.* BETHYLLUS. *Panzer.*

Mandibles without teeth: *antennæ* shorter than the thorax in both sexes, the first joint obconic: *abdomen* ovate.

Sp. 1. *Tiph. femorata.*

Inhabits flowers, and sandy situations.

Fam. XII. SAPYGIDÆ. *Leach.*

Thorax with the first segment forming an arch, or a transverse square: *feet* moderate, or short, slender, not strongly ciliated or spined: *antennæ* in both sexes as long as the head and trunk: *superior wings* with the marginal cell not remote, not folded longitudinally.

Genus 444. SAPYGA. *Latr., Jurine, Klug, Illig., Spinola, Leach.* APHIS. *Linn.* VESPA. *Geoff.* HELLUS. *Fabr., Panz.* SPHEX. *Villers.*

Mandibles very strong, trigonate, many-toothed: *antennæ* thicker towards their extremities.

Sp. 1. *Sap. sexpunctata.*

Sapyga sexpunctata. *Leach.* Hellus sexpunctatus. *Fabr.*

Inhabits palings.

Fam. XIII. POMPILIDÆ. *Leach.*

POMPILII. *Latreille.*

Thorax with the first segment forming an arch, or a transverse square: *feet* long; the hinder ones as long as the head and trunk: *antennæ* slender, formed of elongate and slightly serrated joints: *superior wings* not folding longitudinally.

STIRPS 1.—*Superior wings* with three submarginal cells complete.

Genus 445. POMPILUS. *Latr., Leach.*

Marillary palpi longer than the labial ones, with the last joint thicker, conic-obovate; the three last joints nearly equally long: *labrum* inserted under the clypeus: *antennæ* (of the females at least) with their points convoluted.

OBS.—This is an artificial genus, and contains several natural genera.

Sp. 1. *Pom. annulatus.*

Pompilus annulatus. *Latr., Fabr., Leach.*

Inhabits ————

Genus 446. CEROPALES. *Latr., Fabr., Jur., Panz., Spinola, Leach.* EVANIA. *Oliv., Villers, Rossi, Cuvier.*

Maxillary palpi pendulous, longer than the labial ones; the three last

joints equally long, the last joint thicker, conic-obovate: *labrum* entirely exserted, entering to the anterior margin of the clypeus: *antennæ* (in both sexes) thick, rigid, with the middle arcuated, not convoluted.

Sp. 1. *Cer. maculata.*

Ceropales maculata. *Fabr., Latr., Leach.*

Inhabits ————————.

STIRPS 2.—*Superior wings* with two complete submarginal cells.

Genus 447. APORUS. *Spinola, Latr., Leach.*

Superior wings with the second submarginal cell receiving two recurrent nervures.

Sp. 1. *Apo. unicolor.*

Aporus unicolor. *Spinola, Latr., Leach.*

Inhabits ————————

Fam. XIV. SPHECIDÆ. *Leach.*

Thorax with the first segment transverse-linear: *feet* long; the hinder ones as long as the head and trunk: *ocelli* distinct: *superior wings* not folding longitudinally: *mandibles* with their internal edge denticulated.

Genus 448. AMOPHILA. *Kirby, Latr., Leach.* SPHEX. *Linn., De Geer, Panz., Lamarck, Cuv., Jurine, Illig., Spinola.* PEPSIS. *Fabr., Spinola.* MISCUS. *Jurine.*

Antennæ inserted about the middle of the face: *maxillæ and labrum* much longer than the head, bent in the middle: *palpi* very slender, with cylindric joints.

Sp. 1. *Amoph. sabulosa.*

Sphex sabulosa. *Linné.* Amoph. sabulosa. *Kirby, &c.*

Inhabits sandy places.

Genus 449. SPHEX. *Linn., Fabr., Cuv., Lam., Jur., Illig., Leach.* ICHNEUMON. *Geoff.* APIS. *Linn.* PRO-APIS. *De Geer.* PEPSIS. *Fabr., Spinola.*

Antennæ inserted about the middle of the face: *maxillæ and labrum* scarcely longer than the head, and bent towards their extremities: *maxillary palpi* with all the joints elongate and obconic.

Sp. 1. *Sphex flavipennis.*

Pepsis flavipennis. *Fabr.* Sphex flavipennis. *Latr., Leach.*

Inhabits sandy places.

Genus 450. DOLICHURUS. *Latr., Leach.* PISON. *Jurine.* POMPILUS, *Spinola.*

Antennæ inserted at the mouth (at the base of the clypeus?): *maxillary palpi* setaceous, longer than the labial ones.

Sp. 1. *Dol. ater.*

Pompilus corniculus. *Spinola.* Dolichurus ater. *Latr., Leach.*
Inhabits ————————

Fam. XV. LARRADÆ. *Leach.*

LARRATÆ. *Latreille.*

Thorax with the first segment transverse-linear: *feet* short, or moderately long: *labrum* entirely concealed, or but very obscure: *eyes* elongate, reaching the hinder margin: *ocelli* very distinct: *antennæ* inserted near the mouth, the first joint obovoid or inserted in the middle of the face: *superior wings* not folding longitudinally.

STIRPS 1.—*Superior wings* with two or three submarginal cells complete.

a. *Eyes entire, not emarginate. Mandibles without an emargination on their internal edge.*

* *Antennæ thicker externally: eyes separate.*

Genus 451. GORYTES. *Latr., Illig., Spin., Leach.* MELLINUS. *Fabr., Walck.* VESPA. *Linn., Geoff.* SPHEX. *Rossi.* ARPACTUS. *Jurine, Panz.* OXYBELUS. *Fabr.*

Antennæ inserted below the middle of the face: *mandibles* unidentate: *superior wings* with the second submarginal cell sessile.

Sp. 1. *Gor. quinquecinctus.*
Gorytes quinquecinctus. *Latr., Leach.*
Inhabits ————————.

Genus 452. PSEN. *Latr., Jurine, Panz., Illig., Leach.* TRYPOXYLON. *Fabr.*

Antennæ thicker externally, inserted in the middle of the face, towards the front: *eyes* separate: *abdomen* with the peduncle abrupt and short.

Sp. 1. *Psen ater.* Latr.
Inhabits posts and sandy places.

** *Antennæ filiform: eyes meeting behind.*

Genus 453. ASTATA. *Latr., Spinola, Leach.* SPHEX. *Villers, Rossi.* DIMORPHA. *Jurine, Panz., Illig.*

Antennæ inserted towards the mouth at the base of the clypeus.

b. *Eyes entire, not emarginate: mandibles emarginate on their internal edge.*

* *Superior wings with three submarginal cells.*

Genus 454. LARRA. *Fabr., Oliv., Jurine, Panz., Spinola, Latr., Leach.* LIRIS. *Fabr., Illig.* SPHEX. *Villers, Rossi.*

Antennæ filiform: *superior wings* with the third submarginal cell narrow, almost lunate; *mandibles* without a tooth-like process on their internal edge.

Sp. 1. *Lar. ichneumoniformis.*
Larra ichneumoniformis. *Panz., Fabr., Latr., Leach.*
Inhabits ————.

Genus 455. LYROPS. *Illig., Latr., Leach.* TACHYTES. *Panz.* LARRA. *Fabr., Jurine.* LIRIS. *Fabr.* ANDRENA. *Rossi.*

Antennæ filiform: *superior wings* with the third submarginal cell narrow, almost lunate: *mandibles* with a strong tooth on their internal edge.
Sp. 1. *Lar. tricolor.*
Larra tricolor. *Fabr.* Tachytes tricolor. *Panz.* Lyrops tricolor. *Leach.*
Inhabits ————.

** *Superior wings with two submarginal cells.*

Genus 456. DINETUS. *Jurine, Panz., Illiger, Latr., Leach.* SPHEX. *Schæffer.* POMPHYLUS. *Fabr.* CRABRO. *Rossi.*

Antennæ (of the males) moniliform, terminated by elongate, cylindric joints convoluted in the middle: *mandibles* acutely unidentate on their internal edge: *superior wings* with the marginal cell appendiculated; the two submarginal cells sessile.
Sp. 1. *Din. pictus.*
Dinetus pictus. *Jurine, Panz., Latr., Leach.*
Inhabits the vicinity of Windsor, and has been taken near Swansea.

c. *Eyes notched.*

Genus 457. TRYPOXYLON. *Latr., Fabr., Panz., Illig., Spinola, Leach.* SPHEX. *Linné, Vill., Cuv., Rossi.* APIUS. *Jurine.*

Superior wings with three submarginal perfect cells; the first distinct, receiving a recurrent nervure; the second obsolete, much smaller, receiving another nervure; the third also obsolete, terminal: *abdomen* long and gradually pedunculated.
Sp. 1. *Figulus.* Latr.
Inhabits ————.

STIRPS 2.—*Superior wings* with one complete submarginal cell.

Genus 458. OXYBELUS. *Latr., Fabr., Panz., Jurine, Illig., Spinola, Leach.* VESPA. *Linn., Villers, Christus.* SPHEX. *Schæff.* CRABRO. *Oliv., Rossi.*

Antennæ thicker towards their extremities, longer than the head; convoluted, the second joint much shorter than the third: *mandibles* without teeth at their extremities; *tibiæ* spinose: *tarsi* with large pulvilli.
Sp. 1. *Oxy. uniglumis.*
Vespa uniglumis. *Linn.* Oxybelus uniglumis. *Fabr., Latr., Leach.*
Inhabits ————.

Fam. XVI. CRABRONIDÆ. *Leach.*

CRABRONITES. *Latreille.*

Thorax with the first segment transverse-linear: *feet* short, or moderately long: *labrum* entirely concealed, or but obscure: *eyes* not reaching the hinder part of the head: *ocelli* very distinct: *superior wings* not folded longitudinally: *antennæ* inserted at the mouth, with the first joint cylindric or conic, or towards the middle of the face.

STIRPS 1.—*Superior wings* with one or two complete submarginal cells.

* *Mandibles with their extremities bifid. Superior wings with but one recurrent nervure.*

Genus 459. CRABRO. *Fabr., Oliv., Rossi, Jurine, Panz., Illig., Spinola, Leach.* SPHEX. *Linné, Villers.*

Antennæ with the first joint long and cylindric: *superior wings* with one complete sub-marginal cell.

Sp. 1. *Cra. cribarius.* Fabr., Latr.

Inhabits sand-banks.

Genus 460. STIGMUS. *Jurine, Panz., Illiger, Spinola, Latr., Leach.*

Antennæ with the first joint obconic: *superior wings* with two complete submarginal cells, and two discoidal cells.

Sp. 1. *Stig. ater.*

Stigmus ater. *Jurine, Latr., Leach.*

Inhabits ————————?

** *Mandibles strong, many-toothed: superior wings with two recurrent nervures.*

Genus 461. PEMPHEDRON. *Latr., Fabr., Spinola, Leach.* CEMONUS. *Jurine, Panz., Illiger.*

Superior wings with the submarginal cell not narrower towards the apex: *antennæ* with the first joint longest, thickest.

Sp. 1. *Pem. unicolor.*

Pemphedron unicolor. *Latr., Leach.* Cemonus unicolor. *Jurine.*

Inhabits ————————?

STIRPS 2.—*Superior wings* with three complete submarginal cells.

* *Antennæ inserted at the mouth, filiform: clypeus not trilobate.*

Genus 462. MELLINUS. *Fabr., Panz., Jurine, Illig., Spinola, Leach.* SPHEX. *De Geer, Cuv., Vill.* VESPA. *Linné, Rossi, Harris.*

Abdomen distinctly pedunculated: *tarsi* terminated by a thick joint bearing a large pulvillus.

Sp. 1. *Mel. mystaceus.*

Inhabits sand-banks.

** *Antennæ thicker towards their extremities, inserted about the middle of the face: clypeus trilobate.*

Genus 463. CERCERIS. *Latr., Illig., Spinola, Leach.* SPHEX. *Schæffer, Villers, Rossi.* VESPA. *Geoff., Oliv., Harris.* PHILANTHUS. *Fabr., Jurine, Panz.* BEMBEX. *Rossi.* CRABRO. *Rossi.*

Antennæ gradually thicker externally, very much approximating at their base, almost as long as the thorax, the third joint somewhat cylindric: *mandibles* with a tooth in their internal edge: *superior wings* with the second submarginal cell petiolated.

Sp. 1. *Cer. quadricinctus.*

Philanthus quadricinctus. *Fabr., Panz.* Cerceris quadricinctus. *Leach.*

Inhabits ——————?

Fam. XVII. VESPADÆ. *Leach.*

VESPARIÆ. *Latreille.*

Superior wings folded longitudinally: *thorax* with the first segment forming an arc, prolonged behind even to the origin of the superior wings: *antennæ* twelve-jointed, with their extremities pointed: *lip* with three glandiferous divisions, or with four long plumose setæ.

STIRPS 1.—*Mandibles* longer than broad, anteriorly meeting like a rostrum: *clypeus* cordiform, with the point porrected, and more or less truncated: *lip* having four glandular points at its extremity, parted into three pieces, the middle one large, and bifid or notched at its extremity: *superior wings* doubled, three submarginal cells complete: *maxillary palpi* six-jointed, not very much shorter than the labial ones.

Genus 464. ODYNERUS. *Latr., Leach.* VESPA. *Panz., Fabr.*

Abdomen ovoid-conic, the second segment broader than the first: *maxillary palpi* with the two or three first joints extending beyond the extremity of the maxillæ: *maxillæ* with the terminal lobe short, short-lance-shaped.

Sp. 1. *Ody. parietinus.*

Vespa parietina. *Fabr.*

Inhabits walls.

STIRPS 2.—*Mandibles* longer than broad, long quadrate, with their extremities obliquely truncated: *clypeus* almost quadrate: *lip* with the intermediate division a little lengthened, cordiform.

Genus 465. VESPA *of authors.*

Mandibles (at least of the females and neuters) with the second tooth much broader than the two under ones, the upper one obtuse: *clypeus* with the anterior margin broadly truncate, and somewhat emar-

ginate, with a tooth on each side: *abdomen* ovoid-conic, with the base abruptly truncated, and very shortly pedunculated.
Sp. 1. *Vespa Crabro* (hornet). (*Pl. 8. fig. 8.*)
Vespa Crabro. *Linné*, &c.
Inhabits Europe, building its nest in hollow trees.

Sp. 2. *Vespa vulgaris* (common wasp).
Vespa vulgaris *of authors.*
Inhabits Europe, building its nest in holes under ground.

Sp. 3. *Vespa Britannica.*
Vespa Britannica. *Leach, Zool. Miscel.* vol. i.
Inhabits Britain, and builds a nest suspended from trees.

Division II.—*Hinder feet pollinigerous; their tarsi with the first joint compressed, elongate-quadrate or obtrigonous.*

Fam. XVIII. ANDRENIDÆ. *Leach.*

ANDRENETÆ. *Latreille.*

LARVÆ pollinivorous.

Lip with the apex subcordate or subhastate, on each side with one auricle; nearly straight, or slightly incurved in some, reflexed in others, shorter than the sheathing tube: *palpi* alike.

STIRPS 1.—*Lip* with the apex dilated, somewhat cordiform.

Genus 466. COLLETES. *Latr., Illig., Spinola, Leach.* APIS. *Linné, Oliv., Villers.* ANDRENA. *Fabr., Jurine.* HYLÆUS. *Cuv.* EVODIA. *Panz.* MELITTA. * *a. Kirby.*

Hinder feet pollinigerous: *superior wings* with three submarginal cells: *antennæ* with the third joint longer than the second: *abdomen* much elongated, more or less villose: *ocelli* forming a curved line: *tongue* obtuse, the apex bilobate.
Sp. 1. *Col. succincta.* Latr.
Melitta succincta. *Kirby.* Evodia calendarum. *Panz.*
Inhabits ——————.

STIRPS 2.—*Lip* with the intermediate process lanceolate, acute.

a. *Lip when at rest deflexed.*

* *Superior wings with two submarginal cells.*

Genus 467. DASYPODA. *Latr., Fabr., Panz., Illig., Spinola, Klug, Leach.* ANDRENA. *Rossi.* APIS. *Christus.* TRACHUSA. *Jurine.* MELITTA. *Kirby.*

Maxillæ inflexed at their middle, or below, their terminal process triangular-lanceolate, and longer than their palpi: *hinder feet* with the first joint of their tarsi as long or longer than the tibiæ.
Sp. 1. *Das. plumipes.*

Dasypoda plumipes. *Panz., Leach.* Melitta Swammerdamella. *Kirby.*
Inhabits Europe. It was first noticed by the illustrious Swammerdam. They burrow in sandy soil, throwing up a heap of sand without their hole.

** *Superior wings with three submarginal cells, the second small.*

Genus 468. ANDRENA. *Fabr., Panz., Jurine, Illig., Spinola, Klug, Leach.* APIS. *Linn., Vill.* MELITTA. ** c. *Kirby.*

Maxillæ bent at their extremity, their terminal lobe scarcely longer than broad: *hinder feet* with the first joint of their tarsi shorter than the tibiæ: *labium* or lip little elongate, shorter than its palpi.

Sp. 1. *And. nigro-ænea.*

Melitta nigro-ænea. *Kirby.*

Inhabits the blossoms of sallows in the spring.

OBS.—The species of this genus are extremely numerous, and a very large portion of them inhabit Britain. Their proboscis is downy and thick. The hinder legs of the male are furnished with a flocculus at their base, the tibiæ with a thick scopa or brush, and their anus is covered by a fringe of hairs. They nidificate under ground in a light soil, some choosing banks over which bushes are scattered, others bare perpendicular sections, but all seem to prefer a southern aspect. They excavate burrows of a cylindric form, from five inches to nearly a foot or more in depth, of such diameter only as to admit the insect. In making these holes they remove the earth grain by grain, which they throw up on the outside of their holes in the form of a hillock. Some species penetrate in a horizontal, and others in a perpendicular direction. They construct a cell at the bottom of this hole, which they replenish with pollen made into a paste with honey, and in this they deposit their eggs. The pollen they carry in the scopa or brush of their hinder tibiæ, upon the flocculus at the base of the hinder thighs, and on the hairs of the metathorax. When the female has committed her egg to the paste, she very carefully stops the mouth of her hole, to prevent the ingress of ants, or of other insects which might be enemies to the larva.

