THE

ENTOMOLOGIST'S

Useful Compendium;

OR

AN INTRODUCTION TO THE KNOWLEDGE

OF

BRITISH INSECTS,

COMPRISSING

THE BEST MEANS OF OBTAINING AND PRESERVING THEM, AND
A DESCRIPTION OF THE APPARATUS GENERALLY USED;

TOGETHER WITH

THE GENERA OF LINNÉ,

AND

The Modern Method of arranging the Classes Crustacea, Myriapoda,
Spiders, Mites and Insects, from their Affinities and
Structure, according to the views of Dr. Leach.

ALSO

AN EXPLANATION OF THE TERMS USED IN ENTOMOLOGY;

A CALENDAR OF THE TIMES OF APPEARANCE AND USUAL
SITUATIONS OF 3,000 SPECIES OF BRITISH INSECTS;

WITH

INSTRUCTIONS FOR COLLECTING AND FITTING UP OBJECTS
FOR THE MICROSCOPE.

Illustrated with Twelve Plates.

BY GEORGE SAMOUELLE,

ASSOCIATE OF THE LINNEAN SOCIETY OF LONDON.

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1824.
TO
Dr. W. E. LEACH, F.R.S. &c. &c.

Sir,

I may justly dedicate the following pages to you, being indebted for the most valuable part of their contents to your kindness and liberality. I am happy in thus having it in my power to acknowledge my sense of the many obligations which I lie under to you: and at the same time I trust the present work will be the means of aiding you in the very praiseworthy cause in which you are engaged. It is also to be hoped that in England, ere long, Entomology will stand on the same ground with Botany, Chemistry, or Mineralogy; and that your labours will eventually be as duly appreciated in this country as they are now on the Continent.

I remain, Sir, with the greatest respect,

Your most obliged and obedient servant,

GEORGE SAMOUELLE.

Blackfriars Road,
March 1819.
PREFACE.

It must be acknowledged that the very rapid progress which every science for some years past has made in this country, is greatly to be attributed to Elementary works, and at the same time it is to be regretted that as yet none has appeared on the practical part of Entomology, by which I mean the method of collecting and preserving insects, the elements of the science, &c. It is true such a work is announced, and it is hoped will shortly appear; I allude to the completion of Messrs. Kirby and Spence's Introduction to Entomology.—From the profound knowledge of the subject which these excellent authors possess, we certainly may expect a most complete work; yet its extent, and the necessary expense of at least four octavo volumes, must exclude many from purchasing it, and especially young persons to whom the study of Entomology is particularly adapted.

From this consideration I was induced more than twelve months ago to begin a work, the mere outline of the present, and which was intended to comprise little more than the Linnean Genera, with a slight notice of the more natural Genera which had been separated from them, with references to the best essays or papers that had been published on the subject, and directions for collecting, &c. This was to have been published in duodecimo, and would have made but a thin
PREFACE.

volume. On the return of Dr. Leach from the continent in May I consulted him on the subject, when he most liberally promised me every assistance, with the free use of his books and manuscripts, if I would extend the work. This was a kindness which I certainly did not expect, although I knew his zeal and ardour in the promotion of science: it was also an offer I could not withstand, and which no lover of science will regret. It has been my wish in no instance to omit acknowledging what has been derived from his valuable assistance: should this however have been in any case neglected, I trust that Dr. L. will pardon the oversight.

To experienced scientific Entomologists this work cannot be expected to afford much additional information: their good sense will however admit its necessity and utility, since a publication on such a plan has long been a great desideratum; yet even to these it is presumed it will not be altogether useless, since it contains the characters of many genera lately established by the most celebrated Entomologists on the continent, and never before printed in this country.

The Genera of Linné I have been obliged to give according to my former plan, as the plates were engraved previous to the alteration. The Modern System is nearly the same as that given in the Supplement to Encyclopædia Britannica, article Crustaceology, and Dr. Brewster’s Edinburgh Encyclopædia, article Entomology, with the exception of the foreign Genera and the alteration of Tribes to Families terminating in *ida*.

The introduction of *Objects for the Microscope* may by some be considered as rather foreign to the subject of Entomology; but this I cannot altogether accede to, since the assistance of this instrument is so often required, and many who possess a microscope might be induced to extend their views
to Entomology if they were acquainted with the method of collecting insects, and were furnished with some work to give them an insight into their distribution and arrangement.

The utility of the Calendar must be obvious to every one, as containing extensive and substantial information such as the Tyro will require. Those who reside at a distance from the metropolis have a great advantage, as by carefully examining such places as are referred to in the Calendar they may not only meet with the species enumerated, but are likely to capture new insects, at least undescribed, for as yet very little is known of the Entomology of Britain.

I cannot omit returning my thanks to that acute and excellent Entomologist J. F. Stephens, Esq. F.L.S. whose extensive knowledge of the subject and the readiness with which he has always assisted me deserve my warmest acknowledgement. To Mr. Sowerby also I am indebted for many personal favours.
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ENTOMOLOGY is a study which may be considered as in its infancy. So prone is man to look with contempt on those parts of the creation which are diminutive, that insects have been almost overlooked in his researches after knowledge. His ignorance, the consequence of this contemptuous neglect, has led him to consider the whole class as of small importance, and to arraign the Creator for forming an useless, and in many cases offensive and injurious tribe of beings. Such can be the language only of "haughty ignorance:" the modest observer of Nature, although he may have learned little of the habits, economy, and uses of insects, will acknowledge that they have been created with design, and will not doubt but the design was benevolent.

The insect race constitute by far the most considerable portion of animated beings;—in this view the science of Entomology becomes one of the most important and interesting that can engage the mind of the natural philosopher. He who neglects the study of insects, or thinks it beneath his notice, cannot deserve respect as a general observer of nature, nor be considered a scientific naturalist. The views of such a man will be partial, and his inquiries circumscribed: he regards only an inconsiderable portion of animated nature; and he confines his remarks to such as from their size and distinctness of character present the least obstacle to investigation. In the study of Entomology, the man of science will find abundant scope for the exercise of his zeal. The amazing number of species; their curious forms, so infinitely varied, and yet so nearly and gradually approximating through an endless series of transitions from one species to another; the diversity of structure observable in those parts which afford generic characters, added to the wonderful changes in form which they undergo, with their surprising economy,—are circumstances which contribute to render them objects of most curious speculation to the philosopher. The study of
every class of animals is most indisputably attended with peculiar advantages: yet I will venture to affirm, that it is from a knowledge of the characters and metamorphoses of these little animals, and the various modes of life which they are destined to pursue, that he will obtain a more intimate acquaintance with the great laws of nature, and veneration for the Great Creator of all, than can be derived from the contemplation of any other class in nature. The beauty of insects in general, renders them engaging to many who have neither time nor inclination for studying their more complicated structure; and the gaiety of their colours, often combined with the most graceful forms, displays a beauty, splendour and vivacity, greater than that bestowed by the hand of Nature on any of her other works. One defect in appearance must indeed be conceded; and this may be regarded, in point of beauty, a material deficiency indeed,—they are not always so considerable in magnitude as to become, even with these embellishments, strikingly attractive. Were they equal in size to the smallest birds, their elegance would render them more inviting to the eyes of mankind in general; but, even amongst the minor species, when examined with a microscope, we find their beauty and elegance far superior to that of any other class of animals in the creation. "After a minute and attentive examination," says Swammerdam, "of the nature and structure of the smaller as well as the larger animals, I cannot but allow an equal, if not superior, degree of dignity to the former. If, whilst we dissect with care the larger animals, we are filled with wonder at the elegant disposition of parts, to what a height is our astonishment raised when we discover their parts arranged in the least in the same regular manner!"

Insects may be divided into two kinds; those which are immediately or remotely beneficial or injurious to mankind. Many insects indeed seem not to affect us in any manner; others, and by far the greater number, most assuredly fall under one or the other denomination, and on this account demand our most serious attention. But, lest the alleged utility of some insects should seem hypothetical to the superficial observer, whilst the noxious effects of others are too obvious to admit of doubt, I shall be more explicit upon this subject. The depredations of insects upon vegetable bodies are often detrimental; but it must be remembered, that in these ravages they often repay the injury they commit. Locusts, the most destructive of all insects, whose numbers spread desolation through the vegetable world, are not (except on some occasions when their multiplication exceeds all bounds) unproductive of advantage. Although they deprive mankind of a certain portion of vegetable food, yet, in return, their bodies afford nutriment of a wholesome and palatable kind, and in much greater abundance. The various species of locusts are the common food on which the inhabitants of several parts of the world sub-
INTRODUCTION.

The honey of bees, in many warm climates, constitutes another primary article of food. The caterpillars of several moths furnish materials for the silken raiment so universally worn by all ranks in the eastern parts of the world; and hence in these countries the silky produce of these industrious little animals is of as much use as the fleecy coat of the sheep is to us. As an object of traffic, silk is one of the utmost importance in China and Tartary; and in those parts paper is manufactured from the refuse of the same material. The extensive use of wax in all ages is well known. Some insects are used with success in medicine; and many others (the cochineal for instance) are rendered useful in the arts: and greater numbers might perhaps be employed for the same purpose. These few, out of a vast many instances, are sufficient to prove the absurdity of an opinion very prevalent, "that insects are too insignificant to deserve the attention of the philosopher." But allowing these benefits to be unknown, and that the study of Entomology is not productive of any substantial advantages, how absurd would it still be to treat such an extensive portion of the creation with neglect! The objection, that they are in nowise conducive to our interests (even if founded in truth), would be no evidence of the frivolity of the science; unless we are to conclude, that the only inquiries which merit our rational attention are those which tend to the gratification of selfishness. If this be admitted as an objection, how many objects of philosophical investigation must be rejected as frivolous! From the earliest period in which the light of natural knowledge dawned, this class of animals has obtained a certain portion of attention: and although the study has not at all times been cultivated with equal ardour, yet it has not been utterly neglected, but has engaged the study of men endowed with talents as splendid, and judgement as refined, as the most exalted of those who affect to treat it with contempt.
Elements of Entomology.

So great is the number of natural bodies on the face of our earth, that on a general view the mind recoils at the attempt to investigate them as impossible. But the invention of systems has facilitated the task; and every natural object can be traced by certain characters to its place in the system, whether natural or artificial.

Those who with a philosophical eye have contemplated the productions of Nature, have all by common consent divided them into three great groups; namely, the Animal, the Vegetable, and the Mineral Kingdoms.

Animals are distinguished by being organized bodies, which have life, sensation, and are capable of voluntary motion.

Vegetables are organized bodies, which are endowed with a living principle but want sensation.

Minerals are unorganized, without life or sensation.

Zoology, or the study of Animals, is not only the amplest and most difficult, but the most pleasant and profitable part of Natural History. The following is the system of the celebrated Linne.

Division 1. A heart with two auricles and two ventricles; warm and red blood.

Class I. Mammalia. Viviparous animals, or such as suckle their young.
Class II. Aves. Oviparous animals. Birds.

Division 2. Heart with one auricle and one ventricle; cold and red blood.

Class III. Amphibia. Animals breathing arbitrarily through lungs.
Class IV. Pisces. Animals with gills. Fishes.

Division 3. Heart with one ventricle, no auricle; white and cold blood.

Class V. Insecta. With antennæ, and undergoing transformations. Insects.
Class VI. Vermes. With tentacula, and undergoing no change. Worms.
DEFINITION OF INSECTS.

Insects are so called because they are divided into numerous segments; and not from their being almost separated into two parts, which are merely attached to each other by a slender thread, as is generally supposed.

All genuine insects have six legs; a head distinct from their body, and furnished with two antennae or horns; and have pores conducting to trachea arranged along their sides for respiration: they are all produced from eggs. Some undergo no metamorphosis, others but a partial change, whilst the remainder pass through three stages of existence, after being hatched from the egg.

PARTS OF INSECTS.

An insect may be divided into four parts.

1. **Caput.** 2. **Truncus.** 3. **Abdomen.** 4. **Artus.**

**Caput,** the **Head,** which is distinguished in most insects, is furnished with **Eyes,** **Antenne,** and a **Mouth.**

**Eyes.** Many insects have two crescents or immoveable caps, composing the greatest part of their head, and containing a prodigious number of little hexagonal protuberances, placed with the utmost regularity and exactness in lines crossing each other and resembling lattice-work: these are termed compound eyes.

Leeuwenhoek reckons in each eye of the Libellula, or Dragon-fly, 12,544 lenses, or in both 25,088; the pictures of objects painted thereon must be millions of times less than the images of them pictured on the human eye. There is no doubt that insects still smaller have eyes adapted to discern objects some thousands of times less than themselves; for so the minute particles they feed on must certainly be. Besides these larger eyes, many insects have three small spherical bodies placed triangularly on the crown of the head, called **ocelli** or **stemmata** (Pl. 10. fig. 11. b). They are simple, and made for viewing large and distinct objects; the other eyes for small and near ones.

**Antenne.** The antennae are two articulated movable processes placed on the head: they are subject to great variety, and were the parts from whence Linné formed his genera: they are called

- **Setaceous,** when they gradually taper towards their extremity;
- **Clavated,** when they grow gradually thicker from their base;
- **Filiform,** of an equal thickness throughout the whole of their length;
- **Moniliform,** formed of a series of knots, resembling a string of beads;
- **Capitate,** when they terminate in a knob;
Fissile, with the knob divided longitudinally into laminae or plates;
Perfoliate, having the knob divided horizontally;
Pectinate, having a longitudinal series of hairs or processes projecting from them in form of a comb;
Furcate, or forked, having the last joint divided into parts.

Nothing has been the source of greater speculation than the use of the antennae: nor is this surprising, considering the variety constantly exhibited in their structure, occupation, and appearance. Some insects seem to keep them in continual employment; in others they are preserved in a quiescent state. Those of the ichneumon show an incessant tremulous vibratory motion, anxiously searching into every crevice; while those of the carrion-fly scarcely appear endowed with flexibility. They have successively been considered as the organs of hearing, feeling, smell, and taste, or of an unknown and indefinite sense.

Bonnet seems to think the antennæ the organ of smell. "Different insects," he observes, "have an exquisite sense of smelling, the organ of which is yet undiscovered. May it not reside in the antennæ?" Lehmann, from the result of experiments on this subject, denies that the antennæ are the olfactory organ. He made an opening an inch wide in the side of a glass vessel, and surrounded the edge with wax, so that a close covering could be applied. An aperture was made in this covering, through which either the whole head, or the antennæ only of an insect could be introduced. By means of a tube the glass was filled with penetrating odours, vapours, or heated air; but neither the fumes of sulphur nor burnt feathers produced the smallest effect on butterflies, bees, or beetles, whose antennæ were exposed to them. He judges that the olfactory organ must be sought in the spiracula; "for what else," says he, "is the sense of the particles inspired than smelling?"

Bonsdorf, in discussing whether the antennæ may be the seat of hearing, mentions an experiment where a species of beetle, whose peculiar property it is to fold in the antennæ when alarmed, did so on a loud noise being suddenly made, and fell to the ground, according to the nature of the species. But, notwithstanding that the animal previously reposed in a tranquil state, his experiment cannot be considered altogether conclusive. Butterflies are seen to erect their antennæ on any sudden noise, and many Coleoptera to depress them; which may equally arise from the sudden shock or vibration of the air. Spiders also, which want antennæ, are extremely sensible of sound. Lehmann relates that, on observing one descend from the roof by its thread in quest of a female, while he was reading, he began to read aloud: the animal, alarmed at the noise, retreated upwards; he was silent, and it returned; on again reading aloud, it testified alarm and ascended its thread; nor was its apprehension of danger dispelled, until familiarized with the sound or conquered by the object of its
Parts of Insects.

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pursuit. The same author deprived crickets, which are animals noted for acuteness of hearing, of the antenna; yet they were equally sensible of sound as before. Lehmann concludes on the whole, that as the antennae are not the organs of either smell or hearing, their principal though not sole office is feeling. But they are also endowed with an unknown sense, which he denominates acroscepsin, and conjectures that in certain species they may contribute to the defence of the head.

Huber, well known for his ingenious and acute observations on bees, has made several most interesting experiments on the subject. Amputating one of the antennae of a queen he found was not attended with any perceptible effect. Privation of both antennae, however, produced very singular consequences. M. Huber cut them from a queen whose fecundation had been retarded, so that she laid none but the eggs of males. From that moment a marked alteration in her conduct was seen; sherens the combs with extraordinary rapidity, scarcely had the workers time to recede before her; and, instead of the care which a perfect queen displays in depositing her eggs in those places alone suitable for their exclusion, she dropped them at random without selecting proper cells: she retired to the most solitary parts of the hive, seeming to avoid the bees, and long remained motionless. Several workers, however, followed her there, and treated her with the most evident respect. She seldom required honey from them; but when that was the case, she directed her trunk with a kind of uncertain feeling, sometimes on the head and sometimes on the limbs of the workers; and if she did reach their mouths it was by chance. Queens leave their hive but once in their whole lives, which is for the purpose of obtaining impregnation; they remain voluntary prisoners ever afterwards, unless in leading out a swarm. This queen, however, seemed eager to escape; she rushed towards the opening of the hive, but finding it too small for her exit she returned after fruitless exertion. Notwithstanding the symptoms of delirium by which she was agitated, the workers never ceased to pay her the same attention as they invariably do their queens, though she received it with indifference.

Apprehensive that the queen’s instinct might be impaired, from her organization suffering by retarded fecundation. M. Huber deprived another female of the antennæ, and introduced her into the hive. She was quite in the natural state, and had already proved of great fertility; but now she exhibited exactly the same symptoms of agitation and delirium that the other had done. Perfect queens, possessing all their organs, testify the most violent animosity against each other; they fight repeatedly; the workers seem to incite them to combat, until one at length falls, while the other survives to preserve and perpetuate the colony. Mutilated of the antennæ, however, they testify no recti-
procal aversion; in traversing the hive they meet without showing the smallest indications of resentment. If a perfect stranger queen is introduced, either when one already exists in a hive or within a few hours after she is lost, that stranger is immediately surrounded, and so closely hemmed in by the bees that she sometimes dies. But here the mutilated stranger was quite well received; her arrival created no discontents in the hive, and the workers paid the same homage to her as to their own. "Was it," asks M. Huber, "because after losing the antenna these queens no longer retained any characteristic which distinguished the one from the other? I am the more inclined to adopt this conjecture, from the bad reception experienced by a third perfect queen introduced into the same hive: it is probably because they observe the same sensations from those two females, and want the means of distinguishing them from each other." Bees never abandon their queen; her presence seems almost indispensable to their existence; and, as before observed, the queen never forsakes her hive. If she does so to found a new colony, the bees accompany her in her flight. Here, as both the mutilated queens constantly endeavoured to escape, the first and third were removed, and the entrance of the hive enlarged; the fertile mutilated one therefore left it, but none of the workers followed her; she was allowed to depart alone. The wise provisions of nature are amply illustrated by these facts. It is fortunate that a queen deprived of the antennæ is thus impelled to leave the hive: while she remains, the bees incessantly attend her, and never think of procuring another. The secret which the workers possess, of converting a common worm into one, which will become a queen, must be exercised within the first three days of its existence; therefore if the queen remained, this limited term would elapse. Neither can her presence contribute to preserve the hive; for mutilation of the antennæ deprives her of the power of discriminating the different kind of cells adapted to receive the various species of eggs which she lays. M. Huber considers the antennæ as the organs of touch or smell, though he declines affirming which of these senses resides in them; and thinks it possible that they may be so organized as to fulfil both functions at once.