Genus 469. CILISSA. *Leach.* MELITTA. *Kirby.* ANDRENA. *Latr., Panz.*

Maxillæ bent near their middle, the terminal process very much longer than broad: *lip* elongate, longer than its palpi: *superior wings* with three submarginal cells, the second small.

OBS.—This genus is not only distinguished from *Andrena* by the characters of the lip and maxillæ, but also by having a longer tongue with very minute auricles, and the tops of the valves cultriform.

Sp. 1. *Cil. tricincta.*

Melitta tricincta. *Kirby.* Andrena tricincta. *Latr.* Cilissa tricincta. *Leach.*
Inhabits ——————.

STIRPS 2.—*Lip* with the intermediate division incurved, or nearly straight: *superior wings* in all with three complete submarginal cells.

* *Lip with the intermediate division nearly straight, not twice the length of the head.*

Genus 470. SPHECODES. *Latr., Leach* SPHEX. *Linné, Villers, Rossi.* APIS. *Geoff.* PROAPIS. *De Geer.* NOMODA. *Fabr.* ANDRENA. *Oliv., Panz., Jurine, Spinola.* DICHROA. *Illig., Klug.* MELITTA. ** a. *Kirby.*

Labrum trigonate, of the male entire, of the female generally emarginate: *antennæ* of the males long, almost moniliform, arcuated: *abdomen* with the greater portion smooth.

OBS.—The species of *Sphecodes*, at first sight, bear a near resemblance to *Sphex*. They make their nests in bare sections of banks exposed to the sun, and nearly vertical. According to Reaumur, they excavate to the depth of nine or ten inches, and deposit their eggs in a mass of pollen mixed with honey.

Sp. 1. *Sph. gibbus.*
Melitta gibba. *Kirby.*
Inhabits Europe.

** *Lip with the intermediate division incurved, longer than the lateral ones, and twice as long or more than the head.*

Genus 471. HYLÆUS. *Fabr., Illig., Spinola, Klug, Leach.* APIS. *Linné, Villers, Rossi.* ANDRENA. *Oliv., Panz., Jurine, Spinola.* MELITTA. ** b. *Kirby.* HALICTUS. *Latr.*

Lip lanceolate, little sericeous: *hinder feet* in both sexes alike: *anus* of the females with a longitudinal groove above.

The males of this genus are remarkable for an elongate cylindric body. The wings of many of the species are beautifully iridescent. They nidificate in bare banks.

Sp. 1. *Hyl. quadri-cinctus.*
Apis 4-cincta. *Linné.*
Inhabits the vicinity of London, but is rare.

Fam. XIX. APIDÆ. *Leach.*

Lip with the apex inflected, the intermediate lacinia filiform, and very long: *labial palpi* with the two first joints resembling a compressed seta.

STIRPS 1.—*Hinder tarsi* with the first joint nearly equally broad, or gradually narrowing from the base to the apex, the second joint originating from the middle of its apex.

A. *Palpi alike.*

Genus 472. PANURGUS. *Panz., Spinola, Latr., Leach.* APIS. *Scopoli.* DASYPODA. *Illig., Fabr.* APIS. * a. *Kirby.* ERIOPS. *Klug.*

Mandibles not dentated: *antennæ* straight in both sexes, and subclavate: *superior wings* with two submarginal cells: *ocelli* disposed in a triangle.

Sp. 1. *Pan. Banksianus.*

Apis Banksiana. *Kirby.*

Inhabits ————.

B. *Palpi unequal; the labial palpi setiform.*

a. *Labrum nearly quadrate, transverse, or not much longer than broad. Mandibles tridentate at their points.* (*Superior wings with three submarginal cells.*)

Genus 473. CERATINA. *Latr., Jurine, Spinola, Leach.* APIS. *Villers, Rossi, Kirby* (** d. 2 α). MEGILLA. *Fabr., Illig.* PROSOPIS. *Fabr.* PITHITIS. *Klug.* CLAVICERA. *Walckenaer.*

Labrum almost quadrate, perpendicular, entire: *antennæ* gradually thickening towards their extremities; the scapus not large.

Sp. 1. *Cer. cærulea.*

Apis cærulea. *Vill.* Apis cyanea. *Kirby.*

Inhabits the flowers of the Ragwort.

b. *Labrum longer than broad, inclined perpendicularly; porrect beneath the mandibles; elongate, quadrate. Mandibles strong, porrected, with the apex bidentate in some; trigonate and often multidentate in others.*

* *Labial palpi with the three first joints contiguous; the fourth inserted under the external apex of the third.*

Genus 474. CHELOSTOMA. *Latr., Leach.* APIS. *Linné, Vill., Kirby* (** c. 2 γ). HYLÆUS. *Fabr.* ANTHROPHORA. *Illig., Fabr.* ANTHIDIUM. *Panz.* TRACHUSA. *Jurine.*

Mandibles (of the females) arcuated; their apex bidentate or furcate, porrect, internally hairy: *maxillary palpi* three-jointed.

The bodies of the insects composing this genus are very long, slender, and cylindric. The belly of the male, near the anus, is concave, and covered with down, and at its base is a horn or protuberance. When asleep they roll themselves up like an armadillo, the horn or protuberance fitting into the anal cavity. They nidificate in posts and rails. The males usually repose in the centre of a flower.

Sp. 1. *Che. florisomne.*

Hylæus florisomnis. *Fabr., Panz.* Apis florisomnis. *Linn.* Chelostoma florisomne. *Latr., Leach.*

Inhabits various flowers in hedges.

The female is *Apis maxillosa* of Linné and Kirby; *Hylæus maxillosus* of Fabricius.

** *Labial palpi with the third joint inserted obliquely on the internal side of the second, near to the apex.*

Genus 475. HERIADES. *Spinola, Latr., Leach.* APIS. *Kirby* (** c. 2 γ). ANTHOPHORA. *Fabr., Illig., Klug.* ANTHIDIUM. *Panz.* TRACHUSA. *Jurine.*

Labial palpi with the second joint longer than the first: *body* very long, cylindric.

This genus in habit and economy resembles *Chelostoma.*

Sp. 1. *Her. truncorum.*

Heriades truncorum. *Spinola, Latr., Leach.* Anthophora truncorum. *Fabr., Illig.*

Inhabits

Genus 476. STELIS. *Panz., Leach.* APIS. *Kirby* (** c. 1 β). ANTHOPHORA. *Illig.* MEGACHILE. *Latr., Walck.* TRACHUSA. *Jurine.* GYRODROMA. *Klug.*

Labial palpi with the second joint not longer than the first: *maxillary palpi* two-jointed, the first joint longest: *mandibles* strong: *abdomen* convex above, smooth below, and scarcely hirsute.

Sp. 1. *Ste. punctulatissima.*

Inhabits

Genus 477. ANTHIDIUM. *Fabr., Panz., Klug, Latr., Leach.* APIS. *Linn., Geoff., Schæff., Kirby* (** c. 2 β). ANTHOPHORA. *Illig.* MEGACHILE. *Walckenaer, Spinola.* TRACHUSA. *Jurine.*

Labial palpi with their second joint not longer than the first: *maxillary palpi* one-jointed: *abdomen* of the females, below, very hairy; above, convex, incurved, the base broadly truncate: *mandibles* broad, multidentate. The anus of the males of this genus is always armed with spines.

Sp. 1. *Anth. manicatum.*

Anthidium manicatum. *Panz., Latr., Leach.* Apis manicata. *Kirby, Linné.*

Inhabits Europe in gardens.

Genus 478. OSMIA. *Panz., Spinola, Latr., Leach.* APIS. *Linné, Villers, Kirby* (** c. 2δ). ANTHOPHORA. *Fabr., Illig., Klug.*

Labial palpi with the second joint not longer than the first: *maxillary palpi* four-jointed: *abdomen* convex above, hairy beneath in the females: *mandibles* broad.

Sp. 1. *Osm. cornuta.*

Osmia cornuta. *Latr., Leach.* Apis bicornis. *Kirby.*

Inhabits Europe. This species selects the hollows of large stones for the purpose of nidificating.

Genus 479. MEGACHILE. *Latr., Walck., Spinola, Leach.* APIS. *Linn., Villers, Kirby* (** c. 2 α). ANTHOPHORA. *Fabr., Illig., Panzer, Klug.* TRACHUSA. *Jurine.* XYLOCOPA. *Fabr.* CENTRIS. *Fabr.*

Labial palpi with the second joint not longer than the first: *maxillary palpi* two-jointed, the first rather longest: *mandibles* very strong: *abdomen* triangular, flat above, very downy beneath in the females.

"The insects of this genus are well known by the name of *leaf cutters* and *carpenter bees*: their interesting economy having attracted the attention of many naturalists, so early as 1670 it was noticed by Ray, Dr. Lister, Willughby, and Sir Edward King. Linné in this as in many other instances (supposing the economy of a genus to be peculiar to one species only) has confounded several species under the general title of *Apis centuncularis*, and denoted it by the orange-coloured hairs which cover the under side of the abdomen, a character which it possesses along with a great number of species."

Sp. 1. *Mega. centuncularis.*

Apis centuncularis. *Linn., Fourcroy, Klug.* Megachile centuncularis. *Latr., Leach.*

Inhabits Europe. Builds its cells with the leaves of roses and of the *Mercurialis annua.*

Genus 480. CÆLIOXYS. *Latr., Leach.* APIS. *Linné, Villers, Kirby* (** c. 1 α).

Labial palpi with their second joint not longer than the first: *maxillary palpi* two-jointed, the first double the length of the second: *mandibles* narrow and strong in both sexes: *scutellum* spiny: *abdomen* conic or triangular, very little or not at all downy: *anus* of the males spiny.

Sp. 1. *Cæl. conica.*

Apis conica. *Kirby.* Cælioxys conica. *Latr., Leach.*

Male

Apis quadripunctata. *Linn.* Anthophora quadridentata. *Fabr.*

Female

Apis conica. *Linn.*

Inhabits flowers.

C. *Labrum a little broader than long, subsemicircular or semioval. Mandibles slender, pointed, unidentate on their internal edge. Abdomen not pollinigerous.*

* *Lip with the lateral divisions shorter than the palpi. Body simply pubescent.*

Genus 481. NOMADA. *Scop., Fabr., Illig., Klug, Spinola, Jurine, Panz., Leach.* Apis. *Linné, Villers, Kirby* (* b).

Superior wings with three submarginal cells complete: *maxillary palpi* six-jointed.

The history, economy, and mode of nidification of the insects of this genus (all of which are remarkable for the gaiety of their colours) as yet remain a secret. Dr. Leach has strong reasons for suspecting them to be parasitical; and this seems the more probable from their having no instrument for carrying pollen. Their flight is silent, unattended by any hum; they frequent dry banks. Their eyes, whilst living, exhibit through the external reticulated covering a surface of hexagons, which keeps shifting with the light.

Sp. 1. *Nom. ruficornis.*

Apis ruficornis. *Linn., Kirby.* Nomada ruficornis. *Fabr., Latr., Leach.*

Inhabits dry banks and sandy situations.

Genus 482. EPEOLUS. *Latr., Fabr., Illig., Jurine, Panz., Spinola, Klug, Leach.* Apis. *Linné, Kirby* (** b).

Superior wings with three complete submarginal cells: *maxillary palpi* one-jointed.

Sp. 1. *Epeo. variegatus.*

Epeolus variegatus. *Fabr., Panz., Latr.* Apis variegata. *Linné.*

Inhabits Europe, but is very local in Britain. I once met with this species in abundance in a sand-pit near Bexley, Kent.

** *Lateral divisions of the lip almost as long as the palpi. Body very villose in parts. Scutellum spinose. Superior wings with three submarginal cells.*

Genus 483. MELECTA. *Latr., Panz., Illig., Spinola, Leach.* Apis. *Linné, Kirby* (** a).

Maxillary palpi six-jointed, with five very distinct.

The insects of this genus are supposed to be parasitical.

Sp. 1. *Mel. punctata.* Latr.

Crocisa atra. *Jurine.* Apis punctata. *Kirby.*

Inhabits Europe. Is common near Swansea in South Wales.

STIRPS 2.—*Lip* with the apex generally hirsute, not inflected.

A. *Hinder feet of the females, with their tibiæ externally, and the first joint of the tarsi very hairy.*

a. *Maxillary palpi with more than four joints. Lip with its lateral divisions as long or longer than the labial palpi. Antennæ of the males very long.*

Genus 484. EUCERA. *Scop., Fabr., Latr., Panz., Spinola, Klug, Leach.* APIS. *Linné, Kirby* (** d. 1).

Maxillary palpi distinctly six-jointed: *superior wings* with two submarginal cells complete.

Sp. 1. *Eu. longicornis.*

Eucera longicornis. *Fabr., Panz., Latr., Leach.* Apis longicornis. *Linné, Kirby.*

Inhabits banks with a southern aspect.

* *Maxillary palpi with four joints or more. Lip with the lateral divisions shorter than the palpi. Superior wings with three submarginal cells complete: labial palpi setiform.*

Genus 485. ANTHOPHORA. *Latr., Spinola, Leach.*

Mandibles unidentated within: *maxillary palpi* six-jointed.

Sp. 1. *Anth. retusa.* (*Pl. 8. fig. 9.*)

Apis retusa. *Linné, Kirby.* Lasis pilipes. *Jurine.* Megilla pilipes. *Fabr.* Anthophora hirsuta. *Latr.* Anthophora retusa. *Leach.*

Inhabits sandy banks.

Genus 486. SAROPODA. *Latr., Leach.* MEGILLA. *Illig., Panz.,* HELIOPHILA. *Klug.* APIS. *Kirby.*

Mandibles unidentate within: *maxillary palpi* five-jointed.

Sp. 1. *Saro. rotundata.*

Megilla rotundata. *Panz.* Saropoda rotundata. *Latr., Leach.*

Inhabits flowers on sandy heaths.

B. *Hinder feet with the tibiæ and the first joint of the tarsi shortly hairy.*

* *Hinder tibiæ terminated by two spurs or heels: superior wings with three submarginal cells in all, complete, the last neither linear nor oblique.*

Genus 487. BOMBUS. *Latr., Fabr., Illig., Panz., Spinola, Klug, Leach.* APIS. *Linné, Kirby* (** e. 2). BREMUS. *Jurine.*

Labrum transverse: *proboscis* shorter than the body: *ocelli* disposed in a transverse straight line.

The *Bombi* usually nidificate in cavities beneath the ground, but many of the species (especially those of a fulvescent colour) construct their nest of moss on the surface. The females appear early

in the spring when the willows are in bloom. The males are most abundant in the autumn.

Sp. 1. *Bom. terrestris.*

Bombus terrestris. *Fabr., Latr., Leach.* Apis terrestris. *Linn.*

Inhabits Europe.

** *Hinder tibiæ without spurs or heels. Superior wings with two or three submarginal cells, the last oblique or linear.*

Genus 488. APIS *of authors.*

Hinder tarsi with their first joint long: *superior wings* with three submarginal cells complete, the last oblique and linear.

Sp. 1. *Apis mellifica* (hive bee).

Apis mellifica *of authors.*

Inhabits Europe.

Order XIV. RHIPIPTERA. *Latr., Leach.*

Order STREPSIPTERA. *Kirby.*

Order HYMENOPTERA. *Rossi.*

" Xenos, the genus serving as the type of this singular order of insects, was discovered by Rossi, who referred it without hesitation to the Hymenoptera, and placed it next to Ichneumon. Another genus of the same order was found by Kirby, and was described in his celebrated *Monographia Apum Angliæ* under the name of *Stylops*, with expressions of doubt as to its systematic situation. Latreille soon after received from De Brebisson a species of Stylops, and at the end of his *Genera Insectorum et Crustaceorum*, observes, that it seems to disturb our entomological systems, not being referable to any of the established orders. Professor Peck detected a new species of this group in America, and communicated it to Kirby, who considered it to constitute with his Stylops a peculiar order of insects, on which he gave a dissertation to the *Linnean Society of London*, which was published in the eleventh volume of their *Transactions*. I adopted the characters that were laid down by this learned entomologist, as well as the name *Strepsiptera*, by which it was designated. Since then Latreille has convinced me that the supposed elytra are but moveable processes attached to the anterior part of the thorax; whereas true elytra arise from the second segment of the trunk, and always more or less cover the wings, which these parts do not touch. Anxious to become acquainted with all the characters of the order, I commenced an examination of the mouth, and was soon convinced that the parts of it were far from being obsolete; but fearing to undertake the dissection, I submitted the specimen to the inspection of Savigny, from whose exact and almost infallible hand and eye I felt confident of gaining the desired infor-

mation. He observed that the mouth contains the whole of the usual parts which, under various modifications, exist in all insects: the mandibles are perfectly distinct from and unconnected with the maxillæ: the maxillæ are inserted behind, and somewhat below the mandibles, whose base they conceal; and the articulation of the labrum is very evident from its semitransparency." *Leach, Zool. Misc.* vol. iii.

Mr. Kirby, in the second volume of his *Monographia Apum Angliæ*, gives the following account of *Stylops Melitta*: "Upon this insect (*Melitta nigro-ænea*) I discovered, last spring, a very singular animal, which seems appropriated to the present genus. I had previously more than once observed upon other species something that I took to be a kind of *Acarus*, which appeared to be immovably fixed just at the inosculations of the dorsal segments of the abdomen; at length, finding three or four upon a specimen of *Melitta nigro-ænea*, I determined not to lose that opportunity of taking one off to examine and describe; but what was my astonishment when, upon my attempting to disengage it with a pin, I drew forth from the body of the *Melitta* a white fleshy larva, a quarter of an inch in length, the head of which I had mistaken for an *Acarus!* After I had examined one specimen, I attempted to extract a second; and the reader may imagine how greatly my astonishment was increased, when, after I had drawn it out but a little way, I saw its skin burst, and a head as black as ink, with large staring eyes and antennæ, consisting of two branches, break forth, and move itself briskly from side to side. It looked like a little imp of darkness just emerging from the infernal regions. My eagerness to set free from its confinement this extraordinary animal may be easily conjectured. Indeed I was impatient to become better acquainted with so singular a creature. When it was completely disengaged, and I had secured it from making its escape, I set myself to examine it as accurately as possible; and I found, after a careful inquiry, that I had not only got a non-descript, but also an insect of a new genus, whose very class seemed dubious." For further information on this Order I must refer the reader to the eleventh volume of the *Transactions of the Linnean Society*, *Sowerby's British Miscellany*, and *Leach's Zoological Miscellany*, vol. iii., all of which contain figures of the insects of this Order.

Order XV. DIPTERA. *Linné, Leach, Latr., &c.*

Class ANTLIATA. *Fabr.*

The insects composing this Order are distinguished from all other insects by the following characters. *Wings* two, naked, unprotected. *Halteres* (poisers or balancers) placed behind, and generally beneath

the wings: *head* distinct from the thorax by an evident interval: *proboscis* (rarely wanting) univalve: *tarsi* with two simple nails.

Besides these characters may be noted some others, which are common to almost all dipterous insects. The *mouth* is for the most part furnished with a rostrum having no articulations. *Thorax* composed of but one segment, always distinct from the abdomen.

Fam. I. TIPULIDÆ. *Leach.*

TIPULARIÆ. *Latreille.*

Antennæ with many joints, filiform or setaceous, longer than the head.

STIRPS 1.—*Ocelli* none: *antennæ* very hairy: *eyes* large: *rostrum* tubular and long.

Genus 489. CULEX *of authors.*

Sp. 1. *Cul. pipiens* of authors (the common gnat). (*Pl. 9. fig. 5.*)

Inhabits water in the larva state.

STIRPS 2.—*Ocelli* none: *antennæ* very hairy: *eyes* large: *rostrum* very short, terminated by two lips: *two anterior legs* at a distance from the others.

Genus 490. CORETHRA. *Meig., Illig., Latr., Leach.*

Antennæ fourteen-jointed; the basilar joints conic-ovoid; of the male with fasciculi of hairs; with simple hairs on the females, the two last joints attenuated, elongated.

Sp. 1. *Cor. culiciformis.* Meig.

Inhabits marshy places.

Genus 491. TANYPUS. *Meig., Illig., Latr., Leach.*

Antennæ fourteen-jointed, very plumose, moniliform, their extremities filiform; of the male, almost entirely moniliform, their last joint larger and ovoid in the female.

Sp. 1. *Tan. cinctus.*

Inhabits marshy places.

Genus 492. CHIRONOMUS. *Meig., Latr., Illig., Fabr., Leach.*

Antennæ twelve-jointed, very plumose, moniliform, with filiform extremities in the male, seven-jointed, the last joint elongate, cylindric in the female.

Sp. 1. *Chir. plumosus.* Meig.

Inhabits marshy places.

STIRPS 3.—*Ocelli* none: *antennæ* very hairy: *eyes* large: *rostrum* very short: *legs* at an equal distance from each other.

Genus 493. PSYCHODA. *Latr., Fabr., Leach.* TINEARIA. *Schell.* TRICHOPTERA. *Meig.*

Wings deflexed: *rostrum* shorter than the head. *antennæ* with fifteen or sixteen joints, of a globular form, covered with bundles of hairs.

Sp. 1. *Psy. phalænoides.* Latr.
Inhabits moist places.

Genus 494. CECIDOMYIA. *Latr., Illig., Meig., Leach.* OLIGOTROPHUS. *Latr.*
Wings incumbent: *antennæ* moniliform, hairy.
Sp. 1. *Cec. lutea.* Meig.

STIRPS 4.—*Ocelli* none: *antennæ* with short hairs: *eyes* oval, entire: *palpi* with their last joint very long: *lips* not inclined.

Genus 495. CTENOPHORA. *Meig., Illig., Latr., Fabr., Leach.* TANIPTERA. *Latr.*
Antennæ filiform; pectinated in the males, serrated in the females; the second joint short, the third elongate.
Sp. 1. *Cte. atrata.* Meig.
Inhabits moist places and meadows.

Genus 496. PEDICIA. *Latr., Leach.* LIMONIA. *Meig.*
Antennæ subsetaceous, simple; the two first joints larger, elongate; the three following turbinated, the three next globular, and the seven last slender, cylindric.
Sp. 1. *Ped. rivosa.*
Tipula rivosa. *Linné, Donovan.*
Inhabits moist places.

Genus 497. TIPULA *of authors.*
Antennæ subsetaceous, simple; the first joint largest, cylindric; the second subglobose; the next cylindric; the third elongate.
Sp. 1. *Tip. oleracea.* Linné. (*Pl.* 9. *fig.* 2.)
Inhabits Europe: the larva feeds on the roots of vegetables.

Fam. II. STRATIOMYDÆ. *Latreille.*

Haustellum with two setæ.

A. *Antennæ not terminated by a seta.*

STIRPS 1.—*Antennæ* with their last joints having eight rings.

Genus 498. BERIS. *Latr., Leach.*
Antennæ cylindric; the last joint cylindric-conic, elongate: *scutellum* with four or six spines: *palpi* very much shorter than the proboscis.
Sp. 1. *Beris nigritarsis.* Latr., Leach.
Inhabits palings and moist places.

STIRPS 2.—*Antennæ* with their last joint having from four to six rings, fusiform, cylindric-conic, or conic.

Genus 499. STRATIOMYS *of authors.*
Antennæ very much longer than the head; the first and third joints

very long, the latter subfusiform, compressed, with five rings: *thorax* bispinose.
Sp. 1. *Stra. Chamæleon.* (*Pl.* 12. *fig.* 4.)
Inhabits marshy places.

Genus 500. ODONTOMYIA. *Meig., Illig., Latr., Leach.*
Antennæ a little longer than the head; the last joint cylindric-conic, with six rings: *thorax* bispinose.
Sp. 1. *Odont. furcata.*
Inhabits marshy places.

Genus 501. CLITELLARIA. *Meig., Illig., Leach.* EPHIPPIUM. *Latr.*
Antennæ a little longer than the head, with their last joint conic, six-ringed, the two last forming a little style: *thorax* bispinous, the spines erect.
Sp. 1. *Clit. Ephippium.* Meig.
Inhabits the skirts of woods: is rare in Britain.

Genus 502. NEMOTELUS *of authors.*
Antennæ half the length of the head, the third joint fusiform, four-ringed: *proboscis* sheathed beneath a rostelliform process on which the antennæ are inserted.
Sp. 1. *Nem. uliginosus.* Fabr., Leach.
Inhabits flowers in meadows.

B. *Antennæ terminated by a style or seta.*

STIRPS 3.—*Scutellum* spined.

Genus 503. OXYCERA. *Meig., Illig., Latr., Leach.*
Antennæ with their first and second joints forming a subfusiform club, the third styliform.
Sp. 1. *Ox. Hydroleon.*
Inhabits marshes and meadows.

STIRPS 4.—*Scutellum* without spines.

Genus 504. VAPPO. *Latr., Fabr., Leach.* PACHYGASTER. *Meig.*
Antennæ with their two first joints transverse; the second with the third joints forming a sub-hemispheric head.
Sp. 1. *Vap. ater.*
Inhabits hedges in lanes near Darent Wood in July.

Genus 505. SARGUS *of authors.*
Antennæ terminated by a seta longer than the antennæ, their second joint elongate: *abdomen* generally oblong.
Sp. 1. *Sargus cupreus.*
Inhabits umbelliferous flowers in marshes.

Fam. III. TABANIDÆ. *Leach.*

TABANII. *Latreille.*

Haustellum with many setæ.

STIRPS 1.—*Wings* divaricating: *scutellum* without spines: *antennæ* as long or a little longer than the head.

Genus 506. TABANUS *of authors.*

Proboscis a little shorter than the head, terminated by large lips: *antennæ* as long as the head, the second joint cup-shaped, the third lunate-subulate, five-ringed: *ocelli* obsolete or wanting.

Sp. 1. *Tab. bovinus.*

Inhabits meadows.

STIRPS 2.—*Wings* divaricating: *scutellum* without spines: *antennæ* considerably longer than the head.

Genus 507. HÆMATOPOTA. *Meig., Illig., Latr., Fabr., Leach.*

Antennæ with the first joint elongate, incrassate, the second very short, cup-shaped; the third elongate-conic (longer than the first), tubulated, four-ringed: *ocelli* obsolete or wanting.

Sp. 1. *Hæm. pluvialis.* Meig. Tabanus pluvialis. *Linné.*

Inhabits woods and lanes, and is excessively troublesome to travellers.

Genus 508. CHRYSOPS. *Meig., Illig., Latr., Fabr., Leach.*

Antennæ with the two first joints of nearly an equal length, the third joint as long as both the others, cylindric-conic, five-ringed: *ocelli* three.

Sp. 1. *Chry. cæcutiens.*

Tabanus cæcutiens. *Linné.*

Inhabits woods, commons, and lanes.

a. *Proboscis (when at rest) entirely or partially prominent.*

* *Proboscis terminated by two large lips.*

Fam. IV. RHAGIONIDÆ. *Leach.*

RHAGIONIDÆ. *Latreille.*

Palpi prominent, cylindric-conic: *wings* divaricating: *antennæ* generally moniliform.

Genus 509. RHAGIO. *Oliv., Rossi, Cuv., &c.* LEPTIS. *Fabr.*

Antennæ moniliform, the third joint not ringed, but terminated by a seta: *palpi* porrect.

Sp. 1. *Rha. scolopaceus.* Latr.

Inhabits the trunks of trees.

Genus 510. ATHERIX. *Meig., Latr., Leach.*

Antennæ moniliform; the third joint not ringed, but terminated by a seta: *palpi* erect.

Sp. 1. *Ath. maculata.* Meig.

Inhabits borders of woods.

Fam. V. DOLYCHOPODÆ. *Leach.*

DOLYCHOPODES. *Latreille.*

Palpi prominent, lamelliform: *wings* incumbent: *antennæ* patelliform.

Genus 511. DOLYCHOPUS. *Latr., Fabr., Walck., Leach.*

Antennæ half the length of the head; the third joint trigonal, bearing a seta on its hinder part.

Sp. 1. *Dol. nobilitatus.* Fabr., Leach.

Inhabits moist places in woods and commons.

Fam. VI. MYDASIDÆ. *Leach.*

MYDASII. *Latreille.*

Palpi not prominent.

Genus 512. THEREVA. *Latr., Leach.*

Antennæ as long or longer than the head; the last joint ovoid-conic, with a distinct style terminated by a seta.

Sp. 1. *Ther. plebeia.*

Inhabits commons and woods.

** *Proboscis terminated by very small lips.*

Fam. VII. ASILIDÆ. *Leach.*

ASILICI. *Latreille.*

Body long: *wings* incumbent: *antennæ* three-jointed.

STIRPS 1.—*Tarsi* terminated by two claws, and two pulvilli: *antennæ* as long, or not much longer than the head.

Genus 513. LAPHRIA. *Meig., Illig., Fabr., Latr., Leach.*

Antennæ with their first joint longer than the second; the last suboval, without a style.

There is a British species of this genus, but I do not know its specific name.

Genus 514. ASILUS *of authors.* ERAX. *Scopoli.*

Antennæ with their first joint longer than the second; the last elongate-conic, terminated by a very distinct style.

Sp. 1. *Asi. crabroniformis.* Fabr., Leach. (*Pl. 9. fig. 9.*)

Inhabits commons and heaths.

Genus 515. DASYPOGON. *Meig., Illig., Latr., Leach, Fabr.*

Antennæ with their two first joints nearly equal; the last sub-cylindric, terminated by a minute, articuliform, conic style.

Sp. 1. *Dasyp. punctatus.* Meig., Leach.
Inhabits sandy commons.

STIRPS 2.—*Tarsi* terminated by two claws and two pulvilli: *antennæ* much longer than the head, inserted in a common footstalk.

Genus 516. DIOCTRIA. *Meig., Illig., Latr., Fabr., Leach.*
Sp. 1. *Dioc. Œlandica.* Fabr., Leach.
Inhabits the borders of woods.

STIRPS 3.—*Tarsi* terminated by three claws; pulvilli wanting.

Genus 517. GONYPES. *Latr., Leach.* LEPTOGASTER. *Meig.*
Abdomen very long, slender, thicker towards its extremity.
Sp. 1. *Gon. tipuloides.* Latr., Leach.
Inhabits ————.

Fam. VIII. EMPIDÆ. *Leach.*

EMPIDES. *Latreille.*

Body long: *wings* incumbent: *antennæ* two-jointed: *proboscis* perpendicular.

Genus 518. EMPIS *of authors.*
Antennæ three-jointed, the last joint terminated by a seta; *palpi* erect.
Sp. 1. *Empis Borealis.* Fabr.
Inhabits ————.

Fam. IX. ANTHRACIDÆ. *Leach.*

ANTHRACII. *Latreille.*

Body short: *wings* divaricating: *antennæ* distant, two or three-jointed: *head* as high as the thorax.

Genus 519. ANTHRAX *of authors.*
Palpi received into the cavity of the mouth: *proboscis* short, not porrect.
Sp. 1. *Anth. Hottentotta.*
Inhabits borders of woods on dry banks.

Fam. X. BOMBYLIDÆ. *Leach.*

BOMBYLIARIA. *Latreille.*

Body short: *wings* divaricating: *antennæ* contiguous, three-jointed: *head* lower than the thorax.

Genus 520. BOMBYLIUS *of authors.*
Proboscis longer than the head, pointed: *palpi* distinct: *antennæ* with their first joint much longer than the second.
Sp. 1. *Bomb. major* of authors. (*Pl. 9. fig. 10.*)
Inhabits open places in woods in the spring of the year.

Fam. XI. ACROCERIDÆ. *Leach.*

INFLATA. *Latreille.*

Body short as if inflated: *wings* divaricating: *antennæ* three- or two-jointed.

b. *Proboscis (when at rest) retractile within the cavity of the mouth.*

Genus 521. ACROCERA. *Meig., Latr., Leach.*

Proboscis obscure: *antennæ* inserted on the vertex; two-jointed, the last joint terminated by a seta.

There is a British species of this genus.

Genus 522. OGCODES. *Latr., Leach.* HENOPS. *Illig., Walck., Meig., Fabr.*

Proboscis obscure: *antennæ* inserted anteriorly over the cavity of the mouth; two-jointed, the last joint terminated by a seta.

Sp. 1. *Og. gibbosus.* Latr., Leach.

Inhabits Germany and England.

Fam. XII. SYRPHIDÆ. *Leach.*

SYRPHIÆ. *Latreille.*

B. *Haustellum with two setæ.*

STIRPS 1.—*Head* anteriorly conic-produced: *antennæ* much shorter than the head, placed in a common elevation: *oval cavity* on the nasal prominence: *wings* divaricating.

Genus 523. RHINGIA *of authors.*

Head anteriorly much produced, terminated by the proboscis.

Sp. 1. *Rhin. rostrata* of authors.

Inhabits flowers.

Genus 524. SERICOMYIA. *Latr., Leach.*

Antennæ with their setæ plumose, inserted at the dorsal juncture of the second and third joints; the last joint of the antennæ suborbicular.

Sp. 1. *Ser. Lapponum.* Latr., Leach.

Inhabits marshes, especially the bogs of Dartmoor, and the north of England, Scotland, and Ireland.

Genus 525. VOLUCELLA. *Geoff., Schæff., Latr., Leach.* PTEROCERA. *Meig.*

Antennæ with their last joint elongate; seta plumose, inserted at the dorsal juncture of the second and third joint.

Sp. 1. *Vol. pellucens.* Latr., Leach.

Inhabits woods in June and July.

Genus 526. ERISTALIS. *Latr., Fabr., Leach.* HELIOPHILUS. *Meig., Illig.*

Antennæ contiguous at their base, their last joint broader than long;

seta (simple or slightly plumose) inserted beyond the dorsal junction of the second and third joints: *head* anteriorly distinctly rostriform.

Sp. 1. *Erist. Narcissi.*

Inhabits flowers in marshes.

Genus 527. HELOPHILUS. *Leach.* ELOPHILUS. *Meig., Illig., Latr.*

Antennæ contiguous at their base, their last joint broader than long; *seta* (simple or slightly plumose) inserted beyond the dorsal juncture of the second and third joints; head anteriorly distinctly rostriform.

Sp. 1. *Hel. tenax.* Latr., Leach.

Inhabits hedges, and is very common.

Genus 528. SYRPHUS *of authors.*

Antennæ separate at their base, their last joint suborbiculate: *seta* inserted beyond the dorsal junction of the second and third joints: *abdomen* elongate-subquadrate, gradually somewhat narrower towards its extremity.

Sp. 1. *Syr. Pyrastri.* Fabr.

Inhabits flowers.

Genus 529. DOROS. *Meig., Illig., Leach.*

Antennæ separate at their base; their last joint suborbiculate: *seta* inserted beyond the dorsal juncture of the second and third joints: *abdomen* subovate-trigonal; the length double the breadth.

Sp. 1. *Doros conopseus.*

Milesia conopsea. *Fabr.*

Inhabits fields, but is very rare.

STIRPS 2.—*Head* not anteriorly conic-produced: *antennæ* much longer than the head, placed on a common elevation: *oval cavity* on the nasal prominence: *wings* deflexed.

Genus 530. CHRYSOTOXUM. *Meig., Latr., Leach.*

Antennæ subcylindric, their last joint having a seta at its base.

Sp. 1. *Chrys. arcuatum.*

Musca arcuata. *Linné.*

Inhabits flowers.

Genus 531. CERIA. *Fabr., Latr., Illig., Meig., Leach.*

Antennæ with their first and second joints forming an oval mass terminated by a style.

There is one British species, that does not seem to have been described.

STIRPS 3.—*Head* not anteriorly produced: *nasal* part straight, not prominent: *antennæ* inserted separately, very much longer than the head: *wings* deflexed.

Genus 532. APHRITIS. *Latr., Leach.* MICRODON. *Meig.*

Antennæ with their third joint conic, elongate, its base bearing a seta.

Sp. 1. *Aphr. auro-pubescens.* Latr., Leach.
Inhabits heaths.

Stirps 4.—*Head* not anteriorly produced; *nasal* part straight, not prominent: *antennæ* inserted separately, very much longer than the head: *wings* deflexed.

Genus 533. MILESIA. *Latr., Leach.*

Hinder thighs (of the males at least) large, very thick, elongate-ovato, denticulated beneath: *antennæ* with their last joint much compressed: *abdomen* trigonate.
Sp. 1. *Mil. annulata.* Leach.
Inhabits borders of woods.

Fam. XIII. Conopsidæ. *Leach.*

Conopsarii. *Latreille.*

Proboscis prominent, nearly cylindric or conic, without any remarkable dilatation: *antennæ* with their second joint as long or longer than the third, forming with it a fusiform or subovate-compressed club: *body* elongate.