Mr. Kirby, in speaking of the _Eucera_ (or long-horned bee), says: "A singular circumstance distinguishes their antennæ, which, to the best of my knowledge, has never before been noticed, and which may possibly lead to the discovery of the use of these organs. Placed under a powerful magnifier, the last ten joints appear to be composed of innumerable hexagons, similar to those of which the eyes of these insects consist. If we reason from analogy, this remarkable circumstance will lead us to conjecture, that the sense of which this part so essential to insects is the organ, may bear some relation to that conveyed by the eyes. As they are furnished with no instrument for
receiving and communicating the impressions of sound, similar to the ear, that deficiency may be supplied by extraordinary means of vision. That the *stemmata* are of this description seems very probable; and the antenna may, in some degree, answer a similar purpose: the circumstance just mentioned, furnishes a strong presumption that they do this, at least in the case of these males; else why do they exhibit that peculiar structure which distinguishes the real eyes?"

Mr. Marsham observed the *Ichneumon Manifestator*, in June 1787, on the top of a post in Kensington Gardens. It moved rapidly along, having its antennæ bent in the form of an arch; and, with a strong vibratory motion in them, felt about until it came to a hole made by some insect, into which it thrust them quite to the head. It remained about a minute in this situation apparently very busy, and then, drawing its antennæ out, came round to the opposite side of the hole, and again thrust them in, and remained nearly the same time. It next proceeded to one side of the hole, and repeated the same operation there. Having now again withdrawn its antennæ it turned about, and, dexterously measuring a proper distance, threw back its abdomen over its head and thorax, and projected the long and delicate tube at its tail into the hole. After remaining near two minutes in this position, it drew out the tube, turned round, and again applied its antenna to the hole for nearly the same time as before, and then again inserted its tube. This operation was repeated three times; but Mr. Marsham approaching too near, in order if possible to observe with a glass what was passing in the tube, he frightened the insect entirely away.

About a week afterwards Mr. Marsham was in Kensington Gardens, and saw several of these ichneumons at work. They appeared to pierce the solid wood with their tubes, which they forced in even to half their length, constantly passing between the hinder thighs, which they closed in order to keep the tubes straight, when over resistance would otherwise have forced them to bend. It appeared truly surprising to see an instrument, apparently weak and slender, able, with the strength of so small an animal, to pierce solid wood half or three-quarters of an inch deep; but, on particular attention, it was discovered, that all those that appeared to pierce the solid wood, did it through the centre of a small white spot resembling mold or mildew, which on minute examination was found to be fine white sand, delicately closing up a hole made by the *Apis macillosa*, and where, no doubt, there were young bees deposited.

In deep holes that were not closed, the insect not only thrust in the whole tube, but in some cases the whole of the abdomen and posterior legs, leaving out only the two fore feet and wings, which it placed in contrary directions, like arms. The two cases of the tube were also projected up the back, with the ends appearing above the head out of the hole.
From Mr. Marsham's account it appears that these insects do not adopt any hole indiscriminately as a situation for their eggs; for in many instances he saw them thrust their antennae into holes and crevices from which they almost immediately withdrew them, and proceeded in search of others. As the whole of the ichneumons deposit their eggs in the body of some other creature as a nidus, it appears probable that in these instances they found the holes empty, and that they went on in search of those in which the young of the *Apis maxillosa* were deposited.

From these remarks may we not infer that the antennae may be the organs of smelling? for the antennae of the *Ichneumon Manifestator* (Pl. 3, fig. 4.) are not so long as the tube from which the eggs are excluded, and consequently could not have touched the animal in which it afterwards deposited its eggs. In many species of *Lepidoptera* the females are destitute of wings; the males in general have pectinated antennae, and are so extremely eager after the female, that they have been known to enter the pocket of an entomologist who had one secured in a box.

These experiments are in some measure corroborated by the observations of Latreille, who supposes the antennae to be the olfactory organs. In the twelfth number of the Edinburgh Review is a critique (on the *Nouveau Dictionnaire d'Histoire Naturelle*, 24 tom. 8vo. Paris, 1803-4.) the following extract I here insert, hoping it will produce a further inquiry.

"That insects possess the faculty of smelling is clearly demonstrated. It is the most perfect of all their senses. *Beetles*, of various sorts, *Niterula*, the different species of *Dermeestes, Sylphae, Flies*, &c., perceive, at a very considerable distance, the smell of ordure and dead bodies, and resort in swarms to the situations in which they occur, either for the purpose of procuring food or depositing their eggs. The blue fleshly, deceived by the cadaverous odour of a species of *Arum*, alights on its flower. But though we can thus easily prove the presence of the sense of smell among insects, it is much more difficult to discover the seat of that particular sense. Several naturalists have supposed that it resides in the antennae. Duméril, in a dissertation published in 1799, attempts to prove that it must be situated about the entrance of the stigmata or respiratory organs, as Baster had previously supposed. His arguments, however, did not induce Latreille to relinquish the former opinion, which places it in the antennae. The following are the reasons which he assigns for his belief.

1. The exercise of smell consists only in the action of air, impregnated with odoriferous particles, on the nervous or olfactory membrane, which transmits the sensation.

2. If insects be endowed with an organ furnished with similar nerves, and with which air, charged with odoriferous particles, comes in con-
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tact, such an organ may be regarded as that of smell. Should the anten-
tenna present a tissue of many nerves, what inconvenience can result
from supposing that this tissue is capable of transmitting odour? Would
not this hypothesis, on the contrary, be more simple and more
consonant to anatomical principles, than that which fixes the seat of
smell at the entrance of the stigmata? Besides, this last mode of ex-
planation will not, I presume, suit the crustaceous animals, which so
nearly approach to insects.

"2. Many male insects have their antennæ more developed than the
females; a fact easily explained, if we admit that these organs are the
seat of smell.

"3. It is certain that most of those insects which live or deposit
their eggs on putrid animal or vegetable matters, stagnant waters, or
any substance, in short, which, for a time, affects peculiar localities,
are almost uniformly distinguished by a greater development of the an-
tennæ. Such, for example, are the Scarabæus, Dermestes, Silpha, Clerus,
Tenebrio, Tipula, Blööa, &c. These require a more perfect sense of
smell, and are organized accordingly.

"4. A great many insects which are entirely predaceous have simple
antennæ; and those which are characterized by similar manners, and
which are sedentary, have none at all; as, for instance, the Acri, and
a considerable portion of Lamarck’s Arachnida.

"5. Insects discover their habitation and food by the sense of smell.
I have deprived several insects of their antennæ, when they instantly
fell into a state of stupor or derangement, and seemed to be incapable
of recognising their haunts or their food, though just beside them.
Such experiments deserve to be prosecuted. I would recommend, for
example, the varnishing or covering the antennæ of dung beetles, and
placing them near animal excrements, of which they are particularly
fond, to observe if they would repair to them as usual.

"6. The nerves terminate at the antennæ; and their articulations,
though externally covered with a pretty thick membrane, are hollow,
lined within by a soft substance, which is often of a watery consist-
ency, and whose extremity, when opposed to the air, may receive its
impressions."

Os, the Mouth. In order to afford some idea of the amazing dif-
ference that prevails in the structure of the several parts or organs
which constitute the mouth, it will be only requisite to observe, that
the classification of all insects in the Fabrician system is founded on
this character. There are ten principal parts of which the mouth con-
sists; and it is from the relative proportion of each, from the dissimi-
larity in the form, position, variation in number, or occasional pecu-
liarities, that the most permanent characters are deduced. These parts
have one disadvantage; they are generally small, and from this cir-
cumstance have not been so universally adopted in the arrangement
of insects as they would otherwise have been. Without, however, bestowing some little attention on these organs, it is impossible to distribute insects into their natural order with any great degree of certainty. In the works of Latreille, Leach, and most other modern writers on Entomology, the essential characters are established chiefly on the peculiarities of these organs.

The ten principal parts of which the Mouth consists are the following.

**Labrum**, or **Labium, superius**, the *Upper Lip*: a transverse, soft, moveable piece, of a corneous or membranaceous nature, known from its situation at the anterior or upper part of the mouth. This part is very distinct in many of the *Coleoptera*, and in *Gryllus*, *Apis*, and some other genera. Linné sometimes confounds the upper lip with the *clypeus* or shield of the head; and similar instances occur in the works of Fabricius. These two parts may be distinguished by one invariable character; the *clypeus* is fixed, and forms a portion of the head; the upper lip is moveable, and is placed more forward.

**Labrum**, or **Labium, inferius**, the piece which terminates the mouth beneath, and which is sometimes lengthened so as to form the instrument called *ligula*. It is often bifid, and has the posterior pair of feelers placed at the base.

**Mandible**, *Mandibles*: (*Pl. 10. fig. 1. d.*) two hard pieces, in substance resembling horn, which are placed one at each side of the mouth, below the upper lip. These have a lateral motion, while the upper and lower lip move up and down, as in other animals. These differ from the *maxilla*, with which they are sometimes confounded, by not having any of the *palpi* or feelers attached to them. In rapacious insects these are longer than in those which perforate wood; and the latter again have stronger mandibles than insects which feed only on herbage or leaves.

**Maxille** (*Pl. 10. fig. 1. c.—fig. 2. a. the same magnified*): two small pieces generally of a somewhat membranaceous consistency, and in figure different from the mandibles. These are commonly indented at the extremity, and nearly all ciliated at the inner edge. They are placed under the mandibles, and above the lower lip; their motion is lateral. In those insects which have more than two pair of feelers, the posterior ones take their origin from the sides of the maxille. (*fig. 2. b. c.*)

**Galea**, *Shields of the Mouth*: two membranaceous appendages, usually of a large size and cylindrical form, placed one on each side, at the exterior part of the jaw, and which cover and protect the organs of the mouth conjointly with the lips. The *galeae* are inserted at the back of the jaws, as is well exemplified in the *Gryllus* tribe.

**Ligula.** This is the part considered by many authors as the lower lip; its situation is immediately under the jaws; and it consists of a single piece, which is generally of a soft texture, often bifid, and, if at-
tentively examined at the base, will be frequently found of a horny sub-
stance.

In the Coleoptera, and in some of the Hemiptera (as in Blatta, Gryllus, &c.), this appendage terminates at the point in a membranaceous sub-
stance:—its form is extremely various in the different genera. The
Hymenoptera and some Neuroptera have the ligula situated in the
same manner; but it is in these concave, and is frequently prolong-
ated into a sort of proboscis, which sometimes exceeds the length of the
whole body. It is membranaceous, but of a soft and spongy texture, and
well suited for receiving the impressions of taste. This kind of
process is extremely well exemplified in the bee.

Lingua, the Tongue: an involuted tubular organ, which constitutes
the whole mouth in lepidopterous insects. This is of a scaccous form,
and either very long, as in the Papilio and Sphinx genera; or short, as
in most of the Bombyces and other moths. It consists of two filamen-
tous pieces, which are externally convex, concave within, and connected
longitudinally by a suture along the middle above and beneath. These,
in uniting, form a cylinder, through which the nectarous juices of the
flowers on which these insects subsist are drawn up with facility.
These two pieces are not very closely united, and may be separated by
means of a needle point. When the insect takes its food, this tube is
exserted; at other times it is rolled up spirally between the palpi.

Rostrum, or Beak: the part which forms the mouth in many of the
hemipterous order of insects. This instrument is moveable, articu-
lated, and bent under the breast. Within, this beak is hollow, and
contains, as in a sheath, three or more very fine and delicate bristles,
the points of which these insects introduce into the body of the ani-
mal, or substance of the plants, from which they draw nourishment.
The rostrum is conspicuous in the genera Cicada, Neya, and Cimer.

Proper, the Trunk: inserted in the place of the mouth in most
dipterous insects. It is rather fleshy, retractile, of a single piece, and
often cylindrical; the end forming two lips, which are of a soft sub-
stance, and from the delicacy of their teguments must possess the fa-
culty of taste in a very high degree. Example in the House-fly.

Lingua, rostrum, and proboscis, are Linnaean terms; and are adopted
according to the definition of that author. Ligula is a Fabrician ex-
pression, indicating a process of the lower lip.

Hastulcm: formed of two or more very small and delicate fil-
ments, inclosed in a sheath of two valves.

Palpi, Fiehers. These are the small, moveable, filiform organs or
appendages, placed at each side of the mouth in the generality of in-
sects. In some respects they resemble the antenna, but are more
distinctly articulated. They vary in number in different insects, being
either two, four, or six, (Pl. 40, fig. 1, f, f. and g.) and are commonly in-
serted at each side the exterior part of the jaw. In those which have
only one pair, they are usually situated on the upper lip; when two or more, the posterior ones are generally on the lower lip; and in some insects furnished with a sucking trunk, they are oftentimes found inserted at each side of that organ. These feelers are composed of several joints, the number of which vary. Like the antennae, to which they bear analogy, they are endowed with powers of motion, but still more extensively. They also serve, like the antennae, as an essential character in the construction of genera; and from their situation, the number of joints, termination, and relative proportion and size, are exceedingly useful for that purpose.

Frons, the Front: the anterior or fore part of the head, the space between the eyes and the mouth.

Clypeus, Shield of the head in coleopterous insects: the part corresponding with the front of the head in the other orders. In the beetle kind it is advanced more or less upon or over the mouth, and in some forms a sort of cap, the rim of which extends so far over the head as to conceal the mouth beneath. The anterior edge of the clypeus is sometimes mistaken for the upper lip.

Vertex, the Crown or summit of the Head.

Gula, that part which is opposed to the front of the head, usually called the Throat.

TRUNCUS, the Trunk: the second principal division of which an insect consists, comprehending that portion which is situated between the head and the abdomen. The trunk includes the Thorax, Collar, Sternum, and Scutel.

Thorax: a term indefinitely applied sometimes to the whole trunk, the scutel excepted: in a stricter sense it implies only the dorsal part of the trunk, and may be considered as expressive of that portion of the superior surface which lies between the head and the base of the wings. The appropriation of suitable terms, by which a thorax consisting of one or of several pieces may be discriminated from each other, is desirable. In some the thorax is of a single piece, as in the orders Coleoptera and Hemiptera; in that of Lepidoptera it comprehends several segments, and a similar structure is still more conspicuous to view in the order Hymenoptera. The first or anterior segment of the thorax, in those consisting of several pieces, has been sometimes called the collar; but in admitting this, the coleopterous and hemipterous orders of insects can have no thorax. This will be rendered plain, when we consider that in the latter kinds of insects the first pair of legs arises from what is usually understood by the lower surface of the thorax; the interior segment, in hymenopterous insects, corresponds with the whole thorax in the former, for the first pair of legs arises from it in exactly the same manner. In the former, the thorax of a single piece is immediately succeeded behind by a scutel, while in
the Hymenoptera and Lepidoptera a large plane of one or more joints intervenes between the true thorax and the scutel; and it is to this last-mentioned dorsal space that the term thorax is assigned. Hence it is evident that the language of Entomology in this point is not altogether consistent; because what we denominate the collar in Hymenoptera, is the thorax in Coleoptera; and in Coleoptera we find nothing analogous to the thorax of the other order, except the collar.

The thorax in those insects which have that part consisting of a single piece, or the first segment in such as are of a compound nature, has the first pair of legs arising from the lower surface, and it is in this part that the muscles which move the head as well as this pair of legs are said to be contained. The thorax in different kinds of insects varies considerably in form, and affords very excellent generic and specific distinctions. Some are armed with spines, others denticulated, margined, &c.

Pectes, the Breast, is the third segment of the body, or that to which the four posterior feet are attached, and which is longitudinally divided at the anterior part of the sternum. The wings in lepidopterous and most other insects have their origin or base in the superior part of the breast. The wings and elytra in the Coleoptera and Hemiptera deviate a little from this, as they are placed more immediately on the back than in a lateral position; the breast contains the muscles that move the wings and give action to the four posterior legs. This part is capable of being compressed and dilated, the alternate motion of which is very evident in some insects of the butterfly or moth kind when held between the fingers. The power of compression and dilatation is supposed to arise from the action of some very strong muscles, being reddish yellow, and extremely loose. It has been conjectured that these muscles may assist the motions of the organs of flight.

Sternum, or Breast-bone. By this term entomologists define that portion of the middle part of the breast which is situated between the base of the four posterior legs. This piece terminates in some insects anteriorly in a somewhat acute point; in others it appears rather bilobate; and in the far greater number ends obtusely or in an obtuse lobe. There are few insects in which the sternum is remarkable, either from its magnitude or figure. In some of the coleopterous tribes, as in the Hydrophili and Dytici, this part is most conspicuous.

Scutellum (Linne), the Scutel or Escutcheon: the lobe-like process situated immediately at the posterior part of the thorax in the scutellate insects. The scutel is not of the same form in all insects, yet its general tendency is towards a sub-triangular figure. In the coleopterous tribes it approaches nearest to this form; its deviations incline more or less to heart-shaped, with the tip pointing backwards. The same figure prevails in some of the Hemiptera. In the Neuroptera, Hymenoptera, and
Diptera, the triangular contour is still more observable under various modifications, and most commonly with the posterior tip rounded off. Sometimes, as in several of the hymenopterous insects, the posterior end is armed with spines or dentellations; this is, however, not usual. The scutel in the far greater number of insects, whether terminating in a point or rounded, is commonly unarmed. In point of size the scutel is more variable than in figure: in some it is so small as almost to escape notice, merely forming a point at the extremity of the thorax, as we observe in certain kinds of the beetle tribe; in others it is very conspicuous, being sometimes so large as to cover the middle of the back; and in others, as the scutellate kinds of Cimicids and a few of the genus Acrilius, it expands over the back, entirely concealing the wings and wing-cases, and covering the margin of the abdomen.

ABDOMEN. The third principal division, or posterior part of the body, is connected with the breast, either closely or at a distance, by means of a fillet. The abdomen is composed of annular joints or segments, the number of which vary in different insects. The upper part of the abdomen is called by entomologists, tergum; the inferior or belly, venter. The opening at the posterior part of the abdomen is the vent; and the extremity in most insects contains the organs of generation: there are exceptions to the latter.

The total movement of the abdomen is not very obvious, except in insects which have that portion of the body pediculated, as in many of the hymenopterous genera. It has then a real joint, in which the first annulation is indented above, and receives a projecting process from the breast, on which it moves. This joint is rendered secure by elastic ligaments, which have a considerable degree of force. Some muscles which arise within the breast are inserted into the first ring, and determine the extent of its motions. The partial motion of the ring is produced by very simple muscles, consisting of fibres which extend from the anterior edge of one ring to the posterior edge of that which immediately precedes it. When the dorsal fibres contract, the superior part of the abdomen being shortened, it turns up towards the back; but when the contraction takes place in the ventral or lateral fibres, the abdomen is inflected towards the belly, or directed towards one of the sides. The extent of the motion, however, depends on the number of the rings and their mode of junction. In the Coleoptera, for example, the rings only touch each other by their edges, and the motion is very limited; but in the Hymenoptera they are so many small hoops, which are incased one into another like the tubes of a telescope, so that scarcely half, and sometimes not above one-third, of their extent appears visible externally.

The form, connexion, proportion, and appearance, of the surface of the annulations of the abdomen, afford numberless specific distinc-
tions; and so likewise do the appendices at the extremity of the abdomen.

The abdomen contains the intestines, the ovary, and part of the organs of respiration; it is affixed to the thorax, and in most insects distinct from it, forming the posterior part of the body.