Genus 534. CONOPS *of authors.*

Proboscis porrect: *ocelli* none: *antennæ* very much longer than the head: *apex* fusiform.
Sp. 1. *Con. aculeata.* Fabr., Leach.
Inhabits hedges and flowers.

Genus 535. ZODION. *Latr., Leach.*

Proboscis porrect: *ocelli* three: *antennæ* shorter than the head: *apex* subovoid.
Sp. 1. *Zo. conopsoides.* Latr., Leach.
Inhabits umbelliferous plants. Taken by Dr. Leach in Darent Wood in July.

Genus 536. MYOPA *of authors.* Stomoxoides. *Schæffer.*

Proboscis very long, filiform, geniculated beneath twice.

Sp. 1. *My. dorsalis.* Fabr., Leach.
Inhabits hedges and gardens.

Genus 537. BUCENTES. *Latr., Leach.*

Proboscis geniculated twice.

Sp. 1. *Buc. cinereus.* Latr., Leach.
Inhabits France and England.

Genus 538. STOMOXYS *of authors.*

Proboscis geniculated once.

Sp. 1. *Stom. calcitrans* of authors. (*Pl. 9. fig. 7.*)
Inhabits commons in the autumn.

Fam. XIV. MUSCIDÆ. *Leach.*

MUSCIDES. *Latreille.*

Proboscis retractile, terminated by a very remarkable dilatation.

STIRPS 1.—*Antennæ* inserted near the front, setigerous: *palpi* internal: *halteres* visible: *anterior legs* simple: *head* not subglobose: *hinder legs* not larger than the rest: *wings* horizontal: *eyes* sessile.

Genus 539. MOCILLUS. *Latr., Leach.*

Antennæ shorter than the head: *head* hemispheric.

Sp. 1. *Moc. cellarius.* Linné, Leach.

Inhabits wine-vaults.

STIRPS 2.—*Antennæ* inserted near the front, setigerous: *palpi* internal: *halteres* visible: *anterior legs* simple: *head* not subglobose: *hinder legs* not longer than the rest: *wings* divaricating: *eyes* simple: *vertex* narrow.

Genus 540. TEPHRITIS. *Latr., Fabr., Illig., Leach.* TRYPETA. *Meig.* DACUS. *Fabr.*

Thorax cylindric: *proboscis* entirely retractile.

Sp. 1. *Teph. Cardui.* Latr., Leach.

Inhabits thistles.

STIRPS 3.—*Antennæ* inserted near the upper part of the head, setigerous: *palpi* internal: *halteres* visible: *anterior legs* simple: *head* not often subglobose: *hinder legs* not larger than the rest: *wings* deflexed: *eyes* sessile: *vertex* broad.

Genus 541. CALOBATA. *Meig., Illig., Latr., Fabr., Leach.*

Antennæ very much shorter than the head, the third joint longer than the second: *body* long, filiform: *legs* long, filiform.

Sp. 1. *Cal. filiformis.* Latr., Leach.

Inhabits France and England.

Genus 542. SEPEDON. *Latr., Leach.* BACCA. *Fabr.* MULIO. *Schellenberg.*

Antennæ very much longer than the head, inserted on an elevation; the second joint very long, cylindric.

Sp. 1. *Sep. palustris.* Latr.

Inhabits marshes.

Genus 543. LOXOCERA. *Meig., Illig., Latr., Fabr., Leach.*

Antennæ very much longer than the head; last joint linear: *abdomen* narrow, linear.

Sp. 1. *Lox. Ichneumonia.* Meig.

Inhabits flowers in marshes.

Genus 544. SCATOPHAGA. *Meig., Latr., Leach.* PYROPA. *Illig.*

Antennæ shorter than the head: *head* round, sub-globose: *vertex* horizontal: *body* very much elongated.

Sp. 1. *Scat. merdaria.* Latr., Leach.
Inhabits cow-dung.

Genus 545. ANTHOMYIA. *Meig., Illig., Latr., Leach.*
Antennæ shorter than the head: *head* hemispheric, transverse: *vertex* inclined: *body* not much lengthened.
Sp. 1. *Anth. pluvialis.* Latr.
Inhabits woods.

STIRPS 4.—*Antennæ* inserted near the upper part of the head, not setigerous: *palpi* internal: *halteres* visible: *anterior legs* differing in form from the others.

Genus 546. PIPUNCULUS. *Latr., Leach.*
Antennæ two-jointed, the last joint subulated at its extremity: *anterior legs* simple.
Sp. 1. *Pip. campestris.* Latr.
Inhabits meadows.

Genus 547. SCENOPINUS. *Latr., Fabr., Leach.* CONA. *Schellenberg.*
Antennæ three-jointed: *anterior legs* simple.

Sp. 1. *Scen. niger.* Latr.
Inhabits houses near woods.

Genus 548. OCHTHERA. *Latr., Leach.* MACROCHIRA. *Meig.*
Anterior legs raptorious: *antennæ* terminated by a bearded seta.
Sp. 1. *Och. Mantis.* Latr.
Once taken in Devon by Dr. Leach.

STIRPS 5.—*Antennæ* frontal, very short: *palpi* internal: *halteres* entirely or partly concealed: *wings* divaricating.

Genus 549. PHASIA. *Latr., Leach.* THEREVA. *Fabr., Walck., Meig., Panz.*
Antennæ distant, sub-parallel, last joint subquadrate, with a biarticulate seta: (*body* short: *abdomen* depressed, semicircular: *wings* large.)
Sp. 1. *Phas. variabilis.* Leach.
Musca hemiptera. *Linné.*

STIRPS 6.—*Antennæ* frontal, as long as the face: *palpi* internal, or partly concealed: *wings* divaricating.

Genus 550. MUSCA *of authors.*
Antennæ with the third joint very much longer than the others: *abdomen* moderately long, subacuminate.
Sp. 1. *Mus. vomitoria* (common blue-bottle fly). *Latr.*
Inhabits every where. It is the insect that deposits its eggs on meat, which are commonly denominated fly-blows.

Genus 551. OCYPTERYX. *Leach.* OCYPTERA. *Latr.* EXORISTA. *Meig.* ERIOTHRIX. *Meig.*

Antennæ with their last joint longer than the others: *abdomen* distinctly annulated, rounded.

Sp. 1. *Ocypt. lateralis.* Leach.

Inhabits woods.

Genus 552. GYMNOSOMA. *Meig., Leach.*

Antennæ with their last joint longer than the others: *abdomen* semicircular, subuniarticulate.

Sp. 1. *Gym. rotundata.* Meig.

Genus 553. ECHINOMYIA. *Dum., Latr., Leach.* TACHINA. *Meig., Fabr.*

Antennæ with their second joint longer than the others: *abdomen* subglobose, and very bristly.

Sp. 1. *Ech. grossa.* Latr.

Inhabits woods.

Genus 554. TACHINA. *Leach.*

Antennæ with their second joint longer than the others: *abdomen* ovate, rather bristly.

Sp. 1. *Tach. fera.*

Inhabits the skirts and pathways in woods.

Fam. XV. ŒSTRIDÆ. *Leach.*

MUSCIDES, I. *Latreille.* ASTOMATA. *Duméril.*

The larvæ of all the insects of this family reside in the frontal sinuses under the skin, or in the stomachs of graminivorous mammalia. Their curious œconomy has been admirably detailed in the third volume of the *Transactions of the Linnean Society of London* by Mr. Bracy Clark, who has lately republished his Dissertation under the title *An Essay on the Bots of Horses and other Animals. London*, 1815.

Genus 555. ŒSTRUS *of authors.*

Wings with the two exterior cells complete, the other hinder cells terminal: *thorax* with its surface unequal: *abdomen* with its point deflexed; of the female acuminate: *eyes* distant; of the male closer than those of the female.

* *Thorax roughish, with elevated points.*

The larvæ of the species of this division of the genus inhabit the frontal sinuses.

Sp. 1. *Œstrus Ovis.*

Inhabits the frontal sinuses of the sheep in the larva state; the perfect insect is found on walls and stones in the vicinity of sheepfolds.

** *Thorax with square shining naked spots.*

The larvæ of this section reside beneath the skin of herbivorous mammalia.

Sp. 2. *Œstrus Bovis.* (*Pl.* 9. *fig.* 1.)

"The larvæ of this species, named by the peasants Warbles, or Wornils, are found beneath the skin on the backs and loins of oxen, causing tumours as large as pullets' eggs. The perfect insect, or gad-fly, appears about the end of summer, and is much dreaded by cattle."

Genus 556. GASTEROPHILUS. *Leach.* ŒSTRUS *of authors.*

Wings with all the hinder cells terminal: *thorax* with its surfaces smooth: *abdomen* with its extremities inflexed; of the female, very much elongated and attenuated: *eyes* in both sexes equally distant.

"The larvæ of the *Gasterophili*, as their name imports, inhabit the stomach of herbivorous quadrupeds, and are called Bots; the perfect insect Bot-flies."

Sp. 1. *Gast. Equi.* Leach, Trans. Wern. Nat. Hist. Soc. vol. ii.
Œstrus Bovis. *Linné.* Œstrus Equi. *Clark.*
The larvæ inhabit the horse.

Order XVI. OMALOPTERA. *Leach.*

DIPTERA *of authors.*

Mouth with mandibles and maxillæ: *lip* simple: *wings* two or none (*Metamorphosis* coarctate).

Fam. I. HIPPOBOSCIDÆ. *Leach.*

Head divided from the thorax by a suture at least: *proboscis* provided with two valves: *nails* of the tarsi double or treble.

"The larvæ are nourished within the abdomen of the mother, and, when full grown, are passed in the form of an oviform pupa, covered with the indurated skin of the larvæ." In the second volume of the *Transactions of the Wernerian Natural History Society of Edinburgh* is given a most excellent paper on the insects of this family by Dr. Leach. The following are natives of this country:

STIRPS 1.—*Wings* two; the hinder cell only commenced: *thorax* anteriorly entire, acuminated.

Genus 557. HIPPOBOSCA *of authors.* NIRMOMYIA. *Nitzsch.*

Ocelli none.

Sp. 1. *Hipp. equina.* Linné, Leach. (Forest-fly.) (*Pl.* 9. *fig.* 11.)
Inhabits the horse. In the New Forest of Hampshire they abound in a most astonishing degree. I have obtained from the flanks of one horse six handfulls, which consisted of upwards of a hundred spe-

cimens. Mr. Bentley informs me, from observations he made in the summer of 1818, while in Hampshire, that the *Hippoboscæ* are found in a considerably greater abundance on white and light-coloured horses than those of a black and dark colour; and this observation was confirmed by the stable-keepers in the vicinity of the Forest.

STIRPS 2.—*Wings* two; the hinder cells complete: *thorax* anteriorly notched for the reception of the head.

* *Wings of nearly an equal breadth throughout.*

Genus 558. ORNITHOMYIA. *Latr., Oliv., Leach.*
Ocelli three, situated in foveolæ.
Sp. 1. *Ornith. avicularia.* Leach.
Hippobosca avicularia. *Linné.*
Inhabits the black grouse and tit-pippit.

** *Wings acuminated.*

Genus 559. CRATERINA. *Olfers.* STENEPTERYX. *Leach.*
Ocelli three, situated in foveolæ.
Sp. 1. *Cr. Hirundinis.* Olfers. *Stenepteryx Hirundinis.* Leach.
Hippobosca Hirundinis. *Linné.*
Inhabits the nests and bodies of the house-swallow.

Genus 560. OXYPTERUM. *Kirby, Leach.*
Ocelli none.
Sp. 1. *Oxypt. Kirbyanum.* Leach.
Inhabits England.

STIRPS 3.—*Wings* none: *thorax* anteriorly notched for the reception of the head.

Genus 561. MELOPHAGUS. *Latr., Leach, Olfers.* MELOPHILA. *Nitzsch.*
Ocelli none.
Sp. 1. *Mel. ovinus.* Latr., Leach.
Hippobosca ovina. *Linné.*
Inhabits the sheep.

Fam. II. NYCTERIBIDÆ. *Leach.*

Head united with the thorax: *nails* of the tarsi simple didactyle.

Genus 562. NYCTERIBIA. *Latr., Leach.* PHTHIRIDIUM. *Hermann, Olfers.*
Thorax depressed: *mouth* situated on the back at the anterior part of the thorax: *legs* six, placed at the sides; femora with two joints, the second long and compressed: *tibiæ* with two joints, the first longest and compressed, the second joint slender and arcuated: *tarsi* with

five articulations, the first three gradually shorter, the fourth longer and wider, the fifth shorter, and receiving the didactyle claw: *abdomen* in both sexes with eight joints: FEMALE? with the first segment of the back produced, the fourth and remainder partly concealed, the last segment at its apex furnished with a setigerous style: MALE? with the last segment largest.

Its situation was referred to the *Diptera* by Latreille, who observes, in a note, that it may probably be found hereafter to constitute a peculiar Order of insects. From the apparent want of antennæ, and from the confluence of the head and thorax, Dr. Leach placed it amongst the *Arachnoïda*, in a division by itself. Its mode of propagation is unknown. Hermann considered the sexual as specific differences.

Sp. 1. *Nyct. Hermanni.*

Phthiridium biarticulatum. *Herm. Mem. Apt.* 124. *pl.* 6. *fig.* 1. *Olfers*, 80. Hippobosca Vespertilionis. *Schr. Fn. Brit.* 2587. Phthiridium Hermanni. *Leach, Encycl. Brit. Supp.* vol. i. 446. *pl.* 23.—*Zool. Misc.* iii. 55, *pl.* 144.

In the plate given in the third volume of the *Miscellany*, representations are given of the sexes very much magnified, with one leg still more highly increased by the aid of the microscope. The second joint of each tibia is longer than all the joints of the tarsus taken together.

Inhabits the greater and lesser horse-shoe bat.

ARTICULATED ANIMALS

having articulated Legs, of doubtful Situation.

The singular animals that compose this group inhabit the sea. The females are furnished with two palpiform organs inserted at the base of the rostrum, on which parts they carry their eggs, attached in globular masses.

The legs are composed of three-jointed coxæ, one-jointed thighs, two-jointed tibiæ and tarsi, the latter part furnished with claws.

Order PODOSOMATA.

Body four-jointed, and formed as it were of the junction of the coxæ: *mouth* tubular: *eyes* four, placed on a common tubercle: *legs* eight.

The natural situation of this assemblage of animals is still doubtful, as very little is known concerning them: they were referred to the ARACHNOÏDA by Dr. Leach, in *Brewster's Edin. Encycl.* vol. vii. and also in the article *Annulosa* in the *Supp. to Encycl. Brit.* vol. i.; since which time, from a further examination of their characters, he is by no means satisfied as to their position.

Fam. I. PYCNOGONIDÆ. *Leach.*

Mandibles none.

Genus 1. PYCNOGONUM *of authors.*

Legs rather strong: *coxæ* with subequal joints: *tibiæ* with the first joint largest: *tarsi* with the first joint very small: *claws* simple, strong, acute.

Egg-bearing organs ten-jointed, the last joint very acute, unguiform, attached to the first joint of the body at the base of the rostrum.

Sp. 1. *Pyc. Balænarum.* Fabr., Latr., Leach, Edin. Encycl.—Supp. to Encycl. Brit. vol. i. pl. 23. Trans. Linn. Soc. xi. 388.

Inhabits the European ocean. It is not uncommon in Plymouth Sound, where it is taken by the trawl fishers.

Genus 2. PHOXICHILUS. *Latr., Leach.*

Legs very slender: *coxæ* with the middle joint longest, subclavate: *tibiæ* with the first joint shorter: *tarsi* with the first joint very small: *claws* double, unequal, the longer one acute.

Egg-bearing organs seven-jointed, the last joint tuberculiform, inserted at the base of the rostrum, one on each side, and attached to the first segment of the body.

The specific characters of none of the species are yet ascertained. Phalangium hirsutum, *Montagu, Trans. Linn. Soc.* ix. *tab.* 5. *fig.* 7., belongs to this genus.

Fam. II. NYMPHONIDÆ. *Leach.*

Mandibles two, biarticulate, didactyle.

Genus 3. NYMPHUM. *Lam., Leach.* NYMPHON. *Fabr., Latr.* PYCNOGONUM. *Müller.*

Mandibles longer than the rostrum, with equal joints, the fingers curved, meeting along their whole length and abruptly hooked at their extremities: *palpi* six-jointed, the second joint elongate, the sixth very small: *legs* very slender: *coxæ* with the middle joint longest: *tibiæ* with the second joint rather longest: *tarsi* with the first joint somewhat shortest: *claws* simple.

Egg-bearing organs ten-jointed, inserted behind the rostrum almost under the anterior pair of legs.

Sp. 1. *Nym. gracile.* Cinereous: thighs cylindric.

Nymphum gracile. *Leach, Zool. Misc.* i. 45. *tab.* 19. *fig.* 1.—*Supp. to Encycl. Brit.* i. 433. *pl.* 23.

"Inhabits the British seas everywhere: but as it never attains the size of the *Phalangium*, misnamed by Linné *grossipes* (which is figured by Ström in his History of Sondmor, 208. *tab.* 2. *fig.* 16), it is doubtful if it be the same species: but as the Linnean name is so inapplicable, little fault can be found with the more appropriate name for which it has been exchanged."

Sp. 2. *Nymph. femoratum.* Reddish; thighs dilated and compressed.

Nymphum femoratum. *Leach, Zool. Misc.* i. 45. *tab.* 19. *fig.* 2.—*Supp. to Encycl. Brit.* i. 433.

Inhabits the shores on the southern coast of Devon.

APPARATUS

USED BY

ENTOMOLOGISTS.

THE apparatus used for taking insects are few and simple: the following are indispensable, and will be found to answer every necessary purpose.

A NET, similar in its construction to a bat fowling-net; this is generally made of fine gauze or coarse muslin, and may be either dyed green or remain a white; the advantage of the latter colour is, that minute insects are sooner discovered than if the net is green, but a green net must be used for Mothing. The net rods should be made of ash, beech, hazel, or any tough wood; each rod should be about five feet in length, perfectly round, smooth, and gradually tapering. *Pl.* 11. *fig.* 1. one of the rods complete: *a*, the cross-piece, which should be of cane, and fit into the angulated ferrule: *b*, the rod, must be divided into three or four pieces for the convenience of being carried in the pocket; each joint at the upper part must have a ferrule riveted on as at *d*: the joints are best made with a notch or check, as at *c*, which prevents the upper part from twisting: when fitted together, care must be taken, in fitting the joints to the brass tubes, that they are made exact, or otherwise they will be subject to shake and continually coming to pieces.

The net (*fig.* 2.) must be bound entirely round with a broad welt, doubled to form a groove, into which the rods are to slip. In the centre of the upper part, beneath the *fig.* 2., must be a small piece of wash-leather to form a hinge; this must be sewed round the welt, divided and sewed in the middle to prevent the cross pieces from slipping over each other. *b*, about four inches of the gauze turned up to form a bag. *c*. strings passing through the staple *e*, *fig.* 1. to draw the net tight on each side; the handles are to be held one in each hand when the net is used.

With this net it is intended to take insects on the wing; and for that purpose it answers very effectually, as it may be instantly opened or folded together, and secure the insect between: even the smallest insects cannot escape if the net is not damaged, and the gauze is fine. It also answers well for collecting caterpillars, and many of the coleopterous insects that are seldom found on the wing; in using it for

this purpose, the Entomologist must hold it expanded under the trees or bushes, and with a stout stick beat the branches, by which means a vast number of insects will fall into the net, and many hundreds may be taken in a single day.

A Hoop, or *Landing-net* (*pl.* 11. *fig.* 4.)—This is generally used in taking aquatic insects, but will be found very useful to sweep the grass and low herbage, for many coleopterous and other insects are taken in no other way:—the socket may be of such size that two joints of the net-rod will form a convenient handle, or a walking-stick may be used.

The Digger (*pl.* 11. *fig.* 5.)—This is a piece of iron or steel, of about six inches long, fitted into a wooden handle, and is used for collecting the pupæ of *Lepidoptera* at the roots of trees, also for stripping off the bark, under which many exceedingly rare insects are frequently found. The digger is best with an arrow-headed point, as at a.

A Phial (*fig.* 6.) or tin bottle, useful in collecting coleopterous insects. In this bottle a tube is introduced, which extends a little way down the bottle to prevent the insects from escaping: in small phials, a quill passed through the cork, with a cork stopper, answers extremely well for small insects.

A pair of brass Pliers (*fig.* 7.) for taking up small insects from roots of grass, &c.

A Setting Needle (*fig.* 8 and 9.), fixed in a pencil stick, for the purpose of extending the parts of insects; at the other end of the stick a camel's hair pencil is fixed, to remove any dirt or dust which may be on the insects; and if the pencil is drawn through the lips, to bring the end to a fine point, it may be frequently useful to display the antennæ, palpi, &c. of the minute species.

A Pair of Forceps (*fig.* 10.)—These are about eight or ten inches in length; are made of steel. The fans are either of a circular or hexangular form, and are covered with fine gauze; they are held and moved as a pair of scissors, and are extremely useful in taking bees, wasps, &c. If an insect is on a leaf, both leaf and insect may be inclosed in the forceps; or if lodged against the trunk of a tree, paling, or any flat surface, they may very conveniently be entrapped; if of the Lepidoptera order, the insect should be pressed with the thumb-nail pretty smartly on the thorax, but not so as to crush it; it may then be shaken into the hand, and a pin passed through the thorax, (this means is also used with moths, &c. when taken in the net;) or a pin may be passed through the thorax while the insect is confined between the gauze, and then carefully taken out by the pin.

Pocket Collecting Box.—The Entomologist must also furnish himself with a chip-box, of a convenient size for the pocket, lined at the top and bottom with cork, to stick those insects in that would injure themselves by being loose in a box: in this some camphor, con-

fined in a small gauze-bag, should constantly be kept, as the scent from it not only tends to hasten the death of the insect, but stupifies and prevents their fluttering.

Pins.—Those used for the Crustacea are generally large, some being four inches in length;—the size of the pin should correspond with the size of the animal. Those used for insects are of two sizes, small lace, and a much finer made only for this purpose. The pins used for setting should be longer than those used for piercing the insects, and will be found much more convenient.

Pill Boxes.—Of these the Entomologist should possess three or four dozen:—they are generally used for the smaller species of Lepidoptera, such as the Tineæ, Tortrices, &c. In collecting the latter, no more than one specimen should be inclosed; and such boxes as contain them require some care in carrying, to prevent the insect being shaken, which would injure the wings: carrying them in the hat, with a handkerchief over them, to prevent their rolling about, is by far the safest way.

Quills will also be found useful; these must have one end carefully stopped up with cork or cement, the mouth with a cork stopper. It is also advisable to tie a piece of waxed sewing silk round each end, to prevent them from splitting:—the Entomologist may in these secure with safety the most minute insects.

Pocket Larvæ Box.—This is essential in collecting for the safe conveyance of Caterpillars, and is merely a chip-box, with a piece cut out of the top and bottom, and covered with gauze, for the free admission of air: a few leaves of the plants on which the caterpillars are found must be put in the box with them. Further instruction for the method of breeding insects is given below.

Setting Boards.—These are simply a thin deal board of a convenient size, and covered with soft cork. The cork must be perfectly even on the surface, and covered with white paper. As many insects require much time in drying, I should recommend the Entomologist to have a small box of about a foot square, with slips of wood nailed on the inside for the boards to slide on, and at the same time at a sufficient distance from each other, that the pins may not be displaced or moved in putting the boards in, or drawing them out; this should be kept in a dry place, and furnished with a door covered with fine muslin to admit the air, and exclude the dust.

Braces.—These are merely slips of card, used for confining the wings of insects whilst drying, as shown in *plate* 12.

Breeding Cages are used for rearing insects from Caterpillars, and may be made of wainscot, (deal is objectionable, as the scent from the turpentine is liable to kill the larvæ,) in the form represented in *pl.* 11. *fig.* 3, with the sides and front covered with gauze. *b* a small square box or tube, for the reception of a phial of water, in which the stalks

of the plants may be put for the caterpillars to feed on. The most convenient size of the cages is about eight inches in breadth, four deep, and one foot in height; they should never contain but one kind of caterpillar, as some species devour others; and indeed, if left without food, will devour those of their own kind also. At the bottom of each case must be a quantity of earth, about two inches deep; with the earth should be mixed a little sand, and some of the fine mould frequently found in the bodies of old trees; this will prevent in a great measure the earth drying up into hard lumps or clods. The most certain way of breeding insects is to keep the cages in a cool and moist place, as in a cellar or out-house; for a great number of caterpillars change into the pupa state several inches beneath the surface of the earth, and if kept too dry, the earth about them will absorb the nutritive moisture from the animal, thereby not only weakening it, but hardening the shell in which it is inclosed, so that its strength will be insufficient to burst the case when it should come forth, and in which it must die, as many have done, occasioned entirely by this mismanagement of them.

Some years produce a greater quantity of caterpillars than others, and keeping each kind by themselves would require an immense number of cages, and much time in changing the food, and paying a proper attention to them. It is a common practice to have a breeding cage of larger dimensions, by which means a great number of caterpillars may be fed in one cage, in which a variety of food may be put, but must be taken away and replaced with fresh plants every second or third day, for this tends greatly to the obtaining of fine specimens of the perfect insect.

The larvæ of many insects that feed beneath the surface of the earth may be bred in the following manner: Let any box that is about three or four feet square, and two or three feet deep, be lined or covered externally with tin, and bore through the sides and bottom a number of very minute holes: put into this box a quantity of earth that is replete with such vegetables as the caterpillars subsist on, and sink it into a bed of earth, so that the surface may be exposed to the different changes of the weather: the lid should be covered with brass or iron net-work, to prevent their escape.

Cabinet.—In the present advanced state of Entomology, a collection of British insects requires a cabinet of from 50 to 100 drawers, which are generally about fourteen or fifteen inches in length and breadth, and about two inches in depth; the cork with which the bottoms are to be lined must be chosen as free from cracks and knots as possible, and filed, or cut very level, and be about the sixth of an inch in substance. The top of every drawer must be glazed, to prevent the admission of dust or air; the glass is usually fitted into a frame of the same size as the drawer, and is made to let in on a rabbet.

The best method for a young Entomologist is to obtain a cabinet of about thirty drawers, arranged in two tiers, and covered in with folding doors. There is a great convenience in this size, as the cabinets are rendered more portable; and cabinets may be added of the same size, as the collection increases, without injuring the uniformity, may be placed on each other, and carried to any extent. It is immaterial whether the cabinet is made of mahogany or wainscot; sometimes they are made of cedar wood, but seldom of deal or any other wood that is soft; small holes or cells must be made on the inside of the fronts for camphor.

Corking of Drawers.—The readiest way is to buy the cork prepared, which may be obtained at most of the cork-cutters; but this will be found expensive for large cabinets. I have generally bought it in the rough state, and cut it into strips about three inches wide (the length is immaterial if the method advised hereafter is pursued); these strips must be fixed in a vice, and, if the substance of the cork will admit, split down the middle with a fine saw, (greasing the saw must be avoided as much as possible, as it will stain the paper used for covering it afterwards;) the out or black side is to be rasped down to a certain smoothness, as well as the middle or inside. Having reduced the slips to about three-eighths of an inch in thickness, glue each piece (the darkest or worst side) on a sheet of brown or cartridge paper; this should be laid on a deal board about three feet in length, and the width required for the drawer or box: a few fine nails or brads must be driven through each piece of cork, to keep it firm and in its place until the glue be dried: by this means sheets of cork may be formed of the size of the drawer. All the irregularities must be filed or rasped down quite even, and the whole surface rendered perfectly smooth by rubbing it over with pumice-stone: the sheet, thus formed and finished, must be glued into the drawers, to prevent its warping; some weights must be equally distributed over the cork, that it may adhere firmly to the bottom of the drawer: when quite dry, the weights must be removed, and the cork covered with paper, which should be of the finest quality, but not very stout; the paste should soak well into the paper previous to being laid over the cork, which, if smoothly laid on, and gently rubbed over with a clean cloth or soft paper, will be rendered perfectly smooth and tight when dry.

It is absolutely necessary that the cabinets should be kept in a dry situation, otherwise the insects will become mouldy on the antennæ, legs, &c. This evil will also occur if the insect is put in the cabinet before it is thoroughly dry. Should an insect at any time become mouldy, a camel's hair pencil dipped in clean spirits of wine, in which a little camphor is dissolved, will soon clean it; but the insect must be dried in a warm place before being again placed in the cabinet.

If a sufficient quantity of camphor is not constantly kept in the drawers, the insects will soon be destroyed by mites: where these exist, they are easily discerned by the dust which is under the insects: camphor must be immediately put in the drawers, and the insects taken out, (the dust being brushed off by a fine soft camel's hair pencil) and baked by the fire; care must be had that too great a heat is not applied, as it will utterly destroy the specimen.

STORE BOXES.—The neatest method for these is to make them about a foot square, the top and bottom about two inches deep, on the principle of back-gammon boards; the inside must be lined with cork, and, if with a hinge and neatly covered with paper or painted, they may be kept very conveniently on a shelf in an upright position like books, and lettered accordingly.

METHOD OF COLLECTING INSECTS.

Insects are so various in their habits that they may be found in every part of the world, at all seasons of the year, and in every situation. As some parts are more congenial to their nature than others, I shall state the best methods of searching in those places which in general are the most profitable to the Entomologist.

WOODS, HEDGES, and LANES.—These situations produce by far the greatest portion of insects. In woods, the Entomologist must beat the branches of the trees into his folding net, and must select for this purpose open paths, the skirts, &c. The trunks of trees, gates, and felled timber, should be carefully examined, as many of the Lepidoptera and Coleopterous insects are found in no other situations. Many rare and very beautiful insects are found in the hedges, in lanes, as also in the nettles, &c. which grow under them: these should be well beat, especially when the white thorn is in bloom in the months of May and June. Should the reader collect only for the microscope, he need not go to the trouble or expense of a net, as an open umbrella inverted will answer his purpose. Hedges in dusty roads are seldom productive.—The principal woods near London, and the most frequented by Entomologists, are Coombe Wood and Norwood in Surrey,—Birch Wood, Darent Wood, and woods round Bexley in Kent. Coombe Wood has long been celebrated for the great variety of insects which it produces. Birch Wood is on the Maidstone road, and is of great extent: near the 14-mile stone on this road is a large chalk-pit in which many rare insects are to be obtained. Bexley, a small village, lies between Crayford and Foot's Cray. In these woods I have collected with great success: near the village is a large sand-pit which produces an immense number of Coleopterous and Hymenopterous insects. There are also some very rural lanes round the village which produce a great variety of insects: in the rivers and brooks I have taken many rare aquatics. Norwood

is well known, and is but a short distance from the metropolis of London: but the inconsiderate game-keepers will frequently interrupt and warn the unoffending Entomologist to quit the wood immediately, not allowing that ours

" is untax'd and undisputed game."

HEATHS and COMMONS.—Many insects are confined to these situations, not only on account of plants which grow in no other places, but by the cattle and their dung, in the latter of which many thousands of insects may be found in a single day in the months of April and May; these are principally of the Coleoptera Order.

The principal commons near London are Wandsworth and Wimbledon in Surrey; Epping Forest; Lessness Heath, Erith, and Bexley in Kent: a great many ponds are in those places, which produce many very local insects.

SAND-PITS.—The largest sand-pit I am acquainted with is at Charlton, near the seven mile-stone, on the lower road to Woolwich. In this pit I have met with the following rare insects, *Copris lunarius, Notoxus monoceros, Lixus sulcirostris, &c.* Minute insects are very abundant; the roots of grass, at which the latter are found, should be carefully examined: an Entomologist may find full employment for a whole day at this place. There are also several sand-pits on Hampstead Heath.

MEADOWS, MARSHES, and PONDS.—In meadows, when the Ranunculi or butter-cups are in blossom, many *Muscæ* and *Dipterous* insects are found: the flags or rushes are the habitations of *Cassida, Donacia, &c.* The drills in marshes should be examined, as many species of insects are found on the long grass, as also the larvæ of several *Lepidoptera. Neuroptera* are generally confined to these situations, especially if any hedges or trees are near the spot. I have collected in the marshes of Plaistow, West-Ham, Barking, Hackney, and Battersea, with much success. Ponds afford to the lover of the microscope an infinite number of highly interesting objects, that are best obtained by means of the landing-net, which for this purpose need not be so long as represented in *pl.* 11. *fig.* 4. and should be made of strong cloth, but sufficiently open to allow the water to escape. The mud which is brought up from the bottom of the ponds should be examined, and what small insects are found may be put in a small phial filled with water, which will not only clean them but keep them alive; and in many instances, upon a close examination, the Naturalist will be surprised at these the most wonderful productions of Nature. To the Entomologist this mode of collecting will be equally advantageous, as he will obtain many species of *Dyticidæ, Notonectidæ, &c.*

MOSS, DECAYED TREES, ROOTS of GRASS, &c.—Many insects will be

found in moss and under it: the roots and wood of decayed trees afford nourishment and a habitation to a number of insects; many of the larvæ of the *Lepidoptera* penetrate the trunks of trees in all directions: most of the Cerambyces feed on wood, as well as some species of *Carabidæ*, *Elateridæ*, &c. In seeking for these the digger is generally used, as it is sometimes necessary to dig six or seven inches into the wood before they are found.

Banks of Ponds and Roots of Grass.—This is a never-failing source of collecting, which may be followed at all seasons of the year, and in general with great success: those banks are to be preferred which have the morning or noon-day sun: the Entomologist may sit down and collect with the greatest ease an immense number of *Staphilinidæ*. *Pselaphi* are generally taken in those situations.

Banks of Rivers, Sandy Sea Shores, &c.—These situations are productive of a great variety of *Coleoptera*, *Crustacea*, &c. The dead animals that are thrown on the shores should be carefully examined, as they are the food of *Silphiadæ*, *Staphilinidæ*, &c. May and June are the best times for collecting in these situations.

Dead Animals, Dried Bones, &c. should constantly be examined, as these are the natural habitats of several insects. Dead moles are frequently found hung on bushes by the country people; under these the Entomologist should hold his net, and shake the boughs on which they are hung, as a great number of Coleoptera generally inhabit them.

Fungi, Boleti, and Flowers, ought constantly, when met with, to be examined, as many exceeding rare insects inhabit them.

SEASONS FOR COLLECTING.

January, February, and March.—It is not every Entomologist that will collect at this early season of the year, under the impression that but few insects can be obtained: this is true in some measure: however, I have collected throughout the year and in all seasons, for many years, and my labours have been repaid with success much beyond my hopes or expectations. I have repaired to the woods when in some parts I have been up to my knees in snow, and, strange to say, have taken insects from under the bark of trees, moss, &c. in great numbers, and of species which have been considered scarce even in the summer months. At this season the Entomologist should not omit to collect a quantity of moss from the roots of trees, which may be carried home in a pocket handkerchief and examined, by shaking it over a sheet of paper, upon which the insects will fall, and are easily discovered.

At this season also, if the weather is mild, the Entomologist should

dig at the roots of trees for the pupæ of *Lepidoptera*; for this purpose the digger is used, or a small trowel: the principal places worthy attention are the roots of oaks, elms, lime-trees, &c. or beneath the underwood: open the earth close to the tree, and search to the depth of several inches.

Such pupæ as penetrate into the wood require more care, lest they be destroyed when the attempt is made to extricate them; sound on the bark with the digger, and the hollows will soon be discovered where no external sign is visible; tear off the bark, (and carefully examine it, for minute Coleoptera are frequently found adhering to it,) and with a knife cut away the wood that surrounds the orifice of the cavity, to enlarge it, and take out the pupæ as carefully as possible.

April and May.—The same genial warmth that brings forth vegetation brings forth also myriads of insects into life and motion; the dung of animals at this season swarms with minute Coleoptera; several species of the Lepidoptera will also be found by looking carefully garden pales, gates in lanes, &c. Many species of Bees will be found sucking the pollen from the sallow, which blossoms at this season. Sand and gravel pits should be carefully examined, and under the stones and clods of earth many insects will be found. In May, as soon as the white-thorn is in leaf, the hedges should be well beat; the season for taking Caterpillars commences, from which most of the *Lepidoptera* are obtained, and this is by far the best method, as the insects are generally perfect, and the specimens very fine. Great attention should be paid to the larvæ, as supplying them with fresh food, and keeping the earth moist at the bottoms of their cages.