Cauda, the Tail. An appendage of any kind terminating the abdomen is usually denominated the tail. These appendages vary in figure considerably in different insects, and many tribes are totally destitute of them. They are supposed to be destined to direct the motion of the insect in flight, to serve for its defence, and for the deposition of its eggs. In some insects this tail is simple, and yet capable of being extended and withdrawn at pleasure; in others elongated. Some are setaceous or bristle-shaped, as in the Raphidia. Those termed triseta have three bristle-shaped appendices, as in the Ephemera. In some it is forked, as in Podura. When it terminates in a pair of forceps it is called forcipata.

In the Blatta and others it is foliosa, or resembling a leaf. In the Panorpa it is furnished with a sting, and is called telijera: this last may be more properly referred to the next.

Aculeus, the Sting: an instrument with which insects wound and instil a poison. The sting generally proceeds from the under part of the last ring of the belly: in some it is sharp and pointed, in others serrated or barbed. It is used by many insects both as an offensive and defensive weapon: by others it is used only to pierce wood, or the bodies of animals, in order to deposit their eggs. In wasps and bees the sting is known to be retractile. In some insects it exists in the male only, and in others nature has provided the female alone with this instrument: it is not frequently met with in both sexes of the same species, and the far greater number of insects have no such organ.

ARTUS, the Members.

Pedes, the Legs. In all insects the legs amount to six, and never exceed that number; and the same is observable of the true feet in the larvae of those insects; the latter have spurious feet to a greater amount, but the true feet do not exceed six.

The leg of an insect may be divided into four, or more correctly into five, parts: Coxa, the first joint or haunch, at the base; Femur, the thigh; Tibia, the Shank; Tarsus, the foot; and Unguis, the claw. Each of these parts is enveloped in a hard case of a horny substance, and varies in shape in different insects, the form of the feet in all the kinds being admirably adapted to their mode of life and convenience of their motion. From the different conformations of these limbs it is easy to recognise, even in the dead insect, the mode of life which the species is destined by nature to pursue. Those which have the legs adapted for running or walking have them long and cylindrical: the thighs of the
leapers are remarkably large and thick, with the shank long and commonly arched, by which means they possess great strength and power for leaping: the legs are broad, serrated, and sharp at the edges, in those accustomed to dig in the earth; and such as are of the aquatic kind have the legs, especially the posterior pair, long, flat, and ciliated, or fringed at the edge with hair. The leapers are well exemplified in the saltatorial kinds of Caracilia and Chrysomela; and the swimmers, in the genera Hydrophilus and Dyticus.

The Coxá, a small joint at the base, connects the thigh to the body, and moves in a corresponding cavity of the collar or thorax in the first pair, or breast in the two posterior ones. This part varies in form: in the Cerambices, Coccinella, and other insects in which the feet serve for walking only, its shape is globular: such as require that the feet should have a lateral motion, and which is necessary to those that dig into the earth, have the coxa broad and flat; this is also observable in some of the aquatic beetles: in the Dytici the coxa of the posterior legs is imbedded in the trunk, and in the Blatta, Lepisma, and others which walk very rapidly, it is compressed into a lamellate form.

Femur, the Thigh. There is more diversity in the form of the thigh than the coxa to which it is united. The articulation of these two parts is internal, and is produced in such a manner that when the animal is in a state of repose it is parallel to the inferior surface of the body. It is limited to a forward and backward motion with respect to the first piece. The nature and extent of the motions of the thigh appear to determine its form. In those insects which walk much and fly little, as in the Carabus, &c. the thigh has two little prominences at the base called trochanters, which appear to be intended for removing the muscles from the axis of the articulation. Those which require strong muscles adapted for leaping, have the thigh not only thick but generally elongated; as in the Gryllus and Locusta tribes, the Pulices or fleas, &c. And in the Aphodins, Geotrupes, &c. (Scarabæi Linn.), and also the mole cricket, (all which burrow in the earth,) the thigh is moved with much force, and has an articulated surface corresponding to the flat part of the coxa on which it rests. This part is sometimes spinous.

Tibia, or Shank, is the third joint of the legs, and moves in an angle according to the direction of the thighs. The figure of this part depends essentially on the uses to which the habits of the insect require it to be applied: in the natatorial kinds it is usually flat and ciliated—at least the tibia of the posterior pair; and in many others, as in a variety of the burrowing kinds of beetles, it is serrated. The shank is more frequently serrated or spinous than the thighs.

The Tarsus, or Foot, is the fourth joint or last portion of the leg except the claw. This part consists in general of five joints; this is usually the number in the Coleoptera, Hymenoptera, and Diptera. In some of these, however, and also in the Hemiptera, there are only four
articulations in this part of the leg, as we observe in Cerambyx, Gryllus, and others: in Libellula, Forficula, &c. three: in the anterior feet of Nepa only one. The figure of the tarsus is more variable than any other portion of the leg, and is in a most singular manner adapted to the insect's mode of life. The articulations in such as walk on the surface of the earth are slender; those which burrow have them more robust. Many of those which inhabit waters have them flat and ciliated at the edges, as in the Hydrous. Others are furnished with bristly tufts or vascular fleshy tubercles, which enable them to move with security on smooth and slippery bodies in any direction: an admirable example presents itself in the common house-fly, which "treads the ceiling, an inverted floor," with the same facility that other insects walk on the surface of the ground. An occasional difference in the number and form of the joints of the tarsus is sometimes observed in the two sexes of the same species. The motion of each joint of the tarsus is performed in a single plane, and is directed by two muscles in each joint, one of which is small and placed on the dorsal surface, the other larger and situated beneath.

Unguis, or Claw, the termination of the tarsus. In the greater number of insects there are two claws attached to each tarsus: some have only one; and in others furnished with two there is an intermediate process, forming by this means three. An appearance similar to this is seen in the legs of the Lucanus; but this on minute examination is found to be a distinct joint also, armed with a pair of claws precisely resembling those which more obviously, from their size, appear to terminate the tarsi. It is considerably smaller, but is perfectly well defined.

A.L.E, or Wings: the organs appropriated to flight. These are either two or four, and are attached to the lateral part of the breast close to the lower margin of the thorax. They are placed to an equal amount and in a corresponding situation on both sides of the insect, whether the number be two or four. Those insects which are furnished with only one pair of wings have in these organs both an uniform appearance and size. Such as have two pair most frequently differ, the first being larger than those behind: there is also a difference in shape, and very commonly a considerable variation in the spots, markings, and other particulars, notwithstanding the prevailing hues in all the wings may be the same. In general the posterior pair is paler, and the marks obscure.

A skeleton of nervures, (which are considered in the light of bones by Dr. Leach, who has named them Pterigostia or Wing-bones, and are parts more or less numerous and differing exceedingly in disposition,) placed between two thin and closely united membranes, constitutes the true wing in insects. This conformation is very...
clearly exemplified in that description of wings which is usually termed transparent, as in the common house-fly and the bee. The true wing, by means of which the insect is enabled to fly, is always constructed in this manner, whatever may be its appearance externally, arising from a superficial covering of down, feathers, hair, or any other cause. The variety in the form and structure of the wings, in the number, figure, and disposition of the nervures, or the colours with which they are adorned, is infinite. The diversity in the disposition of the nervure is evident from a comparison of the simply constructed wing of the common house-fly with the complex wing of the Panorpa or the Ephemera, or the wings of an earwig, which consists of a series of single nervure, with the elaborately wrought lattice-work of the wing of the Libellula. The whole of the lepidopterous order exhibit the superficial coating of feathers, down, or hairs; and upon the removal of these the wings are found constructed in the same manner as the transparent wings of the other orders. A variation in the form of the wing as well as its texture is manifest throughout all insects of the winged kind. Those of the Coleoptera have two membranaceous wings, which fold upon each other, forming a plait or double at their external margin, which fold is accommodated by a peculiar joint in the main rib of the wing, and the disposition of the nervures in the middle of the wing contiguous. In the Hemiptera the wings generally fold longitudinally, without any transverse double; so that in expansion these parts open somewhat like a fan. The anterior wings of the Lepidoptera are neither doubled across nor folded longitudinally; they are entirely flat, and are but little capable of contraction and dilatation. In the genus Papilio they are endowed with the power of erection, which is rarely the case in the Phalane, though occasionally observed among the Sphinxes; the Phalene have the lower wings concealed under the anterior pair, the latter being laid in a flat position over them. The wings of the Lepidoptera are downy, and often decorated with very beautiful colours disposed in the most pleasing and varied manner. The Neuroptera in general have the wings flat; this is not invariable; they are constantly membranaceous, and reticulated with nervures. In the Hymenoptera the wings are membranaceous, generally flat, but sometimes folded when the insect settles, as in the wasp genus. The Dipteraeous order cannot be confounded with the preceding, as they have only two wings: they are membranaceous as in the former.

In all insects of the winged kind these organs present the greatest diversity, and afford characters both for genera and species less liable to fluctuation than common observers would conceive. The number, figure, construction, proportion, consistence, and texture of the wings have enabled naturalists to distribute insects into principal groups with considerable precision. Linne derived much assistance from an
attention to these parts; later writers have in many instances regarded them more closely; and in the further progress of the science these parts will be consulted with still greater advantage.

Elytra, or Wing-cases, appertain to the coleopterous order. These are two in number, of a substance resembling leather; for the most part moveable, and opening by a longitudinal suture along the middle of the back. These wing-cases or sheaths are often confounded with the wings; but they are really not wings from their structure or substance, nor do they answer the purpose of flight; they merely open to afford the true wing, concealed beneath, the power of expansion and motion, and close down upon the wing when the insect is at rest, to preserve it from injury. Some Coleoptera have the elytra united.

The superior surface of the elytra is more or less convex, and the lower surface correspondently concave: the texture in some, as in many of the Curculionos and Cerambyces, is so hard that it is pierced with difficulty by means of a strong pin; in others so flexible that they spring into their proper form immediately after being bent double. The proportions of the elytra compared with the body are various; their form dissimilar; and the diversity of their surface—arising from dots raised or depressed, protuberances, flutings, colours, and other circumstances—endless. These differences in the elytra furnish some excellent generic distinctions, and are still more extensively useful in constituting the characters of species.

Halteres, Poisers, or balancers: appendages peculiar to insects of the dipterous order, and which, with sufficient reason, are deemed an essential character of that group. These poisers are two short, moveable, clavated filaments, placed one contiguous to the origin of each wing. They seldom exceed one-tenth the length of the wing, though in certain genera they are rather longer. The capital, or head, in which the filament terminates, is either roundish, oval, truncated at the end, or compressed at the sides: in some insects its situation is directly under a small, arched, filmy scale, which also varies in size and form; and in several families is apparently wanting.

The exact purpose to which nature has destined these organs has not been hitherto ascertained in a very satisfactory manner. The most prevalent, and perhaps in some measure the most consistent, opinion seems to be, that they balance or counterpoise with the action of the wings, when the insect is in flight, in the same manner as rope-dancers exercise a pole to preserve their equilibrium. The diminutive-ness of their size is a plausible objection to this idea. Others consider these as the organs of that vibratory sound which dipterous insects emit in flight: they compare the filmy scale to a kind of tambour, and liken the balancer to a drum-stick, which striking repeatedly upon it, they conceive, must occasion this noise. It is apprehended the sound they emit in flight cannot be traced to this cause; for the best of all possible
reasons, that this buzzing sound is observable in a vast number of insects which have no poisers or balancers, such as wasps and bees. The two genera *Asilus* and *Bombylus* have no scale, and yet the noise perceptible in their flight is louder than in most of those which have both scale and poisers, as in the *Muscæ*. Nor does this noise issue from the poiser, either by striking on the scale or by any other means, since it is known that if the poisers, or both poisers and scales, be cut off, the same sound continues to be heard from the mutilated insects as before.

There are many terms at present in use, to discriminate with greater precision the parts I have here described, and which should be understood by the student in entomology. I have thought it therefore best to insert them in alphabetical order at the end of the work.

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**THE ECONOMY OF INSECTS.**

Most animals retain during life the form which they receive at their birth. Insects are distinguished from these by the wonderful changes they undergo. The existence of an insect partakes of two, three, or four distinct states; and in each of these differs most essentially in appearance, organization, and manners of living.

The changes through which the greater number of insects pass are from the Egg to the Larva, from the Larva to the Pupa, and from the Pupa to the Imago or perfect state. Exceptions occur to this: for some insects are viviparous; but the number of these is not considerable.

Of the EGG state. The egg, containing the insect in its smallest size, is expelled from the ovary as in other oviparous animals. They are contained and arranged in the body of the insect, in vessels which vary in number and figure in different species. The same variety is found in the eggs: some are round, others oval, and some cylindrical. The shells of some are hard and smooth, while others are soft and flexible.

The eggs of insects are of various colours: some are found of almost every shade of yellow, green, and brown, a few are red, and others black. Green and greenish are not unusual, and they are sometimes speckled with darker colours, like those of birds. Some are smooth, and others beset in a pleasing manner with raised dots.

Insects are instructed by nature to deposit their eggs in situations where their young ones will find the nourishment most convenient for them. Some deposit their eggs in the oak-leaf, producing there the red gall; others choose the leaf of the poplar, which swells into a red bladder: and to a similar cause may be assigned the knob which is often seen on the leaf of the willow. The *Lasiocampa neustria* glues its eggs
with great symmetry in rings round the smaller twigs of trees; others affix them to the surface of leaves; and again, others lodge them in the crevices of trees.

The *Ephemera, Phryganea, Libellula*, and Gnat, hover over the water all the day to drop their eggs: these hatch in the water, and continue there while in the larva and pupa form, quitting the water only when they attain the winged state. The mass formed by the eggs of the gnat resembles a little vessel, and floats on the surface. This insect is said to deposit only one egg at a time; the first is retained by means of the legs, when dropped, till a second is deposited next to it, then a third, fourth, and further number, till the mass becomes capable, from its symmetry, to support itself upright. Many moths cover their eggs with a thick bed of hair or down, collected from their own body; others cover them with a glutinous substance, which when hard protects them from the ill effects of moisture, rain, and cold. The solitary bees and wasps prepare nests in the earth, hollow trees, or cavities in old walls, wherein they place a quantity of food for the support of the young brood when they break from the egg. The ants are known to construct nests in the earth, in which their eggs are placed with the utmost care. Some deposit their eggs in the larva of other insects, chiefly those of the moth and butterfly kind; and having passed through all their changes in their bodies, become what is termed the ichneumon-fly. The *Gasterophilus Equi* (bot-fly) deposits its eggs on the bodies of horses in the following remarkable manner. When the female has been impregnated, and the eggs sufficiently matured, she seeks among the horses a subject for her purpose; and approaching him on the wing, she carries her body nearly upright in the air, and her tail, which is lengthened for the purpose, curved inwards and upwards: in this way she approaches the part where she designs to deposit the egg; and suspending herself for a few seconds before it, suddenly dart upon it, and leaves the egg adhering to the hair: she hardly appears to settle, but merely touches the hair with the egg held out on the projected point of the abdomen. The egg is made to adhere by means of a glutinous liquor secreted with it. She then leaves the horse at a small distance and prepares a second egg, and, poising herself before the part, deposits it in the same way. The liquor dries, and the egg becomes firmly glued to the hair: this is repeated by these flies till four or five hundred eggs are sometimes placed on one horse.

The inside of the knee is the part on which these flies are most fond of depositing their eggs, and next to this on the side and back part of the shoulder, and less frequently on the extreme ends of the mane. But it is a fact worthy of attention, that the fly does not place them promiscuously about the body, but constantly on those parts which are most likely to be licked with the tongue; and the ova, therefore, are always scrupulously placed within its reach.
Of the LARVA, or Caterpillar state. All caterpillars are hatched from the egg, and when they first proceed from it are generally small and feeble, but grow in strength as they increase in size. The body of the caterpillar consists of twelve rings; the head is connected with the first, and is hard and crustaceous. No caterpillar of the moth or butterfly has less than eight, or more than sixteen, feet; those which have more than sixteen belong to some other order of insects. The six anterior feet, or those next the head, are hard and scaly, pointed and fixed to the first three rings of the body, and are in number and texture the same in all Lepidopterous larvae. The posterior feet are soft, flexible, or membranaceous; they vary both in figure and number, and are observable only in the caterpillar state, the perfect insect having only six feet, the rudiments of which are the six anterior scaly feet before mentioned. These spurious feet are either smooth or hairy, soft to the touch, or hard like shagreen. On each side of the body are nine small oval apertures, which are the spiracles or organs of respiration.

The caterpillar, whose life is one continued succession of changes, often molts its skin before it attains its full growth. These changes are the more singular, because when it molts it is not simply the skin that is changed; for we find in the exuviae the jaws, and all the exterior parts, both scaly and membranaceous.

The change in the caterpillar is effected by the creature's withdrawing itself from the outer skin as from a sheath, when it finds itself incommodeéd from being confined within a narrow compass. But to accomplish this change is the work of some labour and time. Those caterpillars which live in society, and have a nest or habitation, retire there to change their skin, fixing the hooks of the feet, during the operation, firmly in the web of their nest. Some of the solitary species spin at this time a slender web, to which they affix themselves. A day or two before the critical moment approaches, the insect ceases to eat, and loses its usual activity; in proportion as the time of its change approaches, the colour of the caterpillar diminishes in vigour, the skin hardens and becomes withered, and is soon incapable of receiving those circulating juices by which it was heretofore nourished and supported. The insect is now seen at intervals with its back elevated, or with the body stretched to the utmost extent: sometimes raising its head, moving it from one side to another, and then letting it fall again. Near the change the second and third rings are seen considerably swollen. By these internal efforts the old parts are stretched and distended as much as possible, an operation attended with difficulty, as the new parts are all weak and tender. However, by repeated exertions, all the vessels which conveyed nourishment to the exterior skin are disengaged, and cease to act, and a slit is made on the back, generally beginning at the second or third ring. The new skin may now be just perceived, being distinguished by its freshness and brightness of colour. The caterpillar then
presses the body like a wedge into this opening, by which means it is soon torn down from the first to the fourth ring: this renders it large enough for the caterpillar to pass through.

The caterpillar generally fasts a whole day after each moulting; for it is necessary that the parts should acquire a certain degree of consistency before its organs can perform their ordinary functions. Many perish under this operation. The caterpillar always appears much larger after it has quitted the exuviae than before; for the body had grown under the old skin till it had become too large for it, and the parts being soft they were much compressed; but as soon as this skin is cast off, the parts distend, and with them the new skin, which is yet of a flexible and tender texture, so that their increase in size at each moulting is considerable. Some caterpillars in changing their skin alter very much in colour and appearance; sometimes the skin from being smooth becomes covered with hair, spines, or tubercles; and others that are in one stage hairy, have the skin smooth in the next. No sex is developed in the caterpillar state.

Of the PUPA state. By this term, as understood in the very extensive sense Linné proposes, is signified that state of an insect which succeeds the larva, without any regard to the particular appearance it assumes in this stage of transformation. From this latitude of meaning it includes therefore, with equal precision and no less propriety, states of the most discordant character. It alike implies the uncouth grub incased in its shelly repository and immured in the earth, sluggish, almost destitute of motion or the appearance of any animal function, with the lively half-winged locust, or the Cicada, animals sporting in the full enjoyment of life. The bot imprisoned in its oval covering, without the least external sign of animation, is termed a pupa. The moth, quiescent and absent for months, concealed in its shelly covering in the earth, or suspended aloft in its silky envelope to the branch of a tree, is a pupa; and we denominate those pupa also which have the wings only half expanded; though, like the nimble-footed Cimer, they are perpetually roving, and deriving sustenance from the blood of other animals; and so also the restless Libellula, which is continually traversing the watery element with the facility of fishes in search of prey. Modern writers have therefore considered this state as essential in the formation of Orders, and have even laid down certain rules, which taken in conjunction with the characters of the perfect insect, are often of great use in ascertaining the order to which any genus belongs. In my account of the Larva I have given that of the lepidopterous order, and shall therefore describe the Pupa of the same.

The length of time an insect remains in this form varies much in different species. As soon as the inclosed animal acquires sufficient strength to break the bonds of its confinement, it makes a powerful effort to escape.
The opening through which they pass is always at the same part of the skin, a little above the trunk, between the wings and a small piece which covers the head: different fissures are generally made in the same direction. When the operation begins, there seems to be a violent agitation in the humours contained in the little animal; the fluids being driven with rapidity through all the vessels, the limbs and various parts of the body are put in motion, and by repeated efforts it breaks through the brittle skin that envelopes it. Those inclosed in cones or cases, after bursting through the pupa covering, have another difficulty to overcome, that of piercing through the inclosure, which in many instances is of a stronger texture than the case of the pupa. For the accomplishment of this, most insects are provided with a liquor, which they discharge from the mouth upon that part of the cone through which they intend to escape; and this so moistens and weakens it, that after a short time they force their passage through with some facility. Some insects not provided with this fluid leave one end of their cone weaker than the rest, and close it only with a few threads, so that a slight effort of the head enables the insect to burst from its prison.

The butterfly or moth on emerging from the pupa is moist, the abdomen swollen, the antenna bent down, and the wings crumpled, small, and shapeless. These parts are gradually unfolded, and assume their destined form. The wings, which at one instant are small and like four little buds at the sides of the thorax, in a few minutes after acquire their full size; and the fibres, which were at first flexible, become hard and rigid like bone. In proportion as the fibres lose their flexibility, the fluids which circulate within them extend, and the wings cease to act; so that, if any extraneous circumstance arrests the progress of this fluid through the fibres at the first instant of the moth's escape, the wings immediately become crippled, and never afterwards assume any other form. Most insects, soon after they have attained their perfect state, void an excrementitious substance, which in some places, where the insects were abundant, has produced reports of showers of blood.

Of the IMAGO or Perfect State. As the present work is not intended to enter into all the particulars relative to the habitations, food, modes of life, &c. I must refer the student to Messrs. Kirby and Spence's popular Introduction, in which much information on these points will be found collected together.
OBSERVATIONS

ON THE DIFFERENT SYSTEMS OF

ENTOMOLOGY.

The simplicity of the arrangement adopted by Linné, the celebrity of his name, and the princeely patronage under which he wrote, conspired with other favourable circumstances to render this science more universally cultivated, admired, and respected about his time, than it had probably been at any former period. The credit due to this naturalist for his labours in entomology is great. This must be allowed. But let us also remember, that he is not alone entitled to our commendation for the arrangement proposed in his work. We must in candour acknowledge the merits of many among his predecessors, who wrote under circumstances of less encouragement, and have nevertheless excelled in this science; men to whom the writings of Linné stand in a very high degree indebted, and without the aid of which it is impossible to imagine the system, which now commands our admiration, could have been produced, at least in its present state of purity.

In the works of Aristotle and Pliny, in those of Agricola, Aldrovandus, Franzius, Moutier, Swammerdam, Ray, Willughby, Lister, Vallisnieri, and various others, we distinctly perceive, with some occasional variation, the outline of the superstructure raised in the "Systema Naturae."

These valuable sources of information furnished him with abundant materials, which he selected with profound judgement, and interwove with ability, industry, and success. Linné was in this respect commendable: he did not suffer his mind to swerve on this occasion, from any ambitious or innovating motives; and so far as he deemed it consistent with his plan, he appears to have adhered to the examples of his predecessors. The characters of his Ordines are to be found in several publications earlier than his own, and so likewise are most of his Genera, and the far greater number of his Species. But these he remoulded throughout with so much skill, that this "Systema" constitutes the central point in which the scattered rays of natural science are concentrated with more precision than they really appear in the original authors to whose industry he stands indebted. It was in the concise and very expressive style which Linné
adopts in all his works, and which was almost peculiar to himself, that he excelled.

The following are the definitions of the several Orders established by this eminent naturalist.

Order I. Coleoptera (derived from the Greek words for a sheath and a wing) comprise those insects which have crustaceous elytra or shells, which shut together and form a longitudinal suture down the back, as in beetles.

Order II. Hemiptera (from half and a wing). Insects having their upper wings half crustaceous and half membranaceous, not divided by a longitudinal suture, but incumbent on each other, as in grasshoppers, &c.

Order III. Lepidoptera (from a scale and a wing). Insects with four wings covered with fine scales in the form of powder or meal, as in the butterfly and moth.

Order IV. Neuroptera (from a nerve and a wing). In this order the wings are four; membranaceous, transparent, and naked, reticulated with veins or nerves; the tail is without a sting, as in the Libellula or Dragon-fly.

Order V. Hymenoptera (from a membrane and a wing). The insects of this order have also four wings, and the tail furnished with a sting for various purposes, as in wasps, bees, &c.

Order VI. Diptera (from two and a wing). Those insects with two wings only, and poisers or balancers, as in the common House-fly.

Order VI. Aptera (from without and a wing). In this order Linne placed the spider, crab, scorpions, &c. As these are now universally rejected from insects, and referred to a class named Crustacea, I shall hereafter speak of them when mentioning the system proposed by Dr. Leach.

Fabricius distributes all insects into thirteen Classes, the characters of which are as follow:

Class I. Eleutherata. Jaws bare, free, and bearing feelers.

Class II. Ulonata. Jaws covered by an obtuse mouth-piece.

Class III. Synistata. Jaws elbowed near the base, and connected to the lower lip.

Class IV. Piezata. Jaws horny, compressed, and usually elongated.

Class V. Odonata. Jaws horny, dentated; palpi two.

Class VI. Mitosata. Jaws horny, vaulted; no palpi.

Class VII. Unogata. Jaws horny, unguculated.

Class VIII. Polygnata. Jaws several (usually two), within the lip.

Class IX. Kleistagnatha. Jaws several outside the lip.

Class X. Exochnata. Jaws several, outside the lip, and covered by the palpi.

Class XI. Glossata. Mouth composed of a spiral tongue, situated between two palpi.
Class XII. Rhyngota. Mouth composed of a beak or articulated sheath.
Class XIII. Antliata. Mouth composed of a sucker, not articulated.

In the Edinburgh Encyclopaedia, edited by Dr. Brewster, several valuable papers have appeared from the pen of that excellent and distinguished naturalist, Dr. W. E. Leach, the present Zoologist to the British Museum. The well-known abilities of this gentleman, his sound judgement, his great caution, and extensive correspondence with the most distinguished naturalists of Europe, will, I trust, fully justify me in adopting his system in the present work, as there is no doubt that when it is duly studied it will be universally followed: yet I must confess much still remains incomplete, and many errors no doubt will require future correction. An observation of Mr. Kirby I shall here quote, as it is valuable, and should be strongly impressed upon the mind of every naturalist, and must fully convince every liberal-minded entomologist how far the system proposed by Dr. Leach is consonant to the views of one of the first of entomologists.

"An account of any genus, perfect and elaborate in all its parts, must be the work of him who is versed in the history and economy of every individual that belongs to it: he, and he only can go upon sure grounds, for no other person can in all cases with certainty distinguish the species from the variety, and unite each sex to its legitimate partner. But so much knowledge, even with respect to a single genus where the species are numerous, is not to be expected from one man: nor should the naturalist attempt, like the spider, to weave his web from materials derived solely from within himself; but rather let him copy the industrious bee, and draw genuine treasures from those flowers of science which have been reared by other hands, and combining these with his own discoveries let him endeavour to concentrate all in one harmonious system, with parts curiously formed, arranged, and adapted to each other, and to the whole; and calculated to preserve the sweets of true wisdom pure and unsophisticated."

It would appear that the system of Dr. Leach, or at least the numerous genera into which it is divided, has not met with the approbation of every entomologist; since the Doctor in his Zoological Miscellany, vol. 3, in an account of two species of the Fabrician genus Geotrupes, has made the following observation: "I am a warm advocate for generic divisions (founded on the consideration of every character), being fully satisfied that such exist in nature, and, when distinguished with judgement, tend materially to the advancement of science. Those entomologists of the Linnaean school, who, by dilating the characters either of their genera or species so as to admit of almost any thing, bend nature to the artificial system of their master, would do well to consider whether they do not show greater veneration for it than for nature, and not upbraid those who hold a different opinion from themselves."

In the present work, the genera of Linné are given, not with a wish
that the student should confine himself to that system, but merely to introduce him to a knowledge of the families, for in this term the genera of Linne may certainly be applied in most cases, and which every entomologist will readily admit. Mr. Spence has observed, in his excellent Monograph of the Genus Choletta in the Xth vol. of the Transactions of the Linnean Society: "It is contrary both to analogy and experience to suppose the Creator has formed fewer of those groups into which we divide the vast tribes of nature by the name of genera in one department than in another. Now in Botany, in which not more than about 20,000 species have been described, we have upwards of 2000 genera. In Entomology at least as many species are already described; and when we combine the circumstances, that in Britain not fewer than 3000 species of insects are to be found, while we have about 3000 plants; and these are probably not one half of the European insects, while we know that every other quarter of the globe is still more prolific in species wholly different; and lastly, that every kind of plant probably affords nutriment on the average to three or four species of insects, there can be little doubt that the insect is vastly more populous than the vegetable world. Is it likely then that the number of genera should be much fewer than in botany; or at any rate that it should not very greatly exceed its present amount? We need not fear that the science will be rendered more difficult by an augmentation of its genera. This cannot happen, if a proper system be adopted. If two or three insects, or even a single one, be strikingly characterized by peculiarity of habit, they certainly ought in any system to be distinguished at least as sections of the genera under which they are placed. And will it increase the difficulty of investigation if they be established as genera upon the same characters, and distinguished by a name? Clearly not. On the contrary, the science can be effectually promoted in no other way; for names have an important influence upon the clearness of our ideas, and it will be impossible for us ever to gain correct views of the philosophy of our science while genera essentially distinct are jumbled together under one title.

"Entomology, therefore, is under the greatest obligations to Illiger in Germany, Latreille in France," (Kirby, Leach, and Spence in England); "who having had the good sense to reject the useless while they retain the valuable parts of the Fabrician system, are labouring, by the institution of new genera built upon firm and intelligible characters, to extricate the science from the chaos into which that author has unwittingly reduced it. Fabricius's system has now had a fair trial of upwards of thirty years, and it was at one time universally followed on the continent; yet so far is experience from having confirmed the assertion of its author, that the Linnean system is only calculated to introduce confusion into the science, that the very system professing to dissipate that confusion is even now fast sinking into oblivion, while
the Linnaean orders and generic characters, with such improvements as reason and analogy suggest, and as Linne himself would have approved, are reverted to by the most acute and learned entomologists of the age."

ORDERS AND GENERA OF LINNE.

Order I. COLEOPTERA.

The insects of this Order form a very natural division. They have hard cases to their wings, with a longitudinal suture; these in some are united, and therefore such insects can have no wings; but the wings in most are two. The mouth in general is furnished with two, four, and sometimes six palpi, two mandibles, and two maxille; the mouth is covered above with the clypeus, and closed below with the lips: they have all six feet in their perfect state; in the antennae there is the greatest diversity of shape and form, in this system the principal character of the genera: they have a hard horny skin; on each side they have nine spiracula, one on the thorax, and eight on the abdomen. The females lay their eggs in the earth, dung, plants, wood, &c. and from these proceed the larvae.

The larvae have six feet near the head, which differs in form and size in the different genera; jaws at the mouth; two eyes; often short antennae; and on each side nine spiracula. Those that feed on plants and their roots move but slowly; those which live on dead animals are more active; others, as the Carabide, Dyticide, and Staphylinide, which feed on living animals, are very rapid in their motions. The larva state, during which insects change their skins, endures in most species for a year; in the larger species longer, sometimes three or four years. When the larva arrives at its appointed time, it draws itself together, and changes for the most part into a pupa incompleta, which, sometimes below the earth or in rotten wood, reposes for several weeks or months. Afterwards the skin of the pupa bursts, and the perfect insect appears. It is now fit for the propagation of its species.

Genus 1. Scarabeus.

Antennae clavated; the club lamellated (Pl. 1. fig. 1. a.): palpi four: mandibles horny, in general without teeth: the tibiae or second joint of the foremost pair of feet generally dentated.

Species 1. Sc. Typhaus. Three horns on the thorax, the middle one the smallest; the other two extending forwards and of the same length with the head, which has no horns. (Pl. 1. fig. 1.)

Inhabits Europe.
This species burrows in cow-dung and under the earth, digging deep holes; and is found plentiful on heaths and commons during April and May. Mr. Marsham in his Entomologia Britannica has described 30 species of Scarabæi found in this country.

Genus 2. Lucanus.

Antenna clavated; club perfoliate; maxillæ prominent and dentated; body oblong; anterior tibia dentated.

Sp. 1. L. Cervus, the Stag-beetle. With a scutellum; the maxillæ projecting, bifurcated at the apex, with many teeth on the internal edge. (*Pl. 1. fig. 3.*)

This is the largest of the British Coleoptera; the larva is white, and lives on putrid wood, particularly oak; its head and feet are of a rust colour. The perfect insect varies in size and colour; in general it is dark brown or blackish; the jaws are very large, about one third of the length of the whole insect, and have a distant resemblance to the horns of a stag; Mr. Marsham's incmis is only the female of this species.

Sp. 2. L. parallelipipedus is considerably smaller, and may be obtained in June and July in the neighbourhood of willows.

Obs. L. caraboides has not yet occurred in Britain, at least no British specimen is known.

Genus 3. Dermestes.

Antenna clavated; the club perfoliated (*Pl. 1. fig. 4. a.*); the three terminating articulations larger than the rest; thorax convex, with scarcely any margin; head inflected, and partly hid under the thorax.

The larva of the insects of this genus feed on decayed animal substances, and are exceedingly injurious to the meat in larders, skins, furs, and books.

Sp. 1. D. murinus. Oblong; downy clouded with black and white; abdomen covered with fine white down or hair.

Inhabits Europe; and may frequently be found in the dead moles hung up on the hedges by countrymen. (*Pl. 1. fig. 4.*)

Sp. 2. D. Scolytus. Elytra truncate, blackish and striate: abdomen reunio; front downy and of an ash colour. (*Pl. 1. fig. 5.*)

The insects of this genus are very prolific; both the larva and perfect insect eat the roots and wood of trees, and are sometimes very destructive to woods. The following account, from Mr. Kirby's Introduction to Entomology, of Bostrichus Typographus Fabr., will further illustrate the habits and manners of this genus: "This insect in its preparatory state feeds upon the soft inner bark only: but it attacks this important part in such vast numbers, 80,000 being sometimes found in a single
tree, that it is infinitely more noxious than any of those that bore into the wood: and such is its vitality, that though the bark be battered and the trees plunged into water or laid upon the ice or snow, it remains alive and unhurt. The leaves of the trees infested by these insects first become yellow; the trees themselves then die at the top, and soon entirely perish. Their ravages have long been known in Germany under the name of *Wurmtribkiss* (decay caused by worms); and in the old liturgies of that country the animal itself is formally mentioned under its vulgar appellation of 'The Turk.' This pest was particularly prevalent and caused incalculable mischief about the year 1665. In the beginning of the last century it again showed itself in the Hartz forests;—it reappeared in 1757, redoubled its injuries in 1769, and arrived at its height in 1783, when the number of trees destroyed by it in the above forests alone was calculated at a million and a half, and the inhabitants were threatened with a total suspension of the working of their mines, and consequent ruin. At this period these *Bostrichi* were arrived at their perfect state, and migrated in swarms like bees in Swabia and Franconia. At length, between the years 1784 and 1789, in consequence of a succession of cold and moist seasons, the numbers of this scourge were sensibly diminished. It appeared again however in 1790, and so late as 1796 there was great reason to fear for the few fir-trees that were left.

**Genus 1. Ptinus.**

*Antennae* filiform (*Pl. 1. fig. 6. a.*); the last articulations the largest: thorax nearly round, not margined, receiving the head under it.  

**Genus 5. Hister.**

*Antennae* clavated (*Pl. 2. fig. 1. a.*); the club solid; the lowest articulation compressed and bent: head retractile within the body: elytra shorter than the body: the fore-tibiae dentated.  
The insects of this genus are generally found in dung, in spring, summer, and a great part of the year. Like the *Dermestides* and *Byrrhi*, they contract their antennae and legs when touched, and counterfeit death.  
Sp. 1. *Hist. semipunctatus*. Brassy-black, polished: shells obliquely striate at the base. (*Pl. 2. fig. 1.*) Inhabits dung, and is very common in this country.

**Genus 6. Gyrixus.**

*Antennae* cylindrical, and very short (*Pl. 2. fig. 2. a.*): *maxilla* horny and very acute: eyes divide, so as to appear as four: the four hinder *feet* compressed, and formed for swimming. (*Pl. 2. fig. 2. b.*)

Inhabits stagnant waters, running swiftly in circles on the surface, and when it dives carrying along with it a bubble of air which appears like quicksilver. These insects live in society, and often in their brisk motions strike against one another. In the evenings they betake themselves to still places under bridges, or under the roots of trees which grow at the water's edge.


Antennae a little shorter than the thorax, with the four or five terminal joints gradually thicker, compressed (Pl. 2, fig. 3. a.): palp short, the last joint longest; thick, somewhat ovate: body somewhat ovate, very convex above: scutellum minute.

When touched, they apply their antennae and feet so close to the body, remaining at the same time motionless, that they resemble a seed more than an animated being. They are found in sand-pits and roadways in the spring months, and are very common.

Sp. 1. Byr. Pilula. Brown; the elytra with black interrupted stria. (Pl. 2, fig. 3.)


Antennae shorter than the thorax, with the club solid (Pl. 2, fig. 4. a.): palp filiform, short: body orbiculate, ovate: scutellum very minute: maxille and lip bifid.

These insects are found on flowers; they are small, but in general prettily coloured. They contract on the appearance of danger, and appear as if dead. Their larvae are found in carcases, skins, and dried animal substances. They pass nearly a year in that state before changing into a pupa; the perfect insects are found chiefly in spring.

Sp. 1. Anth. Scrophulariae. Black; sides of the thorax and three transverse bands on the elytra grey; suture and external margin of the elytra and hinder margin of the thorax, red-lutescent. (Pl. 2, fig. 4.)


Antennae gradually thickening towards their extremities (Pl. 2, fig. 7. a.), or terminated by a solid or perfoliated club (fig. 6. a.): elytra covering the greater portion of the abdomen and margined: head projecting: thorax flattish and margined: body oval or parallelopiped.

The Silpha feed on dead carcases and the excrements of animals; they have generally a fetid smell, and when taken they discharge by the mouth or the anus a drop of black liquor of a very disgusting colour; this liquor serves to accelerate the putrefaction of the matters on which they feed. The larvae live in the earth in dung-hills and dead carcases; they have six short feet; the head is small, armed with strong jaws; they undergo their transformations underground.
Sp. 1. Silpha Vespillo. (Pl. 2. fig. 6.) Oblong and black: the clypeus orbicular and unequal: the elytra marked with two ferruginous fasciae. This species is subject to great variety in size. It is infested with Acari; it flies very swiftly with its elytra erect. The elytra are shorter than the abdomen. It feeds on carrion, and a small dead animal is soon visited by a number of this species, which join in burying it after they have deposited their eggs in its body. Thus a mole or a mouse is often buried by the industry of four or five of them in the space of four-and-twenty hours. They scoop out the earth all round and below the animal, which gradually sinks down; and while the agents are invisible, we see the effect by the disappearance of the carcase.