June, July, August.—In these months the Entomologist will find full employment in the woods. Most of the Butterflies are taken in these months, flying abroad in the day-time only: Moths will be found flying at break of day, and at twilight in the evening. This method is termed Mothing, and should be well followed up during the summer season. Many of the rarer *Lepidoptera* are never found but at these times. The males of some, if not of every species of the Moth tribe, and perhaps of other insects also, by a very astonishing faculty, are able to discover the females at a great distance, and in the most secret situations. The following observations by Mr. Haworth on *Bombyx Quercus* will fully establish this fact, and at the same time illustrate the manner of taking them: "It is a frequent practice with the London Aurelians, when they breed a female of this and some other day-flying species, to take her whilst yet a virgin into the vicinity of woods, where, if the weather is favourable, she never fails to attract a numerous train of the males, whose only business appears to be an incessant, rapid, and undulating flight in search of their *unimpregnated* females. One of which is no sooner perceived, than they become so much enamoured of their fair and chaste relation, as abso-

lutely to lose all kind of fear for their own personal safety, which, at other times, is effectually secured by the reiterated evolutions of their strong and rapid wings. So fearless indeed have I beheld them on these occasions, as to climb up and down the sides of the cage which contained the dear object of their eager pursuit, in exactly the same hurrying manner as honey bees, which have lost themselves, climb up and down the glasses of a window." At the latter end of August, and the whole of September, the second and last brood of Caterpillars are found: several species of Gryllus may also be taken in meadows and marshy lands.

OCTOBER, NOVEMBER, DECEMBER.—At the fall of the leaf insects become less numerous, but many of the Hemipterous insects may be found by beating the ferns and underwood in woods, also many very beautiful Tineæ and Tortrices; the aquatic insects will be found in ponds pretty plentiful. Roots of grass, decayed trees, &c. may again be resorted to.

Having now given an outline of the rules which appear necessary for the purpose of collecting insects, I shall proceed to their preservation, which, above all, will act as a particular incitement to the early collector, who, it is supposed, "would feel very little pleasure at the recollection that all the fruits of his toil in one season would be destroyed in the next; or at best, that his specimens would only retain a wretched vestige of their original perfection."

SETTING AND PRESERVING,

CRUSTACEA.

Method of collecting.—Most of the *Crustacea* inhabit the sea; the few that are found in fresh water are generally minute, but highly interesting: ponds, ditches, and marshes produce the latter in abundance, and are common near London; they are taken with the water-net, and may be preserved as directed hereafter.

In searching for Crustacea on the sea-shore, the Entomologist must not omit to search diligently, by turning up stones, &c.;—Confervæ and Corallines, thrown on the shore after storms, frequently contain many rare species, as also the pools left by the retiring tide on most of the rocky coasts. By walking on the sea-shore after heavy gales of wind many Crustacea will be found: he must also take every opportunity of examining the fishermen's nets, and the refuse thrown away by them. Empty shells should also be examined, as they frequently form a habitation for these animals.

Directions for preserving Crustacea for Cabinets.—Those species which inhabit the sea should be suffered to remain for some hours in cold

fresh water, to extract the salt, which would soon destroy them by attracting moisture; they are then to be placed in a crawling posture, and the parts of the mouth are to be displayed by means of pins until dry; they will then remain in that position. The more minute species must be dried, and afterwards stuck on paper with gum-water, in different positions. Those of *Myriapoda* are to be killed by immersion in spirits, and afterwards stuck with a pin on the right side.

Crustacea and Myriapoda are kept in cabinets lined with cork, to which they are affixed with pins; or in boxes loose: the former method is best, as they can then be moved from one place to another without trouble or risk.

Arachnoïda and Acari.

The habitations of the animals of this class are fully described in the account of the genera,—further observations on this point will therefore be unnecessary.

Method of preserving.—Mr. Donovan has observed, "To determine whether some species of Spiders could be preserved with their natural colours, I put several into spirits of wine; those with gibbous bodies soon after discharged a very considerable quantity of viscid matter, and therewith all their most beautiful colours; the smallest retained their form, and only appeared rather paler in the colours than when they were living.

"During the course of last summer, among other Spiders, I met with a rare species; it was of a bright yellow colour, elegantly marked with black, red, green, and purple. By some accident it was unfortunately crushed to pieces in the chip-box wherein it was confined, and was therefore thrown aside as useless; a month or more after that time, having occasion to open the box, I observed that such parts of the skin as had dried against the inside of the box retained the original brightness of colour in a considerable degree. To further the experiment, I made a similar attempt, with some caution, on the body of another spider (*Aranea Diadema*), and though the colours were not perfectly preserved, they appeared distinct.

"From other observations I find, that if you kill the spider, and immediately after extract the entrails, then inflate them by means of a blow-pipe, you may preserve them tolerably well: you must cleanse them on the inside no more than is sufficient to prevent mouldiness, lest you injure the colours, which certainly in many kinds depend on some substance that lies beneath the skin."

The best preserved specimens that I have seen are those where the contents of the abdomen have been taken out and filled with fine sand. I have preserved several in this way, and find it answer the purpose.

INSECTS.

Entomologists are generally satisfied if they can obtain the insect in its last or perfect state; but as a few instructions for the preservation of the egg, larva, and pupa may induce the collector to enrich his cabinet with such specimens, and which is absolutely necessary in gaining a perfect knowledge of their nature, I shall give a few particulars for this purpose.

The Egg.—The eggs of most insects retain their form and colour well if preserved in the cabinet; but those which do not promise fairly may be prepared after the method practised by Swammerdam. He used to pierce the eggs with a very fine needle, and press all the contained juices through the aperture: he then inflated them until they regained their proper form by means of a small glass tube; and lastly, filled them with oil of spike in which some resin had been dissolved.

The Larva or Caterpillar.—The preservation of insects in this state, is not only one of the most curious, but useful discoveries that have been made in this department of science.

The readiest and quickest way of destroying the life of the caterpillar is to immerse it in spirits of wine, by which means the softness and transparency of the parts are retained, and are preserved for a length of time in this liquid.

In the cabinet of Mr. William Weatherhead are preserved many larvæ of the *Lepidoptera*, which he prepares in the following way, and which answers extremely well—Having killed the animal in spirits of wine, he makes a small incision or puncture in the tail, and very gently pressing out all the contained humours, fills the skin with very fine dry sand; the insect is thus again brought to its natural shape: in the course of a few hours the skin dries, and the sand is gently shaken out: it is then gummed on a piece of card, and the preparation is ready for the cabinet: they may likewise be injected with coloured wax. There is another method which is frequently practised, and is as follows: After the whole of the entrails are pressed out, a glass tube drawn to a small point is inserted into the opening, through which the operator continues to blow while he turns the skin at the end slowly round a charcoal fire; this hardens the skin equally, and dries up all the moisture within; a pin is then put through it to fix it in a standing position: it may afterwards be anointed with oil of spike in which some resin has been dissolved, unless it is a hairy caterpillar.

The Pupa.—When insects have quitted the pupa state, the case will require only to be put into the drawers; but those which have insects within must be either dropped into scalding water, or inclosed in a small tin box and exposed to the heat of a fire, which will shortly kill the insect within.

COLEOPTERA, ORTHOPTERA, AND HEMIPTERA.—The preservation of these Orders is attended with very little difficulty.

They are easily killed by immersion in scalding water, and upon being withdrawn should be thrown on a sheet of blossom or blotting paper to extract as much as possible the water: or they may be killed by exposing them in a tin box with a little camphor in it to the heat of a fire, which treatment will add greatly to their preservation. Those of the *Meloe* and *Gryllus* Genera, which have full and tender bodies, are subject to shrivel after death: to preserve them, make an incision on the under part of the abdomen, take out the entrails with a blunt pen or probe, and fill the cavity with cotton.

Specimens of Coleoptera that are required to be set with the wings displayed, should have the elytra separated and the pin passed through the body near the thorax, as at *pl.* 12. *fig.* 2; the wings are to be disposed as in the act of flying, and kept in this situation until perfectly dry with the card braces *b* and *c*; insects of these Orders should never have the pin passed through the thorax, but through the right elytron on the right side, as shown at *pl.* 12. *fig.* 1: the legs, antennæ, and palpi should be placed out in a natural position on the setting boards, and kept so by pins and braces, for a longer or shorter time, according to the size of the insect and state of the weather. No insect must be placed in the cabinet until it is perfectly dry. Minute insects should be fixed on slips of card, as at *pl.* 12. *fig.* 5 *and* 6, with gum, previous to which the legs, &c. should be extended, for future examination: triangular slips of card are to be preferred, as no greater portion of the insect should be hid than what is absolutely necessary to fix it to the card, as at *fig.* 5.

LEPIDOPTERA.—*Butterflies* are soon killed if a pin is passed through the thorax; but many of the *Sphinges* and large Moths are difficult to kill, being very tenacious of life. Mr. Haworth in his *Lepidoptera Britannica*, in his observations on BOMBYX *Cossus*, remarks, that "the usual way of compressing the *thorax* is not sufficient: they will live several days after the most severe pressure has been given there, to the great uneasiness of any humane Entomologist. The methods of suffocation by tobacco or sulphur are equally inefficacious, unless continued for a greater number of hours than is proper for the preservation of the specimens. Another method now in practice is better; and, however fraught with cruelty it may appear to the inexperienced collector, is the greatest piece of *comparative mercy* that can in this case be administered. When the larger Moths must be killed, destroy them at once by the *insertion of a strong red hot needle into their thickest parts, beginning at the front of the thorax.* If this is properly *done*, instead of *lingering through several days they are dead in a moment.* It appears to me, however, that insects being animals of *cold and sluggish juices*, are not so susceptible of the sensations we call pain as those which enjoy a

warmer temperature of body and a swifter circulation of the fluids. To the philosophic mind it is self-evident, that they have not such acute organs of feeling pain as other animals of a *similar size* whose juices are endowed with a quicker motion, and possess a constant, regular, and genial warmth—such as young mice or the naked young of birds: if any of these have the misfortune to lose their heads or limbs from force, speedy death is the certain consequence: but insects under similar circumstances, it is well known, are capable of surviving a considerable time." For small Moths, it is only necessary to put the pin through the thorax, and they die in a very short time. The minute species of this Order should be collected in chip boxes, as they are in general too small to be pierced when first taken; they soon die, and the wings become stiff before the Entomologist has time to set them; but if brought home in separate pill-boxes they will remain alive for several days, and are instantly killed by being exposed near the fire, or placed under a tumbler with the lid of the box slightly elevated, but not sufficient to allow the insect to escape; a lighted match should then be placed under the tumbler, which will deprive the insect of life in a few seconds of time. The pin, which serves to transfix the insect, should be passed through the thorax in the centre, and in an upright position, so that in looking on the insect no part of the wings should be obscured by the slope of the pin. The insects of this Order are by far the most difficult to set, for they require great care and much practice to display them with that nicety which adds so much beauty to their appearance and uniformity in a collection.

The method of setting the Insects of this Order is by braces: a single brace should be first introduced unde rthe wing near the thorax, as in *pl.* 12. *fig.* 3. *a*, with a longer brace over the wings, as at *b*; this should not touch the wing, but be ready to be pressed gently down: when the wings are raised to their proper place by the setting needle *c*, other braces are to be applied according as they are required: the antennæ and feet are to be extended to their proper attitude, and kept so by pins or small braces.

Some Moths are very liable to change colour when placed in the cabinet after a short time: an oily matter is common to all insects, but some are charged with a superabundance. It appears at first in spots on the body, but gradually pervades every part; in some it will even descend into the wings, and then an obliteration of all the beautiful markings is the least that may be expected: the method which is the most successful for recovering the original appearance after the insect has become greasy, is to powder some fine dry chalk on a piece of heated iron, cover the chalk with a very fine piece of linen cloth, and thereto apply the under part of the body of the insect: the heat of the iron dissolves the grease while the chalk absorbs it, and the cloth prevents the chalk from clotting to the insect.

Those known species that are subject to grease, should have the contents of the abdomen taken out, and the cavity filled with cotton.

TRICHOPTERA, NEUROPTERA, HYMENOPTERA, and DIPTERA.—Most of the *Libellulæ* require the contents of the abdomen to be taken out when the insect is dead, as the body generally turns black within, a few days after death, without this precaution: the cavity may be filled up with a roll of white paper or cotton: I have found this method to answer extremely well, and the colours are as brilliant as when the insect was alive. The larger species are very powerful, and when collected they must be transfixed through the side and placed in the corked pocket-box; a brace or two should be placed across the wings, to prevent their fluttering and breaking their wings or those of other insects which may be near them. They may be killed by being plunged in boiling water, or by a hot needle, as directed for Moths. The other species of this Order not being so large soon die, as well as those of the Orders *Trichoptera*, *Hymenoptera*, and *Diptera*. They may be set by braces and pins, as in *pl.* 12. *fig.* 4. In some species of the *Diptera* the colours of the body are very lively, but change after death; in these the colours may be preserved if the contents of the abdomen be removed, and the cavity filled with a powder the colour of the living insect.

METHOD OF RELAXING INSECTS.

It frequently occurs that insects become dead and stiff before the Entomologist has an opportunity of setting or displaying their parts. *Coleoptera* are easily relaxed by immersion in hot water; and in many instances this way is to be preferred, as the parts become more pliable and are more easily set.—The *Orthoptera*, *Hemiptera*, and *Lepidoptera*, must be fixed on a piece of cork, and placed in a pan of water covered over; these, if the specimens are large, will frequently require two or three whole days before the wings will admit of replacing without the risk of breaking; care must be taken not to force the wings, or any part in fact, until the parts are perfectly relaxed, when they may be displayed and kept so by braces, as directed for recent specimens. *Neuroptera*, *Hymenoptera*, and *Diptera*, may be relaxed according to the latter method: but those insects that require the contents of the abdomen to be removed, can never be altered, and therefore must be preserved in a recent state, or their beauty is lost for ever.

ARRANGING INSECTS IN A CABINET.

The modern practice, which is by far the best, is to arrange insects in columns, with the generic name fastened by a pin above, and the specific below them: the lines should be ruled with a black lead pencil, which will always admit of alteration, and look much neater than if ruled with ink. Males and females should be procured as far as possible. *Coleoptera*, *Orthoptera*, and *Hemiptera*, are arranged side by side, with an open-winged specimen below them. *Lepidoptera*, of Butterflies; four specimens of each species are preferred, to show the upper and under side of each sex: the Sphinges and Moths—the upper sides only are shown, as the specific characters are but seldom taken from the under side; in this and the following Orders the males are placed above, the females below; as they not only look much more natural, but save considerable room. Varieties should be procured and extended as far as possible, as they frequently tend to decide the species: mutilated specimens should be rejected; but as we cannot always readily replace them by perfect ones, it is much better to retain them. There is a vile practice in use among collectors, to mend such specimens by parts from other insects. I cannot sufficiently express my abhorrence of such ways, but should hope that no Naturalist, who is a lover of truth and an admirer of nature, will ever disgrace his cabinet by such paltry specimens, as they can be of no use in a scientific view, and only serve to lead to errors.

No Exotic *specimen* should ever be placed in a collection of British Insects, however near it may approach in appearance; for by this means numbers of insects have been described as natives of Britain, merely on account of being found in such cabinets. Species are distinguished in many instances by such minute characters, and they approach each other by such imperceptible degrees, that we cannot be too particular in our examination, or too curious in knowing their habitats, as this frequently leads us to determine whether they are natives of this country.

Our best Entomologists, therefore, where they cannot obtain British specimens of rare insects, are naturally anxious to obtain foreign ones; but these as well as doubtful species are always kept in a drawer by themselves, which answers every good purpose of reference for the sake of becoming acquainted with the species: to this drawer a large label is affixed, as, Exotic Specimens of Rare British Insects. By this means a cabinet is rendered more valuable, as a dependence can be placed on the specimens it contains, and will ever remain a credit to its possessor, as it at once distinguishes the man of science and the lover of truth.

Every Entomologist should keep an exact journal of the insects he collects; with an account, as far as possible, of the place, food, times of appearance, &c. and place to each insect a number corresponding with that of his journal; he should also make a catalogue in which the names, generic and specific, are to be expressed, as also the synonyms, with reference to such authors as have described them. In his journal he must also insert observations on their manners, œconomy, &c. to illustrate as far as possible their natural history, for there is little doubt that many valuable discoveries are yet to be made by a proper attention to insects.

DIRECTIONS FOR THE MICROSCOPE.

MICROSCOPE—an optical instrument, by means of which very minute objects are represented exceedingly large, and viewed very distinctly, according to the laws of refraction or reflection.

Microscopes are properly distinguished into simple or *single*, and compound or *double*.

MICROSCOPES, *single*, are those which consist of a single lens or a single spherule.

MICROSCOPES, *compound*, consist of two or more lenses duly combined. As optics have been improved, other varieties have been contrived in the sorts of microscopes; hence we have *reflecting* microscopes, *water* microscopes, &c. Each of these two kinds has its peculiar advantage; for a single glass shows the object nearer at hand and rather more distinct; and a combination of glasses presents a larger field, or, in other words, exhibits more of an object equally magnified at one view. As each of these has its advantages, each of them has its advocates, at least in practice. The celebrated Leeuwenhoek never used any but single microscopes; and, on the contrary, Dr. Hook made all his observations with double ones.

History.—When, and by whom, microscopes were first invented is not certainly known. Huygens tells us that one Drebell, a Dutchman, had the first microscope in the year 1621, and that he was reputed the first inventor of it; though F. Fontana, a Neapolitan, in 1646, claims the invention to himself, but dates it from the year 1618. As a telescope inverted is a microscope, the discovery might easily enough have arisen from thence.

Nothing more is certain concerning microscopes, than that they were first used in Germany about the year 1621. According to Borellus, they were invented by Zacharias Jansen, in conjunction with his son, who presented the first microscope they had constructed to Prince Maurice, and Albert archduke of Austria. William Borel, who

gives this account in a letter to his brother Peter, says, that when he was ambassador in England, in 1619, Cornelius Drebell showed him a microscope, which he said was the same that the archduke had given him, and had been made by Jansen himself. The limits of this work will not admit of a description of all the microscopes that have been invented, or the principle and laws by which they are regulated: for much useful and further information on the subject I must therefore refer the reader to the works of Baker, Adams, and others on the microscope, where every information on this head will be found.

It may not be amiss, to state clearly and distinctly the method of determining the magnifying powers of glasses employed in single microscopes. 1st. If the focus of a convex lens be at one inch, and the natural sight at eight inches, which is the common standard, an object may be seen through that lens at one inch distant from the eye, and will appear in its diameter eight times larger than to the naked eye. But as the object is magnified every way equally, in length as well as breadth, we must square this diameter to know really how much it appears enlarged, and we shall then find that its superficies is indeed magnified sixty-four times.

2dly. Suppose a convex lens whose focus is at one-tenth of an inch distance from its centre; in eight inches there are eighty such tenths of an inch, and therefore an object may be seen through this lens eighty times nearer than it can distinctly by the naked eye. It will consequently appear eighty times longer and eighty times broader than it does to common sight; and as eighty multiplied by eighty makes six thousand and four hundred, so many times it really appears magnified.

3dly. To go one step further: if a convex glass be so small that its focus is no more than one-twentieth of an inch distant, we shall find that eight inches, the common distance of sight, contains a hundred and sixty of these twentieth parts; and, in consequence, the length and breadth of an object, when seen through such lens, will each be magnified a hundred and sixty times, which multiplied by a hundred and sixty to give the square, will amount to twenty-five thousand six hundred: and so many times, it is plain, the superficies of the object must appear larger than it does to the naked eye at the distance of eight inches.

Therefore, in a single microscope, to learn the magnifying power of any glass, no more is necessary than to bring it to its true focus, the exact place of which will be known by an object's appearing perfectly distinct and sharp when placed there. Then, with a pair of small compasses, measure, as nearly as you can, the distance from the centre of the glass to the object you were viewing, and by afterwards applying the compasses to any ruler with a diagonal scale of the parts of an inch marked on it, you will easily find how many parts of an inch the

said distance is. When that is known, compute how many times those parts of an inch are contained in eight inches, the common standard of sight, and that will give you the numbers of times the diameter is magnified: squaring the diameter will give you the superficies; and if it be an object whose depth or whole contents you would learn, multiplying the superficies by the diameter will show the cube or bulk.

A TABLE of the magnifying Powers of Convex Glasses employed in Single Microscopes, according to the Distance of their Focus; calculated by the Scale of an Inch divided into a Hundred Parts; showing how many Times the Diameter, the Superficies, or the Cube of an Object is magnified, when viewed through such Glasses, to an Eye whose natural Sight is at Eight Inches, or Eight Hundreds of a Hundredth Part of an Inch.

Focal Distance of the Lens or Microscope in 100dths of an Inch.	Number of Times that the Diameter of an Object is magnified.	Number of Times that the Surface of an Object is magnified.	Number of Times that the Cube of an Object is magnified.
$\frac{1}{2}$ or 50	16	256	4,096
$\frac{4}{10}$ or 40	20	400	8,000
$\frac{3}{10}$ or 30	26	676	17,576
$\frac{1}{5}$ or 20	40	1,600	64,000
15	53	2,806	148,877
14	57	3,249	185,193
13	61	3,721	226,981
12	66	4,356	287,496
11	72	5,184	373,248
$\frac{1}{10}$ or 10	80	6,400	512,000
9	88	7,744	681,472
8	100	10,000	1,000,000
7	114	12,996	1,481,544
6	133	17,689	2,352,637
$\frac{1}{20}$ or 5	160	25,600	4,096,000
4	200	40,000	8,000,000
3	266	70,756	18,821,096
$\frac{1}{50}$ or 2	400	160,000	64,000,000
1	800	640,000	512,000,000

METHOD OF USING THE MICROSCOPE.

In using the microscope there are three things necessary to be considered; 1st, The preparation and adjustment of the instrument itself. 2dly, The proper quantity of light, and the best method of directing it to the object. 3dly, The method of preparing the objects, so that their texture may be properly understood.

Preparation of the instrument.—1st, With regard to the microscope itself, the first thing necessary to be examined is, whether the glasses are clean or not; if they are not so, they must be wiped with a piece of soft leather, taking care not to soil them afterwards with the fingers; and, in replacing them, care must be taken not to place them in an oblique situation. We must likewise be careful not to let the breath fall upon the glasses, nor to hold that part of the body of the instrument where the glasses are placed with a warm hand; because, thus, the moisture, expelled by the heat from the metal, will condense upon the glass, and prevent the object from being distinctly seen. The object should be brought as near the centre of the field of view as possible, for there only it will be exhibited in the greatest perfection. The eye should be moved up and down from the eye-glass of a compound microscope, till the situation is found where the largest field and most distinct view of the object are to be had; but every person ought to adjust the microscope to his own eye, and not depend upon the situation it was placed in by another. A small magnifying power should always be begun with; by which means the observer will best obtain an exact idea of the situation and connection of the whole, as well as the connection and use of the parts. A living animal ought to be as little hurt or discomposed as possible.

Great caution is to be used in forming a judgement on what is seen by the microscope, if the objects are extended or contracted by force or dryness.

Nothing can be determined about them without making the proper allowances; and different lights and positions will often show the same object as very different from itself. There is no advantage in any greater magnifier than such as is capable of showing the object in view distinctly; and the less the glass magnifies, the more pleasantly the object is always seen.

The colours of objects are very little to be depended on, as seen by the microscope; for their several component particles being by this means removed to great distances from one another, may give reflections very different from what they would if seen by the naked eye. Some consideration is likewise necessary in forming a judgement of the motions of living creatures, or even of fluids, when seen through the microscope; for as the moving body, and the space wherein it moves, are magnified, the motion will also be increased.

2d. On the management of the light depends in a great measure the distinctness of the vision: and as, in order to have this in the greatest perfection, we must adapt the quantity of light to the nature of the object, and the focus of the magnifier, it is therefore necessary to view it in various degrees of light. In some objects it is difficult to distinguish between a prominence and a depression, a shadow or a dark marking; or between a reflection of light, and whiteness, which is particularly observable in the eyes of *Libellulæ* and other insects; all of them appearing very different in one position from what they do in another. The brightness of an object likewise depends on the quantity of the light, the distinctness of vision, and on regulating the quantity to the object; for some will be in a manner lost in a quantity of light scarcely sufficient to render another visible.

The light of a lamp or candle is generally better for viewing microscopic objects than daylight, it being easier to modify the former than the latter, and to throw it upon the objects with different degrees of density. The best lamp that can be used for this purpose is the one invented by Count Rumford, which moves on a rod, so that it may be easily raised or depressed. The light of a candle or lamp is increased, and more directly thrown upon the reflecting mirror or object, by means of a convex lens mounted on a semicircle and stand, so that its position may be easily varied. If the light thus collected from a lamp be too powerful, it may be lessened by placing a piece of thin writing-paper, or a piece of fine grayed glass, between the object and the reflecting mirror. Thus a proper degree of light may be obtained, and diffused equally all over the surface of an object, a circumstance which ought to be particularly attended to; for if the light be thrown irregularly upon it, no distinct view can be obtained.

The examination of objects so as to discover truth, requires a great deal of attention, care, and patience; with some skill and dexterity, to be acquired chiefly by practice, in the preparing, managing, and applying them to the microscope.

Whatever object offers itself as the subject of our examination, the size, contexture, and nature of it are first to be considered, in order to apply it to such glasses, and in such a manner, as may show it best. The first step should always be to view the whole together with such a magnifier as can take it in all at once; and after this the several parts of it may the more fitly be examined, whether remaining on the object, or separated from it. The smaller the parts are which are to be examined, the more powerful should be the magnifiers employed. The transparency or opacity of the object must also be considered, and the glasses employed accordingly suited to it; for a transparent object will bear a much greater magnifier than one which is opaque, since the nearness that a glass must be placed at, unavoidably darkens an

object in its own nature opaque, and renders it very difficult to be seen, unless by the help of a silver speculum.

The nature of the object also, whether it be alive or dead, a solid or a fluid, an animal, a vegetable, or a mineral substance, must likewise be considered, and all the circumstances of it attended to, that we may apply it in the most advantageous manner. If it be a living object, care must be taken not to squeeze or injure it, that we may see it in its natural state and full perfection. If it be a fluid, and that too thick, it must be diluted with water; and if too thin, we should let some of its watery parts evaporate. Some substances are fittest for observation when dry, others when moistened; some when fresh, and others after they have been kept some time.

Transparent objects.—Most objects require also some management in order to bring them properly before the glasses. If they are flat and transparent, and such as will not be injured by pressure, the usual way is to inclose them in sliders between talc, or, what is certainly preferable, between two slips of glass. For this purpose thin and clear glass must be used. The slips should be about three inches in length and half an inch in width: a piece of paper, the size of the glass, must be placed between them, with circular or oblong holes cut a little larger than the object intended to be placed between them;—one side of the paper should be washed over with a little gum-water, fastened on one of the glasses, and suffered to dry; the objects are then to be placed on the glass where the holes are cut in the paper; the upper part of the paper is then to be slightly touched with gum-water; and the other glass may be placed on it. This plan answers well for the transparent wings of insects, &c.

Opaque objects are best preserved and viewed in the following manner: Cut card- or drawing-paper into small pieces of about a quarter of an inch in diameter, and with a fine camel's hair pencil, or the point of a pen, put a little gum-water in the centre of it; if the object is an insect, display the legs, antennæ, &c. by means of a fine needle (as in *pl.* 12. *fig.* 6.); the gum, when dry, will fix the insect in this position. The seeds of plants, minerals, &c. may be preserved in this way. Paper of different colours should be chosen for different objects, in order to render them the more conspicuous, such as a black paper for a white subject, &c.

Objects prepared in this way are extremely convenient for viewing, and by means of the pliers they may be examined in every direction; a pin may be passed through the paper or card, and the objects kept in a small box lined with cork. The boxes may be made the size and form of an octavo or quarto volume, and kept on shelves, in the manner of books; if made in the book form the backs should be lettered, and the collection may be continued to any extent.

Living Objects.—These will be treated of hereafter under the head *Animalcula.*

No part of the creation affords such an infinite variety of subjects for the microscope as insects. "Insects," observe Messrs. Kirby and Spence, in their *Introductory Letter to Entomology*, "indeed, appear to have been Nature's favourite productions, in which, to manifest her power and skill, she has combined and concentrated almost all that is either beautiful and graceful, interesting and alluring, or curious and singular, in every other class and order of her children. To these, her valued miniatures, she has given the most delicate touch and highest finish of her pencil. Numbers she has armed with glittering mail, which reflects a lustre like that of burnished metals; in others she lights up the dazzling radiance of polished gems. Some exhibit a rude exterior, like stones in their native state; while others represent their smooth and shining face after they have been submitted to the tool of the polisher: others again, like so many pygmy Atlases bearing on their backs a microcosm, by the rugged and various elevations and depressions of their tuberculated crust, present to the eye of the beholder no unapt imitation of the unequal surface of the earth, now horrid with mis-shapen rocks, ridges, and precipices—now swelling into hills and mountains—and now sinking into valleys, glens, and caves; while not a few are covered with branching spines, which fancy may form into a forest of trees.

"What numbers vie with the charming offspring of Flora in various beauties! some in the delicacy and variety of their colours, colours not like those of flowers evanescent and fugitive, but fixed and durable, surviving their subject, and adorning it as much after death as they did when it was alive; others, again, in the veining and texture of their wings; and others in the rich cottony down that clothes them. To such perfection, indeed, has Nature in them carried her mimetic art, that you would declare, upon beholding some insects, that they had robbed the trees of their leaves to form for themselves artificial wings, so exactly do they resemble them in their form, substance, and vascular structure; some representing green leaves, and others those that are dry and withered. Nay, sometimes this mimicry is so exquisite, that you would mistake the whole insect for a portion of the branching spray of a tree. No mean beauty in some plants arises from the fluting and punctation of their stems and leaves, and a similar ornament conspicuously distinguishes numerous insects, which also imitate with multiform variety, as may particularly be seen in the caterpillars of many species of the butterfly tribe (*Papilionidæ*), the spines and prickles which are given as a *Noli me tangere* armour to several vegetable productions.

"In fishes the lucid scales of varied hue that cover and defend them

are universally admired, and esteemed their peculiar ornament; but place a butterfly's wing under a microscope, that avenue to unseen glories in new worlds, and you will discover that nature has endowed the most numerous of the insect tribes with the same privilege, multiplying in them the forms, and diversifying the colouring of this kind of clothing beyond all parallel. The rich and velvet tints of the plumage of birds are not superior to what the curious observer may discover in a variety of *Lepidoptera*; and those many-coloured eyes which deck so gloriously the peacock's tail are imitated with success by one of our most common butterflies. Feathers are thought to be peculiar to birds; but insects often imitate them in their antennæ, wings, and even sometimes in the covering of their bodies.—We admire with reason the coats of quadrupeds, whether their skins be covered with pile, or wool, or fur; yet are not perhaps aware that a vast variety of insects are clothed with all these kinds of hair, but infinitely finer and more silky in texture, more brilliant and delicate in colour, and more variously shaded than what any other animals can pretend to.

"In variegation insects certainly exceed every other class of animated beings. Nature, in her sportive mood, when painting them, sometimes imitates the clouds of heaven; at others, the meandring course of the rivers of the earth, or the undulations of their waters: many are veined like beautiful marbles; others have the semblance of a robe of the finest net-work thrown over them: some she blazons with heraldic insignia, giving them to bear in fields sable—azure—vert—gules—argent and or, fesses—bars—bends—crosses—crescents—stars, and even animals. On many, taking her rule and compasses, she draws with precision mathematical figures: points, lines, angles, triangles, squares, and circles. On others she pourtrays, with mystic hand, what seem like hieroglyphic symbols, or inscribes them with the characters and letters of various languages, often very correctly formed; and what is more extraordinary, she has registered in others figures which correspond with several dates of the Christian era.

"Nor has nature been lavish only in the apparel and ornament of these privileged tribes; in other respects she has been equally unsparing of her favours. To some she has given fins like those of fish, or a beak resembling that of birds; to others horns, nearly the counterparts of those of various quadrupeds. The bull, the stag, the rhinoceros, and even the hitherto vainly sought for unicorn, have in this respect many representatives amongst insects. One is armed with tusks not unlike those of the elephant; another is bristled with spines, as the porcupine and hedge-hog with quills; a third is an armadillo in miniature; the disproportioned hind legs of the kangaroo give a most grotesque appearance to a fourth; and the threatening head of the snake is found in a fifth. It would, however, be endless to produce all

the instances which occur of such imitations; and I shall only remark that, generally speaking, these arms and instruments in structure and finishing far exceed those which they resemble."

METHOD OF DISSECTING INSECTS.

Swammerdam excelled in the preparation of insects. Neither difficulty nor disappointment could make him abandon the pursuit of any object until he had obtained a satisfactory idea of it. But, unhappily, few of the methods he used in preparing his objects for the microscope are now known. Boerhaave examined with the strictest attention all the letters and manuscripts of Swammerdam which he could find; but his researches were far from being successful. The following are all the particulars which have come to the knowledge of the public.

For dissecting small insects Swammerdam had a brass table, to which were affixed two brass arms moveable at pleasure to any part of it. The upper part of these vertical arms was constructed in such a manner as to have a slow vertical motion; by which means the operator could readily alter the height as he saw convenient. One of these arms was to hold the minute objects, and the other to apply the microscope.

The lenses of Swammerdam's microscopes were of various sizes as well as foci; but all of them the best that could be procured both for the transparency of the glass and the fineness of the workmanship. His observations were always begun with the smallest magnifiers, from which he proceeded to the greatest; but in the use of them he was so exceedingly dexterous, that he made every observation subservient to that which succeeded it, and all of them to the confirmation of each other and to the completing of the description. His chief art seems to have been in constructing scissars of an exquisite fineness, and making them very sharp. Thus he was enabled to cut very minute objects to much more advantage than could be done by knives and lancets; for these, though ever so sharp and fine, are apt to disorder delicate substances by displacing some of the filaments and drawing them after them as they pass through the bodies; but the scissars cut them all equally. The knives, lancets, and styles he made use of in his dissections, were so fine that he could not see to sharpen them without the assistance of a magnifying glass; but with these he could dissect the intestines of bees with the same accuracy that the best anatomists can do those of large animals. He made use also of very small glass tubes, no thicker than a bristle, and drawn to a very fine point at one end but thicker at the other. These were for the purpose of blowing

up, and thus rendering visible, the smallest vessels which could be discovered by the microscope, to trace their courses and communications, or sometimes to inject them with coloured liquors.

PARTS OF INSECTS FOR THE MICROSCOPE.

The head and the parts of the mouth can seldom be examined without the aid of a microscope; consequently, much still remains to be done in this department of science: the *palpi, mandibles, maxillæ, &c.* (for their use and situation, see page 21 to 29) would form a most beautiful series of objects, which may be rendered still more interesting by a knowledge of the manners, economy, &c. of the animals; these parts can always be separated and displayed, however old the specimen may be, by being plunged into boiling water, and then placed on a piece of blotting paper to extract whatever water remains about them: the parts of the mouth may then be displayed by means of the setting needle, and when the articulations are fine and in danger of breaking, a camel's hair pencil will be found extremely useful. The abdomen and legs frequently display the most lively and brilliant colours, especially the *Chrysalidæ;* the minute *Ichneumons* are no less to be admired, either for their beauty or the singularity of their manners. The wings, for transparent objects, form an endless variety; the disposition of the nerves is frequently found essential in their generic character, as in the *Tenthredinidæ:* these, no doubt, would frequently, with other parts, be useful in forming natural genera of many families, both of *Hymenoptera* and *Diptera,* as the parts are easy of examination: in fact, there is no part of an insect but what may be rendered a pleasing and interesting subject. The copious directions for collecting them that I have before given, will render any further directions on this head unnecessary.

There is no substance in nature but what will bear an examination by the microscope: consequently this instrument is a never-failing source of rational amusement; the hair of animals, the feathers of birds, the scales of fish, bones, the circulation of the blood, cuttings of wood, seeds, vegetable infusions, the leaves of plants, and the innumerable *animalcula* which are found in every decaying substance, will afford employment never to be regretted: I shall therefore close this part of the subject by a few brief directions for preparing, examining, and obtaining the above, which I trust will be found sufficient for the purpose.

PARTS OF ANIMALS.