Sp. 2. Silpha quadripunctata. (Pl. 2. fig. 7.) Black: elytra and thorax yellow, with two black spots on each elytron: head, antennæ and legs black.

Found at the roots of oak trees in the winter, and in the foliage in the months of May, June, and July.


Antennæ clavated: the club solid: elytra marginated: head prominent: thorax flattened and marginated.

In the former editions of the Systema Naturæ the insects of this genus were included in the genus Silpha, the habits of which they greatly resemble, being found in decayed animal substances, under the bark of trees, bones, &c.

Sp. 1. Nit. discoidea. Black: the thorax marginated: the disk of the elytra ferruginous: length 1¼ lin. (Pl. 2. fig. 5.)

The species of this genus are numerous, subject to great variety, and require a minute examination.


Antennæ moniliform, growing thicker at the end: elytra marginated: head prominent: thorax flattened and marginated.

The insects of this genus are found in sandy situations in May, June, and July.—They were arranged with the Silpha by Linné.

Sp. 1. Opat. sabulosum. Brown: thorax emarginate: elytra dentate, with three elevated lines. (Pl. 2. fig. 3. a. antennæ magnified.)

Genus 12. Tritoma, Fabr.

Antennæ clavated: club perfoliated (Pl. 2. fig. 9. a.): lip emarginate: anterior palpi secundiform: body much elevated: thorax flat.

Of this genus we have but one species at present known in this country, which inhabits fungi: I once took them in profusion at Coombe Wood in the month of March.

Sp. 1. Trit. bipustulatum. Black: the elytra with a scarlet spot on the shoulder, in which is a small black dot. (Pl. 2. fig. 9.)

Antenna moniliform: thorax and elytra margined; head concealed under the thorax: body above gibbous, beneath flat and margined.

Of this genus we have several species, some of which are very brilliant in colours, which disappear when the insect dies, but are said to revive when put in warm water.

The larvae of these insects are found under the leaves of the plants on which they feed; by means of the lateral spines and bristle at the end of the tail they form a kind of parasol with their own excrements to shelter themselves from the sun and rain, and probably to screen themselves from their enemies.

Sp. 1. Cass. maculata. The elytra vary in colour, the young state of the insect being green, and as it advances in age gradually approaching to red spotted with black: black on the under side. C. murrae of Marsham is only a variety of this. (Pl. 2. fig. 10.)


Antenna clavated: the club solid: maxillary palpi terminated by a large securiform joint: body hemispherical: thorax and elytra margined: abdomen flat.

The insects of this genus are commonly called in England Lady-cows, or Lady-birds. The larvae feed chiefly on the Aphides or plant-lice, and are very serviceable in clearing vegetables of the myriads with which they are often infested. Mr. Marsham in his Entomologia Britannica has described 50 species, two-thirds of which only are genuine. So great is the variety in the species of this genus, that by a close examination scarcely two specimens will be found alike: this shows the necessity of collecting varieties, for by this means species may be decided upon; I should therefore strongly recommend the young entomologist never to disregard them, as they tend greatly to the advancement of the science, and certainly enrich a collection. Mr. Stephens (the author of the continuation to the ornithological part of Shaw's Zoology, and a most excellent entomologist,) for some years past has paid great attention to this genus of insects; and it is his intention to lay his observations before the Linnean Society.

Sp. 1. Cocc. 14-guttata. Elytra red: with fourteen white dots: antennæ and eyes black: the spots on the elytra form four lines; the first line contains two spots, the second six, the third four, and the last two. Inhabits willows. (Pl. 2. fig. 11.)

Genus 15. Chrysomela.

Antenee moniliform: palpi six, thickest at their extremity: thorax margined, but not the elytra: body for the most part ovate.

The insects of this genus are in general adorned with shining and splendid colours. They live on leaves, but do not eat the nerves.
Their larvae are in general of an oval shape, somewhat elongated and soft, with six feet near the head. The last joint of their feet or tarsi consists of four articulations, which in most cases serve for sexual distinctions, the tarsi of the fore feet being considerably broader in the males than in the females. This numerous and beautiful tribe is found in almost every situation: their motion is slow; and some of them when caught emit an oily liquor of a disagreeable smell.

In this genus of Linne we find many insects that differ widely from the generic character given above, which form many natural families consisting of numerous genera, the characters of which will be given in the system proposed by Dr. Leach.

Sp. 1. Chrys. coriaria. Apterus, oval; varies in colour from a dark blue to a black. It is a very common species, and may be found on heaths from April to June in abundance. (Pl. 2. fig. 12.)


Sp. 3. Chrys. mordigera. (Pl. 2. fig. 11.) Auchenia mordigera, Marsham. Inhabits the white lily.


Antennae filiform: palpi four: thorax margined, but not the elytra: body nearly cylindrical.

The insects of this genus in some of the sections into which it has been divided by Gmelin resemble the preceding in form and manners, and were accordingly in the former editions of the Systema Naturae arranged with Chrysomela. Mr. Marsham’s Auchenia, Criocris, and Tillus, are separated from this genus.

Sp. 1. Crypt. Lincoln. Body black: elytra red, with a black line on each. (Pl. 2. fig. 15.)

Genus 17. Hispa.

Antennae cylindrical, approximate at the base and seated between the eyes: palpi fusiform: thorax and elytra often spinous or toothed.

Sp. 1. Hispa mutica. (Pl. 2. fig. 16.) Orthocerus muticus, Latr. Inhabits sandy situations.


Antennae filiform: palpi equal and filiform: lip acuminated.

Sp. 1. Bruchus Pisi. Elytra black, with white spots; the extremity white, with two black dots. (Pl. 2. fig. 17.) Inhabits Europe, and is very destructive to fields of peas.

*Antennae* clavated, situated on the rostrum; *palpi* four, filiform.

The insects of this genus are very numerous, and subject to great diversity in form and colours. Mr. Marsham has described 234 species in his *Entomologia Britannica*, some of which are but varieties. Many species have been discovered since his work was written, and the number is probably doubled.

Sp. 1. *Curc. nitens*. Oblong, dark-violet; thorax and elytra of a blueish green. (*Pl. 2. fig. 13.*)

Inhabits Europe; is found in England on the white-thorn in woods in the month of May.

Sp. 2. *Curc. Pyri*. Bronzed with a changeable colour of yellow, red, and green; legs rufous. (*Pl. 2. fig. 19.*)

Inhabits the nut-tree, but is very local.

Sp. 3. *Curc. Nucum*. Grey-brown; rostrum as long as the body. Inhabits the nut-tree; the larva is frequently found in the hazel nut. (*Pl. 2. fig. 20.*)

Sp. 4. *Curc. Scrophulariae*. The coleoptera with two black spots on the back. (*Pl. 2. fig. 21.*)

Inhabits the *Scrophularia* in marshes.

Genus 20. Attelabus.

*Antennae* moniliform; thickest towards the apex; head inclined, and acuminated behind.

Sp. 1. *Att. Coryli*. Black; elytra red and reticulated. (*Pl. 2. fig. 22.*)

Inhabits Europe; is found on the hazel; the leaves of which the larva rolls up into a cylinder, close at both ends. The form of the head in this insect is remarkable: it is shaped like a long triangle; the acute angle attached to the thorax, the eyes in the other two angles, and from the base the rostrum arises.


*Antennae* filiform; *palpi* four, securiform; *maxilla* with one dent or tooth.

Sp. 1. *Not. monoceros*. The thorax projecting like a horn over the head. (*Pl. 2. fig. 23. a. head, thorax, and antennae magnified.*)

Inhabits sand-pits, is rare near London. This species has been taken in profusion on the sandy sea shores of South Wales.

Genus 22. Cerambyx.

*Antenna* setaceous; *palpi* four; *thorax* spinous or gibbous; *elytra* linear.

This is a numerous genus: it has therefore been divided into several
genera by later writers. Few of them are natives of Britain. Their larvae live in wood, which they perforate and consume. They are the favourite food of the woodpecker. They have shorter feet than the larvae of most other Coleoptera. The antennae are often longer than the whole body, being in some species four times its length.


Inhabits Europe. In England it frequently occurs on willow-trees in June.

Sp. 2. Cer. Textor.

Inhabits Europe. This is esteemed a very rare British insect; it occurs on willows at the Efford Mills, near Lymington in Hampshire, and near Bristol. (Pl. 2, fig. 24.)

Sp. 3. Cer. arcuatus. The elytra with four yellow fasciae; the first interrupted, the others arched backwards. (Pl. 2, fig. 25.)

Inhabits Europe. Is found on the trunks of trees, but is rare in Britain.

Genus 23. Leptura.

Antennae setaceous: palpi four, filiform: elytra attenuated towards the apex: thorax somewhat cylindrical.

Sp. 1. Lept. quadrifasciata. Black; elytra testaceous with four black fasciae. (Pl. 2, fig. 26.)

Inhabits Europe. In Britain it is found in the woods of Kent on umbelliferous plants.


Inhabits Europe. May frequently be found in ditches on the leaves of Nymphoea alba in the month of May. (Pl. 2, fig. 27.)


Antennae setaceous or filiform: palpi four, filiform: elytra smaller than the wings.

Sp. 1. Necyd. caerulea. Elytra subulate: abdomen blue; hind thighs of the male clavate, arcuate; those of the female simple. (Pl. 2, fig. 28.)

Inhabits flowers in woods and chalk-pits.

Genus 25. Lampyris.

Antennae filiform: (Pl. 3, fig. 1, a.) palpi four: elytra flexible: thorax flat, semiorbicular, concealing and surrounding the head: the sides of the abdomen with papillary folds: the females for the most part are destitute of wings and elytra, and resemble herbivorous larvae.

Sp. 1. Lamp. noctiluca. Glow-worm. Oblong and brown; the thorax ash-coloured. (Pl. 3, fig. 1, male, fig. 2, female.)

Inhabits woods, heaths, and grassy banks in the months of June and July; the female alone is luminous. The light, which is phos-
phoric, proceeds from the last segment but one of the abdomen, and seems intended to attract the male. *Lampyris splendidula* is said to inhabit this country, but I have not yet seen any British specimen: I should therefore advise those entomologists residing at a distance from London to collect all the specimens they can obtain, and carefully examine them: the males may be taken in profusion in the evenings of the above months, if a few females be put in the entomologist's folding-net as he walks in the above places of an evening.


*Antenna* pectinate; *thorax* orbicular; *body* elongate, depressed. The prevailing colour in this genus is red and black.


Inhabits the woods of Kent in the months of June and July. (*Pl. 3. fig. 3.*)

Sp. 2. *Pyroch. rubens*. Black; *thorax* and *elytra* of a duller red than the preceding species.

A very common insect in the months of May and June, and may be found in most hedges where white-thorn grows.

**Genus 27. Cantharis.**

*Antenna* filiform; *thorax* (in most species) marginated; *elytra* flexible: the sides of the abdomen with papillary folds.

This is an extremely rapacious genus, preying upon other insects, and even its own tribe.

Sp. 1. *Canth. fusca*. Thorax red, with a black spot; *elytra* brown. (*Pl. 3. fig. 4.*)

This is a numerous tribe, and forms several natural genera of modern authors.

Sp. 2. *Canth. biguttata*. Thorax black in the middle; *elytra* greenish-bronze; red at the apex. (*Pl. 3. fig. 5.*)

This insect is furnished with two red obtuse vesicles at the base of the abdomen, and two at the apex of the thorax, which are raised and depressed alternately. Common on various plants in woods in the months of May and June.

**Genus 28. Elater.**

*Antenna* filiform; *palpi* four, securiform; *mandibles* notched, or bifid at their extremities.

Many of the coleopterous insects have a great difficulty in restoring themselves when laid on their back; the apparatus with which the insects of this genus are provided for that purpose is singular and curious. An elastic spring or spine projects from the hinder extremity of the breast, and there is a groove or cavity in the anterior part of the ab-
**ORDER I. COLEOPTERA.**

When laid on its back, the insect raises and sustains itself on the anterior part of the head and the extremity of the body, by which means the spine is removed from the groove where it is lodged when in its natural position; then suddenly bending its body, the spine is struck with force across a small ridge or elevation, into the cavity from whence it was withdrawn, by which shock, the parts of the body before sustained in the air are so forcibly beat against whatever the insect is laid on, as to cause it to spring or rebound to a considerable distance. The antennae are lodged in a cavity scooped out of the under side of the head and thorax, probably to preserve them from injury when the insect falls, after its singular leap. The larvae reside in decayed wood.

Sp. 1. *Elat. sanguineus*. Black; thorax smooth and shining; elytra of a blood red colour. (Pl. 3. fig. 6.)

Inhabits decayed oaks, and has been found in abundance under the bark of trees in June, in the New Forest of Hampshire, which is a most excellent and fertile county for insects.

Sp. 2. *Elat. cyanus*. Blue, varying from a purple to a greenish hue; elytra striated and finely punctured. (Pl. 3. fig. 7.)

Inhabits gravel-pits in the months of May and June, under stones, clods of earth and conglomerated masses, by turning up of which the entomologist will frequently find other insects equally rare.

**Genus 20. Cicindella.**

*Antenna* setaceous; *palpi* six, filiform; the posterior ones hairy; *mandibles* projecting with many dents; *eyes* prominent; *thorax* rounded and margined.

This is in general a very beautiful tribe of insects; they are found in dry sandy places, and prey with the most ravenous ferocity upon all weaker insects which come in their way. The larva is soft and white, with six feet, and two tuberces on its back which assist it in retreating with its prey; the head is brown and scaly, and armed with a pair of large jaws. It lurks in a round perpendicular hole in the ground, with its head at the entrance, to draw in and devour whatever insects may come near or fall into it.

Sp. 1. *Cicind. campestris*. Green; the elytra with five white dots.

Inhabits sand-pits and other hot and dry places from April to July.

Sp. 2. *Cicind. sylvetica*. (Pl. 3. fig. 8.)

**Genus 30. Buprestis.**

*Antenna* filiform, serrated; the length of the *thorax*: *palpi* four, filiform; the last articulation obtuse and truncated; *head* partly retracted within the thorax. (Pl. 3. fig. 9.)

Few of this numerous genus are natives of Britain. Many of the exotic species are remarkable for their rich metallic colours, having fre-
quently the appearance of the most highly polished gold or copper: the larvae live in wood.

Sp. 1. *Bupr. biguttata.* Green above, blue-green beneath; scutellum transversely impressed; apex of the elytra serrated; a white villose spot on each side of the suture, and three on the sides of the abdomen.

In England it is rather rare, but was once observed in very great abundance, by Dr. Latham, in Darent-wood, Kent.

**Genus 31. Hydrophilus, Fabr. Dytiscus, Linn.**

*Antennae* clavated, *club* perfoliate; *palpi* four, filiform; *hind feet* ciliated and formed for swimming, with minute claws.

The insects of this genus live in water and moist places. They may be seen in ponds during the summer and calm mild days in winter, frequently rising to the surface for fresh air; they swim well, and when laid on their backs restore themselves by whirling round; they rest in the shade, keep in the water during the day, come abroad in the evening, and are sometimes found sitting on the plants by the edge; they fly by night; after having been long out of the water they cannot dive but with difficulty: the foremost feet of the males have a hemispherical appendage. The larvae always live in the water, and are the crocodiles of their class, killing not only aquatic insects but even fishes.

Sp. 1. *Hydroph. piccus.* Black; the sternum channelled and spiny behind.

*Hydrous piccus. Leach, from the Linnean MSS.*

This is the largest British species of the genus. The larva lives in still waters and ponds; is about an inch and a half in length; black; its head smooth and chestnut-coloured; with six short slender feet, which are actually placed on the back, and a tapering tail through which it respires.—In the month of July it is said to attain its utmost size, and leaving the water, creeps upon the dry ground to a heap of dung, (cower dung if it be near,) and makes a hole under it pretty deep, and so wide that it can lie in it rolled up in a circle, and there it changes into its pupa state. About the middle of August the perfect insect appears. Like most of the aquatic insects it lives through the winter, diving deep into the mud in the most inclement weather.

Sp. 2. *Hydroph. caraboides. (Pl. 3, fig. 16.)*

**Genus 32. Dytiscus.**

*Antennae* setaceous; *palpi* six, filiform; *hind feet* villous, formed for swimming, with the claws very minute. (Pl. 3, fig. 13, 14 & 15.)

The insects of this genus are very numerous, and are well deserving the attention of the entomologist. In Dr. Leach's system they are divided into several very natural genera: they are found in almost every
pond, ditch, and rivulet, but many of the species are very local; they may be obtained in the above-mentioned situations at all seasons of the year.

Genus 33. Carabus.

Antenna filiform; palpi six, the last articulation obtuse and truncated: thorax obcordate, truncated at the apex, and margined: elytra margined.

Mr. Marsham has described 109 British species of this genus: the generality of them are found on the ground, under stones, in sand-pits &c. a few are found in trees, feeding on the larvæ of Lepidoptera. The whole of this tribe are very voracious, preying on all insects which they can overcome; they discharge, when taken, a brown caustic and fetid liquor: many of them want wings; though their elytra in general are separate and moveable: their larvæ live in putrid wood, among mosses, in the earth, &c.

Pl. 3. fig. 17, 18, 19, & 20, belong to this genus of Linne. They are types of so many genera, the characters of which are given in the system of Dr. Leach.

Genus 34. Tenebrio.

Antenna moniliform; the last articulation nearly round: thorax with a small degree of convexity, and margined: head standing out: elytra somewhat rigid.

Sp. 1. Teneb. Molitor. Brownish-black; the anterior thighs the thickest. (Pl. 4. fig. 1.)

The larvæ of this insect are called Meal-worms, and are found in meal, bakers' ovens, dry bread, &c. They are of a pale colour, smooth, with thirteen segments, soft; and are the favourite food of nightingales, and other Motacillas.


Antenna filiform; palpi four: thorax with a small degree of convexity, and margined: head standing out: elytra somewhat rigid: wings (in most species) wanting.

Sp. 1. Bl. mortisaga. Black; coleoptra ending in a point, and smooth; the antennæ moniliform at the apex.

This species wants the wings: it walks slowly, and is therefore called the slow-legged beetle: when taken it emits a certain colourless but very fetid liquor.


Antenna filiform; palpi four, unequal, the hind ones clavated: thorax somewhat round: head inflected and gibbous: elytra soft and flexible.

Sp. 1. Lytta vesiculatoria. Green; the antennæ black. (Pl. 4. fig. 5.)

Inhabits the south of Europe, and is occasionally found in Britain.
This is the common Spanish fly: it is found on the privet, the ash, the elder, the poplar, &c. It is so light when dried that fifty of them scarcely weigh a dram.

Genus 37. Meloe.
Antennae moniliform: thorax nearly round: elytra soft, flexible, and shorter than the abdomen: head inflected, gibbous. (Pl. 4. fig. 7.)
Found in spring, particularly in open sandy fields, feeding on the different species of Ranunculus, &c.; its ova have an agreeable smell; when touched, there issues from it a very limpid yellowish oil, which is exceedingly diuretic, and when mixed with honey or oil has been recommended in cases of hydrophobia.

Genus 38. Mordella.
Antennae moniliform or pectinated: palpi four, the anterior ones clavated, the hinder filiform: when frightened, it hides its head beneath the thorax: elytra narrower towards the apex, and slightly curved: before the thighs a broad plate at the base of the abdomen.
The insects of this genus inhabit flowers.
Sp. 1. Mord. fasciata. (Pl. 4. fig. 8.)

I shall omit the generic character of Linne, and refer the student to those genera given in Dr. Leach's system. Mr. Marsham has described only 87 species of this very extensive family: 500 species at least are found to be natives of this country, many of which are exceedingly minute, but very interesting. (Pl. 4. fig. 10, 11, 12, 13 § 11.)

Genus 40. Forficula.
Antennae setaceous: palpi unequal and filiform: elytra truncated and shorter than the abdomen, the extremity of which is armed with forceps.

Order II. HEMIPTERA.
Many of the insects of this Order are furnished with a rostrum which is inflected and bent inwards towards the breast. Their wing-cases are hemelytrate, or of a substance less hard than those of the preceding order; they do not meet together and form a longitudinal suture, but have some part of their anterior margins crossed or laid one over the other.
ORDER II. HEMIPTERA.

Genus 41. Blatta.

Head inflected: antennae setaceous: palpi unequal, filiform: wings flat, and nearly coriaceous: thorax nearly flat, orbicular, and marginated: feet formed for running: two horns above the tail in most species. (Pl. 4, fig. 17.)

Sp. 1. Bl. orientalis, Black-beetle or Cock-roach.

This insect was originally a native of South America, but is now very generally spread throughout Europe. It cannot be considered a British insect, though it frequents kitchens, ovens, and warm places, and devours meal, bread, and other provisions, shoes, &c. It conceals itself during the day, and comes abroad in the night; it runs quickly, and is very tenacious of life. They are killed by red wafers.

Genus 42. Gryllus.

Head inflected, furnished with maxillae and filiform palpi: antennae setaceous or filiform: wings four, deflected and convoluted; the under ones folded: hind legs formed for leaping: two claws on all the feet.

Sp. 1. Gr. flavipes. (Pl. 4, fig. 19.)

Inhabits marshes, but is very local in Britain.

Genus 43. Cicada.

Rostrum inflected: antennae setaceous: wings four, membranaceous and deflected: feet formed for leaping. (Pl. 5, fig. 1 & 2.)


Inhabits aquatic plants in ditches.

Genus 44. Notonecta.

Rostrum inflected: antennae shorter than the thorax: wings four, folded together crosswise; coriaceous at the base: hinder feet ciliated, formed for swimming.

The insects of this and the following genus live in water, feeding on aquatic animaleula; the larva and pupa have each six feet; they are active, and swim like the perfect insect; the former wants wings, the latter has the rudiments of them. (Pl. 5, fig. 3.)


Inhabits ponds.

Genus 45. Nepa.

Rostrum inflected: antennae short: wings four, folded crosswise, the anterior part of them coriaceous: the two fore feet cheliform; the others formed for walking.

Sp. 1. Nepa cinerea. Of an ash colour: the thorax unequal: the body oblong, ovate. (Pl. 5, fig. 1.)

Inhabits ponds and ditches; is very common in Britain throughout the year.
Genus 46. Cimex.

Rostrum inflected: antenna longer than the thorax: wings four, folded crosswise; the upper ones coriaceous in the anterior part: back flat: thorax marginated: feet formed for running. (Pl. 5. fig. 6, 7, 8.)

The insects of this genus, whether as larvae or in the perfect state, feed for the most part on the juices of plants; some on the larvae of other animals: they have in general a very disagreeable smell. The larvae and pupae have six feet; they are active, and walk about like the perfect insect: the former has no wings, the latter has the rudiments of them. A great number of species are found in Britain.


This insect (the bed-bug) is unhappily but too well known, and was an inhabitant of Europe prior to the Christian era; at least it is mentioned by Aristophanes and other Greek writers. Southall says it was hardly known in London before 1670; but there is good authority for asserting that it was common enough there before the great fire in 1666. It is a nocturnal animal, very fetid; seldom, though sometimes, found with wings; easily killed when taken alive. Bugs are said to be expelled in a variety of ways, viz. by charcoal and oil of turpentine, soft soap, or hard pomatum.

Genus 47. Aphis.

Rostrum inflected: the vagina with five articulations and a single seta: antenna coriaceous, longer than the thorax: wings four, erect, or none: feet formed for walking: the abdomen generally armed with two horns. (Pl. 5. fig. 9.)

The insects of this genus are small and defenceless; but very noxious animals, and most remarkable for the singularities in their history and manners. They seldom appear before autumn, when the males impregnate their females, which soon thereafter lay eggs or rather a sort of capsule in which the young Aphis lie already perfectly formed, but do not break their shell till the following spring. When they appear, it is very remarkable that they are almost wholly females, with hardly a male to be seen during the whole spring and summer. Notwithstanding this, all these female Aphis without any communication with a male are able to propagate their species, and seem to have received the genial influence not merely for themselves alone but for their posterity to the ninth generation. During the whole summer they are viviparous; and if a young Aphis be taken immediately upon exclusion from the mother, and kept apart, it will produce young; which young, if also kept apart, will likewise produce, and so on, without the presence of a male. Towards autumn, however, this singular fructification begins to lose its wonderful effects; the Aphis cease to bring
ORDER III. LEPIDOPTERA.

forth females only; males likewise are produced, which immediately celebrate their nuptial rite, that is to communicate fertility to the whole female posterity of the following summer.


The rostrum rising from the breast with a vagina and three inflected setae: antennæ cylindrical, longer than the thorax: wings four, deflexed; thorax gibbous: feet formed for leaping. (Pl. 5. fig. 10.)

The larvae of the insects of this genus are furnished with feet and generally covered with down. In the perfect state they greatly resemble the Aphides.

Genus 49. Coccus.

Antennæ filiform: abdomen furnished with two setæ: rostrum rising from the breast with a vagina and setae: two erect wings in the males; none in the females. (Pl. 5. fig. 11.)


This insect, so useful when properly prepared to painters and dyers, is a native of South America, where it is found on several species of Cactus, particularly the Cactus Opuntia or Prickly-pear. The insects are collected in a wooden bowl, thickly spread from thence upon a flat dish of earthenware, and placed alive over a charcoal fire, where they are slowly roasted until the downy covering disappears and the aqueous juices of the animal are totally evaporated. During this operation the insects are continually stirred about with a tin ladle, and sometimes water is sprinkled upon them to prevent absolute torrefaction, which would destroy the colour and reduce the insect to a coal; but a little habit teaches when to remove them from the fire. They then appear like so many dark, round, reddish grains, and take the name of Cochi- neal, preserving so little the original form of the insect that this precious dye was long known and sought in Europe before naturalists had determined whether it was animal, vegetable, or a mineral substance.

Genus 50. Thrips.

Rostrum indistinct: antennæ filiform, of the length of the thorax: body linear: abdomen curved upwards: wings four, straight, lying upon the back; longitudinal, narrow, and somewhat crossed. (Pl. 5. fig. 12.)

The insects of this genus are small, and are found on the flowers of various plants.

Order III. LEPIDOPTERA. (Glossata, Fabr.)

The insects of this order contain the butterflies, moths, and hawk-moths; have all four wings covered with scales or a sort of farina: they have a mouth (the jaws of which have lately been discovered, de-
scribed and figured by Savigny in his *Mémoires sur les Animaux sans Vertèbres*, Paris, 1816.), with palpi, a spiral tongue; the body covered with hair. The scales resemble feathers: they lie over one another in an imbricated manner, the shaft towards the body of the insect and the expansion towards the end of the wing, reflecting the most brilliant colours.

**Genus 51. Papilio.**

*Antenna* clavate, gradually thickening towards their extremity: *wings* when at rest erect and meeting upwards. All the insects of this genus fly in the day-time.

Linne in a peculiar and instructive manner divided this beautiful and numerous tribe into sections, instituted from the habit or general appearance, and in some degree from the distribution of the colour of the wings.


This is an insect of great beauty, and may be considered as the only British species of *Papilio*. It is well known to collectors by the title of the Swallow-tailed butterfly, and is of a beautiful yellow, with black spots or patches along the upper edge of the superior wings; all the wings are bordered with a deep edging of black, decorated by a double row of crescent-shaped spots, of which the upper row is blue and the lower yellow. The under wings are tailed, and are marked at the inner angle or tip with a round red spot bordered with blue and black.

The larva of this species feeds on fennel and other umbelliferous plants. It is of a green colour encircled with numerous black bands spotted with red, and is furnished on the top of the head with a pair of short tentacula of a red colour. In the month of July it changes into the chrysalis or pupa state, fixed to some part of the plant on which it feeds, and in the month of August the perfect insect appears. It frequently happens that two broods of this butterfly are produced in the same summer; one in May, having been in the pupa state all the winter, the other in August from the pupa of July. (*Pl. 6. fig. 1.*)

**Genus 52. Sphinx.**

*Antenna* attenuated at each end: *tongue* in most species stretched out: *palpi* two: *wings* deflected.

Some of the species of this genus are the largest of lepidopterous insects. They fly very swift, for the most part early in the morning and late in the evening, some of the smaller species during the day.

Sp. 1. *Sphinx Elpenor*, Elephant Hawk. (*Pl. 6. fig. 2.*)

**Genus 53. Phalena.**

*Antenna* setaceous, and gradually tapering from the base to the tip: *tongue* spiral: the *wings* when at rest are generally deflected.
Moths fly abroad only in the evening and during the night, and obtain their food from the nectar of flowers. The larva is active and quick in motion, and preys voraciously on the leaves of plants.

Sp. 1. *P. Quercus*. Bombyx Quercus, Fabr. (*Pl. 6. fig. 3.*)

**Order IV. Neuroptera.**

The insects of this Order have four membranaceous wings, generally transparent with strong nervures. At the tail they have often an appendage like pincers, but no sting.

**Genus 54. Libellula, Dragon-fly.**

*Mouth* armed with jaws, more than two: *lip* trifid; *antenna* shorter than the thorax; very slender and filiform; *wings* extended: the *tail* of the male is furnished with a hooked forceps.

The insects of this genus are well known; they are remarkable for a long slender body and wings standing out at right angles. The larvæ have six feet, and move with great activity in the water: at the mouth they are furnished with an articulated forceps: they are very voracious, and are the crocodiles of aquatic insects. The larvæ and pupæ are not very different; the latter have the rudiments of wings: in a fine day in June, a person standing by a pond may observe them approach the bank for the purpose of changing their element. Having crawled up a blade of grass or bit of dry wood, the skin of the pupa grows parched and splits at the upper part of the thorax. The insect issues forth gradually, throws off its slough, in a few minutes expands its wings, flutters, and then flies off. The sexual parts in the male are placed under the thorax; in the female at the extremity of the body.

Sp. 1. *L. quadrimaculata*. (*Pl. 7. fig. 1.*)

Inhabits the banks of ponds, but is not common.

**Genus 55. Ephemera.**

*Mouth* without mandibles: *palpi* four, very short, and filiform: *maxilla* short, membranaceous, cylindrical, connected with the lip: *antenna* short, and subulated: *two large stemmata* above the eyes: *wings* erect, the hind ones very small: *setæ* at the tail.

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

This is the largest of the British species. In the evenings in the month of June it assembles in vast numbers under trees near waters, and seems to divert itself for hours together, ascending and descending in the air as if dancing. In the neighbourhood of Luz, in Carniola, these insects are produced in such quantities, that when they die they are gathered to manure the land by the country-people, who think they have been unsuccessful if each does not procure twenty cart-loads of them for that purpose. Their larvæ are the favourite food of fresh-
water fishes, as are also the flies: they are more numerous in running
than in standing waters.

Genus 56. Phryganea.

Mouth with a horny, short, arched, acute mandible, without teeth; and
a membranaceous maxilla: palpi four: stemmata three: antenneae se-
taceous, longer than the thorax: wings incumbent; the hinder ones
folded. (Pl. i. fig. 3.)

Genus 57. Hemerobius.

Mouth with a straight horny mandible: a cylindrical, straight, cleft
maxilla: lip stretched forward and entire: four projecting, unequal,
filiform palpi: no stemmata: wings deflected, not folded: antenneae se-
taceous, projecting, and longer than the thorax, which is convex.
The species of this genus in all their stages feed upon small insects,
especially the Aphides: their larvæ have six feet; in most species they
are oval and hairy; the pupa are inactive, and inclosed in a case. The
eggs are deposited on leaves in the midst of Aphides; they are sup-
ported on small pedicles and set in the form of bunches. The larvæ at-
tain their growth in fifteen or sixteen days, and the pupa incompleta re-
 mains for three weeks before the fly comes forth.
Sp. 1. H. Chrysops. (Pl. 7. fig. 4.) Chrysops maculata, Leach.

Genus 58. Panorpa.

Mouth stretched out into a cylindrical horny rostrum: the mandible is
without teeth: maxilla bifid at the apex: lip elongated, and covering
the whole mouth: palpi four, nearly equal: stemmata three: antenneae
filiform: the tail of the male armed with a chela, that of the female
unarmed.
Sp. 1. P. communis. (Pl. 7. fig. 5. a. chela magnified.)

Genus 59. Raphidia.

Mouth with an arched, dentated, horny mandible: a cylindrical, obtuse
horns maxilla: a rounded, entire, and hornv lip: palpi four, very
short, nearly equal, and filiform: stemmata three: wings deflected: an-
tenneae filiform, of the length of the thorax; elongated before, and
cylindrical: tail of the female with a lax recurved seta. (Pl. 7. fig. 6.)

Order V. HYMENOPTERA.

Wings four, membranaceous: mouth with maxillae, and some of them
likewise a tongue. Between the large eyes they have generally three
stemmata. At the extremity of the abdomen the females of several of
the genera have an aculeus or sting, that lies concealed within the ab-
donien, which is used as a weapon, and instils into the wound an acid
poison: those which want the sting, are furnished with an oviduct, that
is often exserted, and with which the eggs are deposited either in the bodies of the caterpillars of other insects, or in wood. From these eggs the larva are produced, which in some have no feet; in others more than sixteen. They change to pupae *incomplete*, which are inclosed in cases. Some of the insects of this Order live in societies, others are solitary.

**Genus 60. Cynips.**

*Month* with a short membranaceous *maxilla* with one dent: an arched *mandible* cleft at the apex: a short, cylindrical, entire, horny *lip*: four short unequal *palpi*: *antenna* moniliform, aculeus spiral, and in general hidden within the body.

The *Cynips* pierce the leaves, &c. of plants with their sting, and deposit their eggs in the wound; the extravasated juices rise round it and form a gall, which becomes hard, and in this the larva lives and feeds, and changes to a pupa.

Sp. 1. *C. Quercus folii.* ([Pl. 8, fig. 1.)

The larva is found in galls, adhering to the under side of oak leaves, of the size of hazel-nuts.

**Genus 61. Tenthredo.**

*Month* with a horny arched mandible, dentated within: *maxilla* obtuse at the apex: *lip* cylindrical and trifid: *palpi* four, unequal, and filiform.

The larva of the insects of this genus have from sixteen to twenty-eight feet; a round head: when touched they roll themselves together. They feed on the leaves of plants. When full-grown, they make, sometimes in the earth and sometimes between the leaves of the plant on which they feed, a net-work case, and within it change to a *pupa incomplete*, which for the most part remains during the winter in the earth. The species are very numerous, and consist of many natural genera.

Sp. 1. *T. Scrophulariae.* ([Pl. 3, fig. 2.)

Inhabits the Water Betony.

**Genus 62. Sirex.**

*Month* with a thick, horny mandible, truncated at the apex, and denticulated: an incurved, acuminate, cylindrical, ciliated *maxilla*, and a *lip*, both of them membranaceous and entire; the whole short: *palpi* four, the hind ones the longest, increasing towards their apex: *antenna* filiform, with more than twenty-four equal articulations: *ovident* exserted, stiff, and serrated: *abdomen* sessile, terminating in a point or spine: *wings* lanceolated, and not folded.

Sp. 1. *S. Gigas.* ([Pl. 8, fig. 3.)

**Genus 63. Ichneumon.**

*Month* with a straight membranaceous, bifid maxilla, rounded at the apex, dilated, ciliated, and horny: an arched, acute, horny *mandible*;
without teeth: *lip* cylindrical, emarginated, horny, and membranaceous at the apex: *palpi* four, unequal, filiform: *antennae* setaceous.

The insects of this genus lay their eggs in the bodies of caterpillars or pupae, which are there hatched: the larvae have no feet; they are soft and cylindrical, and feed on the substance of the caterpillar; this last continues to feed, and even to undergo its change into a chrysalis, but never turns to a perfect insect: when the larva of the ichneumon are full grown they issue forth, spin themselves a silky web, and change into a *pupa incompleta*, and in a few days the fly appears. The genus is very numerous, upwards of 800 species are found in this country.

Sp. 1. *I. Manifestator*. (Pl. 3. fig. 4.)

**Genus 64. Sphex.**

*Mouth* with an entire maxilla: a horny, incurved, dentated mandible: a horny *lip*, membranaceous at the apex: *palpi* four: *antennae* filiform: the *aculeus* or *sting* concealed within the abdomen.

The insects of this genus form their cells in sand-banks, and they are occasionally found on umbelliferous plants; the larva is soft, without feet, and lives in the bodies of dead insects in which the mother had previously deposited her eggs.

Sp. 1. *S. sabulosa*. (Pl. 8. fig. 5.)

Inhabits sand-banks: is common in Norfolk, Suffolk, and the Hampshire coast, in June and July.

**Genus 65. Chrysis.**

*Mouth* horny and porrected: the *maxillae* linear, much longer than the *lip* which is emarginated: *palpi* four, unequal and filiform: *antennae* filiform, the first articulation the longest, the remainder short: body shining and finely punctured, the abdomen arched underneath; the extremity, in most species, dentated: the *sting* somewhat exerted: wings not folded.

The species of this genus inhabit sand-banks, old walls, or decayed wood. They rarely appear but in the middle of the day, and then only when the sun shines.

Sp. 1. *C. bidentata*. (Pl. 6. fig. 7.)

**Genus 66. Vespa, Wasp.**

*Mouth* horny; *maxillae* compressed: *palpi* four, unequal and filiform: *antennae* filiform, the first articulation the longest, and cylindrical: *eyes* shaped like a crescent: *body* smooth; the *sting* hid within the abdomen; the upper wings folded in both sexes.

The insects of this genus live in society; they prey on insects that have naked wings, particularly bees and flies; the larva is soft and without feet; the pupa is motionless. Wasps make a hive of a substance like paper formed of wood reduced to a paste; the combs are horizontal,
and have only one row of hexagonal cells, flat at bottom, the mouth turned downwards, which serve only for holding the young. Every hive is begun by a mother, who at first deposits a few eggs, from which neuters are produced, or working wasps, who assist her in increasing her work and in feeding the young afterwards produced. Neither males nor females are produced till towards the month of September. Before that time there are none in the nest but the female and the neuters she has engendered. The females remain in the nest. The males do no work. Wasps feed their larvae with insects, meat, and the fragments of fruits. Towards autumn they are said to kill such of the larvae and pupae as cannot come to perfection before the month of November. The males and neuters perish themselves during winter, and none remain but a few impregnated females to perpetuate the species.

Sp. 1. V. Crabro, the Hornet Wasp. (Pl. 8, fig. 3.)
Inhabits Europe, generally forming its nest in the trunks of trees.

Some little caution is necessary in taking the insects of this species, as without care the entomologist is subject to be stung by them. I have found that the bag net (Pl. 11, fig. 4.) is the best means of taking them. The insects when secured in the net should be gently trodden upon, not sufficiently to injure, but merely to numb them; a pin should then be passed through the thorax, and the insect placed in the pocket box.

Genus 67. Apis, Bee.


Sp. 1. A. retusa, Linn. (female) pennisps, (male) (Pl. 8, fig. 9, male.)