Pores of the Skin may be examined by cutting off a thin slice from any soft part of the body that is not hairy, such as from between the fingers, with a razor or sharp penknife—this is a transparent object.

Hair.—The hairs of different animals vary widely in their appearance, as also the hairs from the various parts of the human body, and will furnish a pleasing series of objects.

Calcined Bones.—Bones should be heated red hot in a clear fire, by which means all the animal juices will be destroyed, and little will be left but pure lime of a most delicate whiteness, and highly interesting from the beauty of the cells:—this is an opaque object. Some useful hints on this subject will be found in the 9th volume of the *Medico-Chirurgical Society Transactions*, in a paper by Mr. Howship, which is illustrated by plates with the specimens magnified.

Feathers of Birds.—These afford an almost endless variety of objects, both opake and transparent.

Scales of Lizards, Snakes, and Fish.—These should be carefully cleansed from any dirt or filth; they may always be cleaned by soaking in water and brushing with a camel's hair pencil.

Blood.—The circulation of the blood may be easiest seen in the tails or fins of small fish, which should be placed in a very thin glass tube.

Crustacea.—Many animals of this Class require the aid of the microscope; to the lovers of the microscope they are highly interesting, and well deserving their attention, from the little that is known concerning them: a few of the species are enumerated in the first subclass of the *Crustacea*, p. 78 to 82.

Arachnoïda.—Several species of this Class are very minute; they are found beneath the bark of trees, attached to the legs of insects, &c. As an example of the care we should take in preparing objects for the microscope, as well as forming an idea of them, it is worth notice to mention, that the figure of the "*Lobster insect*," (a species of *Obisium*) given in *Adams's Essays on the Microscope*, 4to. has a dentation on the outer part of the inner claw, which is in fact a fracture produced by compression; this was pointed out to me by my much respected friend T. Carpenter, Esq. of Tottenham, who has the identical specimen in his extensive collection. Many parts of the Spiders form most beautiful objects, especially the eyes. The webs of spiders in hedges, garden gates, and gates in woods, may frequently be examined with advantage, as these are nets in which many minute and rare insects may be found.

Acari.—This Class of animals have long been celebrated as objects for the microscope; yet it is to be regretted that very little is yet known of them, most collectors being satisfied by possessing a specimen of the "*cheese mite*," to exhibit one of the wonders of the little world.

Shells.—Minute shells; these form most elegant subjects, and in general fetch a very high price; but they may be easily obtained by examining with a microscope the sand found on the sea shores; they are used as opake objects, and should be placed on a coloured paper that is the greatest contrast to the shell. An enumeration with figures of most of the minute British shells will be found in Montagu's *Testacea Britannica*, and Walker's *Testacea minuta*, 4to. 1784.

Animalcula.—These animals are so exceedingly numerous that volumes might be written on them. I shall therefore give only a few brief directions for the best methods of obtaining them in vegetable infusions, &c.

Infusions of Pepper.—Bruise as much common black pepper as will cover the bottom of an open jar, and lay it thereon about half an inch thick: pour as much soft water into the vessel as will rise about an inch above the pepper, shake the whole well together; after which they must be stirred, but be left exposed to the air for a few days, in which time a thin pellicle will be formed on the surface, in which innumerable animals are to be discovered by the microscope.

Eels in Paste—may be obtained by boiling a little flour and water into the consistence of honey, then exposing it to the air in an open vessel, and beating it frequently to prevent the surface from growing hard: in summer, after a few days, eels will be found in myriads visible to the naked eye, and may be preserved for a length of time by keeping the paste moistened with water.

Vegetable Infusions.—These as well as *animal infusions* are by far the best methods of procuring animalcula. Plants should be placed in a glass of either rain or river water, and suffered to remain until a scum is observed on the surface of the water, which acquires thickness by standing. In this scum the greatest number of animalcules are found. Sometimes it is necessary to dilute the infusions; but this ought always to be done with water, not only distilled but viewed through a microscope, lest it should also have animalcules in it, and thus prove a source of deception.

Stagnant waters contain also immense numbers of these very minute but interesting animals; they are also found adhering to duckweed, pieces of wood, &c. A quantity of these should be collected and thrown into clean water; they may then be separated and further examined.

Zoophytes and Corals.—These are only to be obtained on the sea shore, and are found at the recess of the tide. When an opportunity occurs of collecting in these places, every piece of sea weed, &c. should be examined, as many very rare marine animals are frequently found in them, especially after a storm.

VEGETABLES.

Seeds of Plants afford many pleasing objects, as well as the leaves, &c.: they should be gummed to paper, as directed for Insects.

Moss.—This, in the winter months, should always be collected and carefully examined, as it not only furnishes many curious subjects of itself, but likewise harbours many very beautiful insects, minute shells, &c.

Farina or the Pollen of Plants affords some curious subjects, and is well deserving of a further investigation. In the sixth volume of the *Transactions of the Linnean Society* is given *an Account of a Microscopical investigation of several species of Pollen, with some Remarks and Questions on the structure and use of that part of vegetables. By Luke Howard, Esq.* from which the following is extracted.

"I began my observations," says Mr. Howard, "with the Hazel-tree (*Corylus Avellana*). On a calm dry day I shook off some of the pollen from the expanded catkins upon a clean piece of writing-paper: I also gathered some of the catkins and female buds. These I viewed separately on a clear plate of glass, usually transmitting the light through them from a speculum below, and with different magnifying powers, preferring those which, without enormously enlarging the objects, gave a clear view of the structure and position of several at once.

"1. *Corylus Avellana.*—Anthers furnished with transparent horn-like appendages. Pollen crumbles from the surface, and is sometimes so abundant as to fall in a visible cloud on the slightest motion of a branch. To the naked eye it is a fine yellow powder. A few grains laid on the glass plate and viewed with the lens, No. 4; some appear of an irregular angular shape, opake, except in one or two parts, where light passing presents the appearance of a perforation; others nearly spherical, the surface divided by depressed lines into a number of convex facets. The transparency of these is such, that they reflect the image of a small object held under them, as well as a drop of liquid. On repeating the examination, the former are found to come from the most mature anthers, and to differ from the latter only as a raisin does from a grape. A clear drop of distilled water being put on the glass, both kinds imbibe it with the avidity of a sponge, at the same time distending and spreading abroad in the water, but without any motion further than that which this expansion causes. When saturated with the water they remain at the bottom, clear as the liquid itself, and all alike distended to a bulk many times greater than their original one in a dry state. They are now seen to be multilocular capsules, having septa in various directions within them, the union of which with the external membrane appears at the angles in the dry state, and at the depressed lines in the wet.

" These capsules may be kept in the water for several days without any further perceptible change. When that is dried up they return to the opake state, and the same operation may be several times repeated on them.

" In exhibiting this spectacle to some friends, pure water not being just at hand, a drop of brandy was substituted for it. This gave rise to a phenomenon equally curious and unexpected. The grains expand as in the water; but in the mean time they are put into rapid motion, each grain darting from side to side with the vivacity of a swarm of gnats in the air. As they approach to complete expansion the motion dies away, and one after another sinks to the bottom. By a small addition of fresh brandy some few are excited a second time, but with fainter movements. Presently the liquid begins to be obscured, and in a few minutes the grains are mostly dispersed and decomposed, and the spirit exhaling, leaves a sort of extract on the glass mixed with many undissolved particles, among which sometimes appear a few unbroken grains, much changed, and now resembling an empty bladder lying flat."

Mr. Howard, after the same experiments on various other plants, observes, " The proper spirit for this purpose seems to be a mixture of one part of pure spirit of wine with two of water. A stronger spirit or spirit of wine alone may sometimes be required, when we operate upon a pollen which has by any means become previously saturated with moisture, (or has lost, by keeping, a part of its irritability,) but it does not enter the dry grain so readily as water alone.

" It is proper here to remark, that the utmost care is requisite to prevent accidental mixtures of the subjects or menstrua in these experiments, which might greatly embarrass and mislead the observer; separate pieces of clear glass for the several kinds, and separate pointed glass tubes to convey the liquids, will therefore be requisite. It will be proper attentively to examine the pollen dry, as well as the liquids before they are used, in order to be satisfied of the absence of animalcules and other extraneous matter which might be suspected to influence the appearances.

" I do not pretend to say that the above-related experiments were absolutely free from optical deception; but I may venture to affirm, from frequent repetition of them, that when tried with due precaution, they will scarcely ever be found to fail of producing the appearance related."

MINERALS.

Crystals.—The name Crystal is given to those polyhedral bodies, produced by nature and the operations of chemistry, which possess a regular geometrical form and rectilineal interior structure.

Observation has shown that every substance in crystallizing has a tendency to assume a peculiar figure. *Common salt* crystallizes in cubes, *Epsom salts* in six-sided prisms, *Alum* in octahedrons, *Sugar-candy* in oblique four-sided prisms with wedge-shaped summits. But the crystalline form in any crystallizable material is liable to be altered by circumstances affecting the crystallizing process; and hence the geometrical forms which the same identical substances present, often bear no such resemblance to each other as would seem to indicate their relation. There are, nevertheless, a certain number of figures peculiar to every crystallizable body, and the crystals of that substance assume one or other of these forms, and no other. *Common salt*, for example, when it has assumed its true crystalline shape, presents itself in the form of cubes; it is also met with in octahedrons, dodecahedrons, or some figure appertaining to these solids. *Sugar-candy* usually crystallizes in oblique four-sided prisms, and it likewise occurs in cubes and in six-sided prisms with wedge-shaped summits variously modified. *Alum* crystallizes in octahedrons, but it also occurs in cubes.

Method of obtaining Crystals.—The method of effecting the crystallization of such bodies as require a previous state of solution, and among which the class of Salts holds a distinguished rank, consists of heating the solution so as to dissipate gradually part of the water by evaporation. It is thus that chemists proceed for obtaining crystals of sulphate of potash, muriate of potash, &c.

The figure of crystals has very little regularity if the water be evaporated too hastily, as by boiling; but by keeping the saline solution in a gentle heat, very beautiful and very regular crystals are obtained in a longer or shorter space of time; and there is scarcely any salt which may not be made to assume a very distinct form by this process if it be skilfully conducted.—*Accum.*

Crystals of Camphor.—Camphor dissolves readily in spirits of wine. To obtain the crystals it is only necessary to place one drop on a piece of glass; the glass should be held over a candle a few seconds to accelerate the evaporation of the spirit, and then placed in the microscope, when the configuration may be seen.

Crystals of Silver.—This forms a very beautiful and interesting object. In one drop of nitrate of silver put a small piece of very fine brass wire; this must be immediately placed in the microscope, and the crystals will extend gradually till the whole quantity of fluid is evaporated.

Minerals of all kinds frequently exhibit very curious objects. Sand also should be collected and examined, as it is subject to great variety: —in fact, a very good knowledge might be gained of Mineralogy from small specimens, which may be obtained at very reasonable prices, and which occupy but little room.

AN EXPLANATION

OF

THE TERMS USED IN ENTOMOLOGY.

ABDOMEN, that part of the body distinct from the thorax, forming the hinder part of the insect, and consisting of segments or rings. (*Pl.* 10. *fig.* 7. *e.*)

Æquale, when it is of the same breadth with the thorax.

Barbatum, with tufts of hair at the sides or extremity.

Falcatum, shaped like a sickle.

Petiolatum, attached to the thorax by means of a slender elongated tube.

Planum, the under part flat.

Sessile, sitting attached to the thorax in its whole breadth; not distant and connected by a filament.

Subpetiolatum, attached to the thorax by a short tube, nearly equalling the thorax in breadth.

ACULEUS, *the Sting*, an elongated dart, often poisonous, seated in the extremity of the abdomen.

Compositus, having two or more sharp points or darts.

Exsertus, projecting, not lying hid within the body.

Reconditus, always concealed within the abdomen, and seldom thrust out.

Retractilis, for the most part exserted, but capable of being drawn in.

Simplex, having one dart or point.

Vaginatus, inclosed in a bivalve sheath.

ALÆ, *the Wings*, the instruments of flight.

Acuminatæ, terminating in a subulated apex.

Angulatæ, the posterior margin having prominent angles.

Angulus ani, the posterior angle of the inferior wings.

Angulus posticus, that extremity of the wing which is opposite to the base and to the apex.

Apex, the part opposite to the base, terminating the anterior margin. (*Pl.* 10. *fig.* 8. *c.*)

Basis, the part by which it is connected with the thorax. (*Pl.* 10. *fig.* 8. *b.*)

Bicaudatæ, the hinder wings having two projecting processes.
Caudatæ, in which one or more projections in the hinder wings are extended into processes.
Concolores, of the same colour both on the upper and under surfaces.
Conniventes, which when at rest have the anterior margin in part contiguous to the inner or posterior margin, whether erect or incumbent.
Convolutæ, wrapping round the body, the upper surface forming a convexity.
Costa, the margin between the base and the apex.
Crenatæ, the margin notched, but in such a way that the incisures are pointed to neither extremity.
Cruciatæ, incumbent, but the inner margins lying over each other.
Cruciatæ complicatæ, folded together crosswise.
Deflexæ, incumbent, but not horizontally, the outer edges declining towards the sides.
Dentato-erosæ, hollowed, with denticulations between the hollows.
Denticulatæ, with minute distinct teeth.
Denudatæ, a certain part destitute of scales, but opake.
Digitatæ, divided nearly to the base like fingers.
Discus, the space between the base, the apex, the margin, and the suture.
Divaricatæ, incumbent, but diverging behind.
Elongatæ, the posterior margin longer than the interior.
Erectæ, when at rest, standing up so as to approach each other.
Erosæ, with minute obtuse hollows and unequal laciniæ.
Excaudatæ, having no projecting processes.
Extensæ, not lying upon one another.
Falcatæ, the posterior margin obtusely hollowed.
Fenestratæ, with one or more transparent spots.
Fissæ, digitated, divided into linear portions with straight margins.
Gymnopteræ, membranaceous and transparent without scales.
Horizontales, which when at rest are parallel to the horizon.
Hyalinæ, quite transparent.
Incumbentes, which when the insect is at rest cover the back of the abdomen horizontally.
Incurvatæ, the anterior margin bent like an arch.
Integerrimæ, with a margin linear and not in any wise cut.
Integræ, undivided without indentations.
Irroratæ, marked with exceedingly minute points.
Lanceolatæ, oblong attenuated at both extremities.
Maculatæ, marked with spots.
Margo exterior, anticus, crassior alæ, the margin between the base and the apex.

Margo posterior, the margin between the apex and the *angulus posticus*.

Margo interior or *tenuior*, the margin etween the base and the *angulus posticus*.

Nebulosæ, marked with many scattered, abrupt lines, of various forms.

Nervosæ, with nerves large for the size of the wing.

Nitidissimæ, with scales exceedingly smooth and resplendent.

Ocellatæ, with one or more *ocelli*, or eye-like markings.

Pagina superior, the upper surface of the wings.

Pagina inferior, the under surface.

Patentes, horizontal, extended when at rest, not uniting or incumbent.

Patulæ, nearly horizontal, little inclined, and not incumbent.

Planæ, extended horizontally, which cannot be folded up.

Plicatæ, wings which when at rest are folded up, but expanded in flight.

Punctatæ, marked with very small dots.

Radiatæ, with nerves diverging like rays from a common centre.

Repandæ, with a waving but plain margin.

Reticulatæ, with nerves disposed like net-work.

Reversæ, deflexed, the margin of the secondary wings projecting from under the primary.

Rotundatæ, the posterior margin rounded and devoid of angles.

Subcaudatæ, the process in the posterior wings, hardly longer than a serrature.

Suberosæ, somewhat indented, but irregularly.

Tessellatæ, marked with black spots so disposed as to resemble a chequered pavement.

Truncatæ, with the posterior angle straight.

Tumidæ, with elevated membranes among the veins.

Variegatæ, of different colours.

Undulatæ, marked with continuous and nearly parallel waving lines.

Unguiculatæ, with a membranaceous tooth or claw at the *costa* or exterior margin.

ANASTOMOSIS, a spot in the upper wing, at the branching of the nerves, near the anterior margin.

Striga, observing the course of the nerves.

ANTENNÆ (*or Horns*) For the supposed use of these organs see p. 21. They are subject to the greatest variety: the number of joints, their form, &c. should always be considered, as they are useful in distinguishing genera; they are discriminated as follows.

Aculeatæ, armed with small sharp points.

Aculeato-serratæ, set with thick prickles turned towards the apex.

Aculeato-uncinatæ, set with hook-shaped prickles.
Acuminato-setaceæ, terminated with a stiff sharp-pointed hair.
Amphi-ophthalmæ, wholly or in part surrounded by the eyes.
Approximatæ, close together at their base.
Aristatæ, furnished with a compressed lateral knob, having attached to it a short beard or bristle.
Articulatæ, with distinct joints or articulations.
Barbatæ, with tufts of hair at the articulations.
Breves, shorter than the body.
Capitatæ, clavated, ending in a knob.
Catophthalmæ, when placed behind the eyes.
Ciliatæ, fringed with parallel *setæ*, inserted along the side of the *antennæ* through their whole length.
Clavatæ, club-shaped, terminating in a knob; growing gradually thicker towards the apex.
Coadunatæ, connected at the base.
Dentatæ, set with remote spreading points in one direction.
Distinctæ, not united at their base.
Elongatæ, when longer than the head.
Exarticulatæ, with no distinct articulations.
Filatæ, simple, without a lateral hair or thread.
Filiformes, of the same thickness through their whole length.
Hyperophthalmæ, placed above the eyes.
Hypophthalmæ, placed under the eyes.
Lamellatæ, pectinated, but with scales instead of bristles.
Longæ, longer than the body.
Mediocres, of the same length with the body.
Moniliformes, with distinct subglobular joints or bead-like articulations.
Mucronatæ, terminating in a sharp projecting point.
Nudæ, not garnished with hairs or bristles.
Nutantes, at the points bent downwards.
Pectinatæ, comb-shaped, or sending out from both sides parallel bristles the whole length.
Perfoliatæ, the club being horizontally divided, the pieces connected in the middle.
Perfoliato-imbricatæ, consisting of small concave pieces, imbricated and connected in the middle.
Plumosæ, like a plume of feathers.
Porrectæ, stretched straight forward.
Prismaticæ, linear, with more than two flat sides.
Pro-ophthalmæ, placed before the eyes.
Ramosæ, with many lateral branches.
Remotæ, distant from each other.
Rigidæ, not flexible.