Mr. Kirby has described upwards of 200 indigenous species of this genus in his admirable work entitled Monographia Apum Angliae, 2 vols. 8vo. This work is indispensable in the library of every entomologist.

Genus 68. Formica, Ant.

Palpi four, unequal, with cylindrical articulations, seated on a submembranaceous cylindrical lip: antennae filiform; between the thorax and the abdomen a small erect scale: the sting concealed in the abdomen, and possessed only by the females and neuters. The males and females only have wings.

All the species of this genus are of three sorts, males, females, and neuters. The neuters alone labour; they form the ant-hill, bring in the provisions, feed the young, bring them to the air during the day, carry them back at night, defend them against attacks, &c. The females are said to be retained merely for laying eggs, and as soon as that is accomplished they are unmercifully discarded. The males and females perish with the first cold; the neuters lie torpid in their nest.

Sp. 1. F. herculanea. (Pl. 8, fig. 10.)
Genus 69. Mutilla.

*Mouth* horned, without a tongue: *maxilla* membranaceous at the apex, the lip projecting, obconical, bearing on its apex four unequal *palpi* with obconical articulations: *antenna* filiform. In general the males are winged, and the females are apterous: *body* pubescent: *sting* concealed.

Sp. 1. *Mutilla europaea.* (Pl. 3. fig. 11. male.)

Order VI. DIPTERA.

This Order includes all those insects that have but two wings, and behind, or below them, two globular bodies, supported on slender pedicles called *Halteres* or poisers. At the mouth they have a proboscis, sometimes contained in a vagina, and sometimes furnished at its sides with two palpi but no maxilla. Their eyes are reticulated and large. The females, in general, lay eggs, but some are viviparous; the larvae of the insects of this order are as various in their appearance as the places in which they are bred. In general they do not cast their skins, but change into a pupa state.

Genus 70. Oestrus, Gad-fly.

*Hautstellum* retracted within the lips, which are tumid and grown together with a small pore and no palpi; the *vagina* is membranaceous, cylindrical, obtuse, including three membranaceous *setae*, which are flexible, short, and reflected; *antenna* short and setaceous.

The insects of this genus lay their eggs in the nostrils or in the skins of horses, oxen, rein-deer, goats, and sheep; their larva is bred, and feeds on the fat of these animals, or on the matter which is generated in the wound. It is soft and without feet; in some species it has at the extremity two hooks, which it uses to assist it in walking. These hooks are wanting in the larvae which reside in the skins of oxen and reindeer. When full grown the larva let themselves fall on the ground, they enter the earth and change into an oval hard pupa. The perfect insect takes no food. [Mr. Bracy Clark has written an excellent paper on the insects of this genus, published in the third volume of the *Transactions of the Linnean Society*; which has been re-published with additional remarks, and entitled an Essay on the Bots of Horses, &c. 4to, 1815.]

Sp. 1. *O. Bovis.* (Pl. 9. fig. 1.)

Genus 71. Tipula.

*Mouth* furnished with a very short proboscis, membranaceous, grooved on the back, and receiving a bristle; a short *haustellum* without a *vagina*; two incurved *palpi*, equal, filiform, and longer than the head; *antenna* in most species filiform.
The insects of this genus live on garbage; the larvae have no feet, they are cylindrical and soft; they feed on the roots of plants under which they live; the pupae are motionless and cylindrical, with two horns before, dentated behind. Some species live in the water, and either swim or roll themselves up in a case.

Sp. 1. *T. oleracea.* (Pl. 9. fig. 2.)

**Genus 72. Musca.**

*Mouth* with a fleshy exserted proboscis; two equal *lips* and a *haustellum* furnished with *setae*, and two short *palpi*; *antennae* in most species short.

Sp. 1. *M. inanus.* (Pl. 9. fig. 3.)

**Genus 73. Tabanus.**

*Mouth* with a straight exserted membranaceous proboscis, ending in an ovate capitulum or knob; with two equal *lips*; *haustellum* projecting, exserted, and received into a groove in the back of the proboscis; *vagina* univalve, with five *setae* and two equal *palpi*, the last articulation of which is thicker than the rest; *antennae* short, approximate, cylindrical, with seven articulations; the third generally largest, and armed with a lateral dent.

The insects of this genus suck the blood of animals. They are of a dull plain appearance, but their large eyes are in general beautifully coloured—these colours fade after they are dead.

Sp. 1. *T. tropicus.* (Pl. 9. fig. 4.)

**Genus 74. Culex, the Gnat.**

With an exserted, univalve, flexible *vagina*; five *setae*; *palpi* two, consisting of three articulations; *antennae* filiform.

Sp. 1. *C. pipiens.* (Pl. 9. fig. 5.)

Inhabits Europe and the northern parts of Asia and America.

This insect is frequent in the neighbourhood of waters and marshy places. In southern regions there is a larger species which is known by the name of *Musquetoe*. Its bite is painful, raising a considerable degree of inflammation, and its continual piping note is exceedingly irksome where it abounds, especially during the night. When it settles to inflict the wound and draw the blood, it raises its hind pair of feet. In Lapland, the injuries the inhabitants sustain from it are amply repaid by the vast numbers of water-fowl and wild-fowl which it attracts, as it forms the favourite food of their young.

**Genus 75. Empis.**

*Haustellum* inflected; *vagina* univalve, with three *setae* and a proboscis; *palpi* short and filiform; *antennae* setaceous.

The changes of these insects are unknown; they are common on
flowers and in gardens; their head is small and round, the thorax gibbous, the feet long, the proboscis small and inflected.

Sp. 1. *E. pennipes.* (Pl. 9. fig. 6.)

**Genus 76. Conops.**

*Mouth* with a porrected, geniculated rostrum; *antennae* clavated; the *clava* acuminated.

Sp. 1. *C. macrocephala.* (Pl. 9. fig. 3.)

**Genus 77. Asilus.**

*Mouth* with a straight, horny, bivalve *haustellum*, which is gibbous at the base; *antennae* filiform.

The insects of this genus live by preying on those of the Dipterous and Lepidopterous orders. When they are at rest, their wings in general are incumbent on the abdomen, which is long and small, often hairy, particularly the feet, and these end in small claws. Their larva feed in the earth, on the roots of plants; they change into a *pupa coarctata*, beset with setae.

Sp. 1. *A. crabroniformis.* (Pl. 9. fig. 9.)

**Genus 78. Bombylius.**

*Mouth* with a very long setaceous, straight, bivalve *haustellum*; the valves unequal, with three setae; *twoshort hairy palpi*; *antennae* subulate, united at the base.

The insects of this genus, while they fly, suck the nectarous juices of flowers.

Sp. 1. *B. major.* (Pl. 9. fig. 10.)

**Genus 79. Hippobosca.**

*Mouth* with a short, cylindrical, bivalve *haustellum*; the valves equal; *antennae* filiform; *feet* with several claws.

The insects of this genus live by sucking the blood of animals; and stick so fast to their skins, that they must be torn before they can be taken off.

Sp. 1. *H. equina.* (Pl. 9. fig. 11.)

**Order VII. APTERA.**

In this Order Linne arranged (if we except the Flea, Louse, and Lepisma,) animals widely different from genuine insects: I shall only enumerate the names of Linne, and the Classes they constitute. The characters of the numerous tribes and genera into which they are distributed, are fully detailed in the article "Annulosa" in the Supplement to *Encyc. Brit.* vol. 1. part 2.

The following genera belong to the Class *Insecta*, the characters of
which will be found in Dr. Leach's System, viz. Lepisma, Podura, Pediculus, Pullex, and Termes. Genera Acarus, Phalangium, Aranea, and Scorpio, belong to the Class Arachniidea. Genera Cancer, Monoculus, and Oxiscus, to the Class Crustacea: Scolopendra and Julus, to the Myriapoda. The characters of the above enumerated Classes will be given hereafter.

It should be observed that those of the above genera, to which are affixed the names of other authors, are not to be found in the writings of Linne, but have been adopted in the various translations and editions since the twelfth of the Systema Nature; and are generally received by those who adhere to that system. The following synoptical view from the 12th edition of the Systema Nature, will show the extent of Entomology as left by Linne himself.

Order I. COLEOPTERA.

* Antenne clavated or gradually increasing.
  Scarabaeus, Lucanus, Dermetes, Hister, Byrrhus, Gyринus, Attelabus, Curculio, Silpha, Coccinella.

** Antenne filiform.
  Bruchus, Cassida, Ptinus, Chrysomela, Hispa, Milot, Tenebrio, Lampyris, Morbella, Staphylinus.

*** Antenne setaceous.
  Cerambyx, Leptura, Cantharis, Elater, Cicindela, Buprestes, Dytiscus, Carabus, Necydalis, Forficula.

Order II. HEMIPTERA.

Blatta, Gryllus, Cicada, Notonecata, Nepa, Cimex, Aphis, Chermes, Coccus, Thrips.

Order III. LEPIDOPTERA.

Papilio, Sphinx, Phaenax.

Order IV. NEUROPTERA.

Libellula, Ephemera, Phryganea, Hemerobius, Panorpa, Raphidia.

Order V. HYMENOPTERA.

Cynips, Tenthredo, Sirex, Ichneumon, Sphex, Chrysis, Vespa, Apis, Formica, Mutilla.

Order VI. DIPTERA.

Cestrus, Tipula, Musca, Tabanus, Culex, Empis, Conops, Asilus, Bombylius, Hippobosca.

Order VII. APTERA.

The genera of the animals of this Order are already enumerated; any further observation will therefore be unnecessary.
It is the object of comparative anatomy to point out the difference which each organ presents when considered in every animal; but this exposition would prove very tedious and intricate, were we obliged at every step to enumerate all the animals in which particular organs have a uniform structure. It is certainly much more convenient to indicate them all at once under the name of a class or genus which may comprehend the whole: but to enable us to form this arrangement, it is necessary that all the animals which compose a genus or a class, should possess some resemblance not only in one, but in all their organs.

Nature never oversteps the bounds which the necessary conditions of existence prescribe to her: but whenever she is unconfined by these conditions, she displays all her fertility and variety. Never departing from the small number of combinations that are possible between the essential modifications of important organs, she seems to sport with infinite caprice in all the accessory parts. In these there appears no necessity for a particular form or disposition. It even frequently happens that particular forms and dispositions are created without any apparent view to utility. It seems sufficient that they should be possible; that is to say, that they do not destroy the harmony of the whole.

Among these numerous combinations there are necessarily many which have common parts, and there are always a certain number which exhibit very few differences. By the comparison therefore of those which resemble each other, we may establish a kind of series which will appear to descend gradually from a primitive type. These considerations are the foundations of the ideas from which certain naturalists have formed a scale of beings, the object of which is to exhibit the most perfect, and terminating with the most simple kind of organization—with that which possesses the least numerous and most common properties; so that the mind passes from one link of the chain to the other, almost without perceiving any interval, and, as it were, by insensible shades.

The object of system is to reduce a science to its simplest terms; by reducing the propositions it comprehends to the greatest degree of generality of which they are susceptible. A good method in comparative anatomy must, therefore, be such as will enable us to assign to each class and to each of its subdivisions, some qualities common to the greater part of the organs. This object is to be attained by two different means, which may serve to prove or verify one another. The first, and that to which all men will naturally have recourse, is to proceed from the observations of species to uniting them in genera, and
to collecting them into a superior order, according as we find ourselves conducted to that classification by a view of the whole of their attributes. The second, and that which the greater part of modern naturalists have employed, is to fix beforehand upon certain bases of divisions, agreeably to which, beings, when observed, are arranged in their proper places.

The first mode cannot mislead us; but it is applicable only to those beings of which we have a perfect knowledge: the second is more generally practised, but it is subject to error. When the bases that have been adopted remain consistent with the combinations which observation discovers, and when the same foundations are again pointed out by the results deduced from observation, the two means are then in unison, and we may be certain that the method is good. On the anatomy of animals, science is most deeply indebted to the learned, acute, and indefatigable Cuvier, who has contributed more than all others, (save Hunter,) to our accurate knowledge of the characters on which the classes are founded. The whole animal kingdom is by Cuvier divided into four great types:—

1st. That of the animals which have their brain and the principal part of their nervous system inclosed within vertebrae, and their muscles attached to a bony skeleton. - - - - - Vertebrata.

2dly. Those that have no skeleton; whose muscles are attached to their skin, and whose nervous system is irregular in its form and distribution. - - - - - Mollusca.

3dly. Those that have no skeleton; whose muscles are attached to their skin, which is hard, or to processes proceeding from it; and whose nervous system consists of a series of knots or ganglia, brought into communication by two longitudinal nervous cords. - Annelata.

4thly. Those whose bodies are radiated, and in whom no nervous system has been discovered, and who have but one opening for the reception and rejection of their food. - - Radiata of Zoophytes.

The animals which come under my observations in this work, belong to the type Annelata, and the classes to which they belong may readily be distinguished by the following characters.

* Gills for respiration.

Legs sixteen: antennae two or four. - - 1. Crustacea.

** Sacs for respiration.


*** Tracheae for respiration.

a. No antennae.

b. Two antennae.


Six thoracic and no abdominal legs - 5. Insecta.
Class I. **Crustacea**.

**History.**—"All the *Crustacea*, as their name imports, are covered by integuments composed of crustaceous materials, more earthy than those which envelope the *Myriapoda*, the *Arachnidea*, and *Insecta*. The greater portion of these animals live on putrid or decomposing animal substances, and in all the sexes are distinct."

To the kindness and liberality of my much respected friend Dr. Leach, I am indebted for the above passage and following review (which he has since published in the *eleventh volume of the Dictionnaire des Sciences Naturelles*) of the rise and progress of *Crustacea*; which is selected from his valuable manuscripts.

"The ancients were well acquainted with the *Malacostraca* (Μαλακοστράκον), which they placed between the Mollusca and Fishes. Aristotle has dedicated a chapter to the species known to him; Athenæus has enumerated those used as food; and Hippocrates has made mention of such species as were considered to be useful in medicine. To the observations of Aristotle very little was added by Pliny; and from his time until that of Rondeletius, Belon, Ge-nner, Aldrovandus and Johnson, (who likewise placed them between the Mollusca and Fishes,) little or nothing was done that tends in any way to illustrate their natural history or structure. Linné, in the first (1735) and subsequent editions of his *Systema Naturae*, placed all the *Crustacea* amongst the apterous insects, in the genera *Monoculus*, *Cancer*, and *Oniscus*.

The *Crustacea* were arranged by Brisson (*Regnum Animale*) along with the *Myriapoda* and *Arachnidea*, being placed between the Fishes and Insects, under the Class *Crustacea*.

Fabricius in his *Systema Entomologicum* (1775) distributed these animals into two Classes: 1. *Syngnatha*, comprehending *Monoculus* and *Oniscus*, which he associated with *Ephemera*, *Phygana*, *Podura*, *Tenthoelda*, and other genuine insects; 2. *Agonata*, containing *Cancer*, *Pallus*, *Scyllarus*, *Astacus*, and *Gammarus*, to which he also added *Scorpio*. The same author in his *Species* (1734) and *Mammis Insectorum* (1737) maintained the same general distribution; adding in the former of those works the genus *Squilla*, and in the latter *Hippa*, removing in each work the genus *Scorpio* from the *Agonata*. In the second volume of his *Entomologia Systematica* (1793) his class *Syngnatha* contained only genuine Insects, the *Onisci* being removed to a new division named *Myriapoda*, where they were associated with the *Myriapoda*; the rest he still placed with the *Agonata*, to which he added the genus *Limnus*, *Cymothoe* and *Galatheus*.

Latreille in his *Précis des Caractères des Insectes* (1796) (a work which commences a new era in the science of Entomology, and in which, for the first time, the distribution of Insects into families is indicated), considered the *Crustacea* as forming three Classes or Orders

"In that excellent little work Le Tableau Elementaire de l'Histoire Naturelle des Animaux, par G. Cuvier (1791), the Crustacea are arranged with the Insecta, Arachnoidae, and Myriapoda, under a division entitled 'Insectes pourvus de Mâchoires, et sans Ailes,' where they are placed at the head of the Insects, in a limited and well defined section (A.), which he afterwards, in his Leçons d'Anatomie Comparée, established on anatomical principles, as a distinct class, named Crustacés.

"In 1798 Fabricius published a Supplement to his last work, in which, by the aid of the Baron de Daldorff, he established several new genera, and amended the arrangement of the whole.

"Lamarck in his Système des Animaux sans Vertèbres (1801) adopted the Crustacea as a peculiar class. This system was adopted by

"Bosc, who in the same year published his Histoire Naturelle des Crustacés faisant Suite à l'Édition de Buffon par Castel, in which for the first time we are made acquainted with his interesting genus Zoëa.

"Latreille in his Histoire Naturelle des Crustacés et des Insectes, tom. 3. (1802,) adopted the class Crustacea, and distributed the genera composing it into two subclasses: 1. Entomostracés: 2. Malacostracés: excluding however the Tétracérés, (Asellidæ, and Oniscidæ,) which he referred to a sub-class of Insects.

"Duménil (Zoologie Analytique, 1806) arranged these animals into 1. Entomostracés, and 2. Astacoides, excluding Oniscus, Armadillo, &c. which he placed with the aperous insects.

"Latreille in the same year produced his celebrated Genera Crustacea et Insectorum, where they are divided into Entomostraca and Malacostraca, the Tetracera being referred to the Insects.

"The same author in his Considerations Générales, &c. (1810) followed the same divisions, referring however the Tetracera to the Arachnoidae.

"In the seventh volume of the Edinburgh Encyclopædia, article 'Crustacology,' Dr. Leach distributed the Crustacea into three Orders: 1. Entomostraca: 2. Malacostraca: 3. Myriapoda: in which the Tetracera were included. In the Appendix, however, he divided the Tetracera from the Myriapoda (which he established as a distinct Class), and placed them with the Malacostraca in an Order named Gasteruri, where they were associated with the Gammeridæ, and considered the Malacostraca and Entomostraca as sub-classes. This opinion he has since maintained in a paper published in the eleventh volume of the Transactions of the Linnean Society of London, in the first volume of the Supplement to the Encyclopædia Britannica, and in the Bulletin des Sciences for 1816.

"Blainville in his Prodrome d'une Nouvelle Distribution Systematique (Bull. des Sciences, &c. 1816) has arranged the Crustacea into three Classes: 1. Décapodes: 2. Heteropodes: 3. Tetradecapodes."
Class I. CRUSTACEA.1.

Classification.—The Crustacea form two large groups or subclasses. The first of these, the Malacostraca, have a pair of mandibles and two pair of maxille bearing palpi, and eight pair of legs furnished with branchie at their bases: all the genera that do not present the above characters are referred to the artificial assemblage denominated Entomostraca.

Subclass 1. Entomostraca.—Legs branchial, or furnished with appendages: mandibles wanting or generally simple: eyes sessile or pedunculated.

Subclass 2. Malacostraca.—Legs simple, without appendages: mandibles palpigerous: eyes pedunculated or sessile.

Subclass 1. ENTOMOSTRACA.

The animals of this subclass are but little known, and consequently their arrangement is extremely imperfect. Some of the genera are parasitic, being found on the bodies of other animals, and some even undergo transformation during their growth.

The following arrangement is artificial, but is well calculated to enable the student to discover the Genera.

Division I.—Body covered by a horizontal shield: eyes sessile.

Subdivision 1.—Shell composed of but one part.

* With jaws.

Genus 1. APUS, Cuvier, Latr., Leach. Apos, Scopoli.

Shell crustaceous-membranaceous, orbiculate-ovate, behind deeply emarginate: the back (with the exception of the anterior part) carinated: eyes two, inserted at the anterior and middle part of the back; somewhat prominent, slightly lunate, approaching each other, especially anteriorly, where they touch each other: antennae two, short, somewhat filiform, biarticulated, scarcely exserted, inserted behind the mandibles: mandibulae two, corneous, somewhat cylindric, short, hollow within, points arcuated and compressed, the extreme apex straight and very much denticiUated: legs branchial and very numerous.

The Apis inhabit stagnant waters and ponds.


Inhabits England near Christchurch in Hampshire, where it was discovered by Montagu, and was named after him by Leach. 

Apis productus of Latreille is synonymous with the Linnean Monoculus Apus.
**CLASS I. CRUSTACEA.**

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**With a rostrum, but no jaws: antennæ two.**

Genus 2. CALIGUS, Müll., Latr., Bosc, Leach.

Shell coriaceous-membranaceous, bipartite; the anterior segment inversely cordiform, very deeply notched behind (the notch receiving the hinder segment, which is round), the anterior part subproduced, notched; the laciniae at their base externally bearing antennæ: antennæ biarticulate, the first joint thickest, the second with a simple seta at its extremity: abdomen narrower than the thorax, with its base contracted and bearing the hinder legs, its extremity on each side with a rounded process of the length of the body: legs rounded, rather more slender towards its apex, which is obtuse: legs fourteen, anterior; second and fourth pairs with a strong claw; the second pair short; the third slender, elongate, the last joint double, with unequal laciniae; the fifth, with the last joint on one side setose, the setæ ciliated on each side; the sixth with a double triarticulated tarsus, the last joints on each side setose, the setæ ciliated on each side; the seventh pair with its last joint trifid: the hinder segment of the thorax beneath, terminated by a large broad lamella, ciliated behind.


Inhabits the common cod-fish.

Genus 3. PANDARUS, Leach. CALIGUS, Müll., Latr., Bosc.

Shell coriaceous-membranaceous, composed of but one part, deeply notched behind; the angles acute; the middle of the notch toothed; anteriorly narrower, rounded, with a process on each side externally bearing the antennæ: antennæ composed of two joints, the second joint terminated by several setæ: abdomen somewhat narrower than the shell, the base above with two transverse lamelle, the first of which is four-lobed, the second bilobate: the apex notched, with two filaments longer than the body, with a lamella at their base above: rostrum elongate, attenuated, inserted behind the anterior legs: legs fourteen; anterior pair short, terminated by a short claw, and arising from beneath an ovate process; second pair with a double, unequal tarsus; third pair without any determinate form, without any claw; fourth pair bifid; fifth and six pairs bifid, their coxae connected by a lamella; seventh pair bifid, the exterior lacinia longest, with a notch externally towards its apex.

Sp. 1. Pand. bicolor. Shell and the middle of the abdominal lamelle black; tail with filaments double the length of the body.


Inhabits the Squalus galeus of Linné.

Genus 4. ANTHIOSOMA, Leach.

Shell coriaceous-membranaceous, unipartite, rounded before and behind; the anterior part as if uni-lobate, the lobe higher than the shell, behind on each side, bearing the antennæ: antennæ six-jointed: abdo-
MODERN SYSTEM.

...much narrower than the shell, on every side imbricated with membranaceous, foliaceous lamellae, which surround or embrace it: two of the lamellae are dorsal, the one being placed over the other; the other lamellae are placed on the sides of the belly, three on each side; apex of the abdomen terminated by two very long filaments, and with two shorter filaments below them: rostrum elongated-cylindric, inserted behind the anterior legs, furnished at its extremity with two straight cornaceous mandibles: legs six; anterior pair three-jointed, the second joint near the apex above unidentate, the last terminated by a claw; second pair triradiated, the last joint ovate, compressed; third pair biarticulated, the second joint very thick, internally dentated, armed at its extremity by a strong claw.


This species was discovered sticking to a shark which was thrown ashore on the coast of Exmouth, in Devon, by T. Smith, esq.

Division II.—Body covered by a bivalve shell: eyes sessile.

Subdivision 1.—Head porrected.

Genus 5. DAPHNIA, Müll., Latr., Bosc, Leach.

Eye one only: antennae two, branching.


Monoculus Pulex. Linné, Fabr.

Inhabits ponds and marshes.

Subdivision 2.—Head concealed.

Genus 6. CYPRIS, Müll., Latr., Bosc, Leach.

Antennae terminated by a brush.

The animals of this genus inhabit pools and ditches containing pure water; they swim with very great rapidity, and whilst in motion conceal their whole body within their shell, which is truly bivalve.


Inhabits France, Germany, and England.

Genus 7. CYTHERE, Müll., Latr., Bosc, Leach.

Antennae simply pilose.

This genus was first discovered and established by Müller, who first observed all the species described in his Entomostraca. It is distinguished from Cypris by the antennae, which are not terminated by a pencil of hairs. The legs are eight in number, and are rarely drawn within the shell, which is really bivalve.

The Cytheræ have no tail, and their antennæ, like those of the Cyprides, have their articulations pilose. They have but one eye. All the species inhabit the sea, and may be found among the confervæ
and corallines, which fill the pools left by the tide in most of the rocky coasts of Europe.


Division III.—Body covered neither by a bivalve shell nor shield. Eye one, sessile.

Genus 3. CYCLOPS. Müll., Lam., Latr., Bosc, Leach. 

Body ovate-conic, elongate: eye one, situate on the thorax: antennae four, simple: legs eight.

All the animals of this genus inhabit fresh waters. The females carry their eggs in a pouch resembling a bunch of grapes on each side of the tail. The organs of generation of the male are placed in the antennae; those of the female, beneath the belly, at the base of the tail, which is abruptly narrower than the abdomen. The antennae are hairy at the base of their joints.


Genus 9. POLYPHEMUS. Müll., Latr., Bosc, Leach. 

Eye one, forming the head: legs ten; two bident, elongate, and extended horizontally.


The only species known of this genus. It inhabits lakes and marshes; and is subject to very considerable variation in size and colour.

Division IV.—Body covered by neither a bivalve shell nor shield. Eyes pedunculated.

Genus 10. BRANCHIPODA. Lam., Latr., Bosc, Leach. 

Body filiform and very soft: head divided from the thorax by a very narrow but distinct neck: eyes two, lateral: antennae two, short, two-jointed, capillary, inserted behind and above the eyes: front with two moveable processes (which are broader towards the apex in the male sex), that are notched, those of the female furnished with a papilla at their point. The organs of generation are situate at the base of the tail.

Sp. 1. Br. stagnalis. Body transparent, of a light brown colour, slightly tinged with green or blue, particularly on the head and legs.

Cancer stagnalis. Linne.—An interesting account of this species is given by the late Dr. Shaw in the Transactions of the Linnean Society of London, vol. i.
Subclass II. MALACOSTRACA.

A very valuable work is now publishing by Dr. Leach, in quarto, and illustrated with highly finished engravings, entitled, MALACOSTRACA Podophthalma Britanniae, in which the whole of the indigenous species hitherto discovered of this subclass are figured. It is necessary to state that this gentleman has spared neither pains nor expense to render the work complete, having with unexampled zeal and perseverance amassed together one of the finest collections ever formed, which is, with the remainder of his cabinet, consisting of insects, shells, &c. deposited in the British Museum, and, under certain restrictions, may always be consulted by students of Zoology.

Legion I. PODOPHTHALMA.

"The Malacostraca Podophthalma include those animals which, in common language, are denominated Crabs, Lobsters, Cray-fish, Prawns, Pandalus, and Shrimps, all of which have the power of reproducing their claws when they are lost."

Order I. BRACHYURA.

A. Abdomen of the male five-jointed, the middle joint longest; of the female seven-jointed. Anterior pair of legs didactyle. (Shell truncate behind. Two anterior legs of the male elongate, of the female moderate.)

Genus I. CORYSTES. Latr., Leach.

Externus long, ciliated on each side.

Genus 1. CORYSTES. Latr., Leach.

External antennae longer than the body; the third segment composed of elongate, cylindric joints: external double palpi with the external foot-stalk narrow; the second joint largest, having its internal side deeply emarginate: anterior pair of legs, of the male twice the length of the body, subcylindric, the hand gradually somewhat thicker and somewhat compressed; of the female, of the length of the body, with a compressed hand: other legs with tibae and tarsi of equal length: claws elongate, straight, acute, and longitudinally sulcate: abdomen, of the male, with the first joint linear-transverse; the second longer, and produced on each side; third, nearly equally quadrate; the fourth transverse, and narrower than the third; the fifth narrower, nearly triangular, with the tip rounded; of the female, with six joints transverse, arcuated in front; seventh triangular, with the apex rounded: shell oblong-ovate, anteriorly slightly rostrated, behind margined:
eyes not thicker than their bending-backward peduncles: orbits above with one fissure.

Sp. 1. Cor. cassivelaunus. Shell granulated, crenulated behind; front bifid; the sides tridentate.


Inhabits most of the sandy shores of the European ocean, and is often thrown up after heavy gales of wind.

Genus 2. ATELECYCLUS. Leach, Latreille.

External antenna half the length of the body; the third segment composed of elongate and cylindric joints: external double palpi with the second joint of the internal footstalk shortest, with the internal apex produced, and the internal side notched towards the joint: anterior legs of the male longer than the body, with a compressed hand: other legs with tibia and tarsi of equal lengths, furnished with elongate, quadrato nails that are longitudinally sulcate, having their tips naked, rounded and sharp, the hinder ones obscurely subcompressed: abdomen of the male with the first joint transverse, linear, twice the length of the second; the third much elongated, narrower towards its extremity, the apex nearly straight; the fourth subquadrate, with the anterior angles produced; fifth flask-shaped, with a very sharp extremity; of the female, with the first five joints transverse quadratro; anteriorly notched; the last elongate, subtriangular behind, subproduced: shell subcircular, the sides gradually converging into an angle behind; hinder part truncate and granulate-margined: eyes narrower than their footstalks; orbits behind with two fissures, below, with one.

Sp. 1. At. heterodon. Shell granulated, the sides with seven serrated teeth, and other smaller teeth between some of the other teeth: front with three serrated teeth, the middle of which is the largest. Leach, Malac. Podoph. Brit. tab. 2.

This elegant crab was discovered by Montagu on the southern coast of Devon, where it is not an uncommon species in deep water. To the fishermen it is well known by the name of Old Man's Face Crab.

Fam. II. PORTUMNUS. Leach.

Antenna moderate, simple: hinder pair of legs with compressed claws.

Genus 3. PORTUMNUS. Leach.

Eyes not thicker than their peduncles: orbits entire: anterior pair of legs equal: other legs with compressed claws, internally towards their base dilated: fifth pair with a compressed, foliaceous, lanceolate claw:

r?
abdomen of the male with the fourth joint elongate: shell with the transverse and longitudinal diameters the same.


Planc first discovered this species on the shores of the Adriatic sea. It burrows beneath the sand, where it may be found by digging at low water, on most of our sandy shores.

When living it is most beautifully mottled, and the legs are of a luteous-orange colour.

Genus 4. CARCINUS. Leach. Eys narrower than their peduncles: orbits behind and beneath with one fissure: anterior pair of legs unequal, the hands externally smooth; hinder pair compressed, and slightly formed for swimming: abdomen of the male with the fourth joint transverse, and scarcely narrower than the third: shell with the transverse diameter greatest.


This most common species inhabits all the shores and estuaries of Britain. It burrows under the sand, or conceals itself beneath fuci and stones. It is sent to London in immense quantities, and is eaten by the poor.

Genus 5. PORTUNUS. Fabr., Latr., Bosc, Lam., Leach. Eys much thicker than their peduncles; orbits behind, with two fissures, below with one fissure: abdomen of the male with the fourth joint transverse: anterior pair of legs somewhat unequal, the hands externally with elevated lines, arms generally unarmed; hinder pair compressed, foliaceous, and formed for swimming: shell with the transverse diameter greatest; the sides with five, rarely with six, teeth.

* Hinder claws with an elevated longitudinal line; external double palpi with the second joint of their internal footstalk truncate at their internal apex.

a. Orbits at the insertion of the antennae imperfect. Wrists bidentate.

Inhabits the southern coasts of Devon. In France it is used as an article of food.

b. Orbit internally slightly imperfect. Wrist unidentate.

Sp. 2. Por. corrugatus. Shell convex, with transverse serrate-granulate ciliated lines, the side with five teeth on each side, the three hinder of which are more acute; front trilobate, the lobes subgranulate-serrate, the middle one largest; hands above, unidentate; hinder claws with sharp points.


Inhabits the British seas.

** Hinder claws without the elevated line. External double palpi with the internal apex of the second joint of the internal footstalk emarginate. Orbits internally beneath the insertion of the antenna imperfect.

Sp. 3. Por. marmoreus. Shell convex, obsoletely and slightly granulated, with five nearly equal teeth on each side; front with three equal teeth, with rounded points; hands smooth, with one tooth above; hinder tarsi with acute points.


This elegant species, which derives its name from its colour, was discovered by G. Montagu, esq. It is very common on the sandy shores of southern Devon, from Torcross to the mouth of the river Ex, and is frequently found entangled in the shore-nets of the fishermen, or thrown on the shore after storms.

Fam. III. CANCERIDÆ. Leach's MSS.

Antenne simple, short: four hinder pair of legs simple.

Genus 6. CANCER of authors.

External antenna short, inserted between the internal canthus of the eye and the front; internal antenna placed in foveole in the middle of the clypeus, with their peduncle nearly lunate: external double palpi with the second joint of the internal footstalk notched at the internal apex: shell emarginate behind; orbits behind with one fissure, and externally with one fold: beneath with one fissure, and externally with one fold: anterior pair of legs unequal.


This species is the common crab of Britain. It is considered to be in season between Christmas and Easter, and about harvest, being much esteemed as an article of food. Its natural history is but little known. During the summer months it is very abundant on all our rocky coasts, especially where the water is deep. At low tide they are often found in holes of rocks in pairs, male and female; and if
the male be taken away, another will be found in the hole at the next recess of the tide. By knowing this fact, an experienced fisherman may twice a day take, with little trouble, a vast number of specimens, after having once discovered their haunts. In the winter they are supposed to burrow in the sand, or to retire to the deeper parts of the ocean. They are taken in wicker baskets, resembling mouse-traps, or in large nets with open meshes, which are placed at the bottom of the ocean and baited with garbage.

Genus 7. XANTHO. Leach.

*External antennea* very short, inserted in the internal corner of the eye; *internal antennea* received in a fosseola under the prominent margin of the clypeus, the peduncle sublinear: *external double palpi*, with the second joint of the internal footstalk, notched at the internal apex: *shell* submargined behind: *orbits* entire above, below externally with one fissure: *anterior pair of legs* unequal.

Sp. 1. Xan. florida. Wrists above, with two tuberces: shell on each side with four obuse teeth, the interspaces cut out: fingers black.


B. Abdomen in both sexes seven-jointed. Two anterior legs didactyle.

Division I. Eight hinder legs simple, and alike in form.

Fam. IV. Pilumnide. Leach’s MSS.

*Shell* anteriorly arcuated, the sides converging to an angle: *two anterior legs* unequal.

Genus 3. PILUMNVS. Leach.

*External double palpi* with the second joint of the internal footstalk with the internal apex truncate emarginate: *claws* simple, with naked tips.


Inhabits the south coast of Devonshire.

Fam. V. Ocypodaide. Leach’s MSS.

*Shell* quadrate or subquadrate: *eyes* inserted in the front.

*Shell quadrate. Eyes with a long peduncle.*

Genus 9. PINNOTERES. Latr., Bosc, Leach. ALTHES. Daldorff.

*Antennea* very short (the first three joints largest), inserted in the interior corner of the *eyes*: *external double palpi*, with the internal foot-
stalk, one-jointed: anterior pair of legs unequal: eyes thick: shell ovate-orbicular, orbiculate-quadrate, or transverse subquadrate.

All the species of this most interesting genus inhabit the bivalve shells of the acephalous *Mollusca*, and were supposed by the ancients to be consensuate inmates with the animal, bound by mutual interest.

Aristotle supposed them to act as sentinels, and believed that they guarded the *Pinna* (the animal in whose shell they were first observed) from the attacks of its enemies. Rondeletius and some other naturalists held the same opinion.

Sp. 1. *Pin. Cranchii*. Shell orbiculate-subquadrate, soft, very smooth, with the sides dilated behind: front straight, obscurely subemarginate: hands oblong below, and the thighs above with a ciliated line: thumb subarcuate: abdomen very broad; the sides of the segment arcuate; the second and following ones distinctly notched; the fifth segment somewhat broader; the last narrower than the preceding segment. Female.


The male of this species, which was discovered by Mr. J. Cranch, whose name it bears, is unknown. It is distinguished from *P. Pison* (the common species) by the form of the front of the shell, which is straight, and slightly notched; by the dilated hinder part of the shell, and by the abdomen, all the joints of which, excepting the first, are distinctly notched behind.

**Shell quadrate. Eyes with a long peduncle.**


Eyes terminating their peduncle: anterior pair of legs equal; of the male very long; of the female twice the length of the body: antennæ half the length of the body, inserted at the internal canthus of the eyes.

The animals of this genus inhabit the ocean, preferring such parts as have a slimy bottom. They burrow laterally in the clay or slime, making two entrances to their hole; entering by one and going out by the other.

Sp. 1. *Gon. bispinosa*. Shell on each side with two spines: arms above, and wrists internally, with one spine.


Inhabits the British sea. It is not uncommon at Salcombe and in Plymouth sound; and likewise occurs at Weymouth, and at Red Wharf in Anglesea.
Division II.—Shell rostrated in front. Eight hinder legs alike, and simple.

Fam. VI.—Maiad. Leach.

Subdivision 1.—Fingers deflected.

Genus 11. EURYNOME. Leach.

External antenna rather long, with the first joint shorter than the second: shell verrucated, anteriorly terminated by a bifid rostrum with divaricating laciniae; eyes distant, thicker than their peduncule which is of moderate length: external double palpi with the interior point of the second joint of their internal footstalks truncate-emarginate; anterior legs equal; of the male, three times the length of the body; of the female, longer than the body.

Sp. 1. Eur. aspera. Anterior legs and thighs tuberculated: shell with eight tubercles on the back that are more elevated than the others, which are irregular and margined with hairs; the sides with four lamellae; rostrum with simple acuminated laciniae.


Inhabits the British seas.

Subdivision 2.—Fingers not deflected. External antenna with the first joint simple. Anterior pair of legs distinctly thicker than the rest.


External antenna with clubbed hairs, the first joint longer than the second: external double palpi with the second joint of the internal footstalk with its internal apex truncate or emarginate; claws internally denticulated: shell villose; the laciniae of the rostrum divaricating; orbits behind with two, below with one fissure.

* Shell densely villose, the sides on each side behind terminated with a spine.

Sp. 1. Pisa Gibbsii. Rostrum descending: shell with a spine behind the eyes on each side; arms and thighs simple.


Inhabits deep waters on the coasts of Devon and Cornwall.

** Shell villose, with spiny sides.

Sp. 2. Pisa tetraodon. Shell on each side with six spines; two small, the rest larger.


Inhabits the south-west coast of England.
Subdivision 3.—Fingers not deflexed. External antennae with their first joint simple. Anterior pair of legs scarcely thicker than the others, which are moderately long.

Genus 13. MAJA. Lam., Latr., Bosc, Leach.

External antennae with the two first joints thickest, and of nearly equal length: shell convexovate-subtriangular, very spiny: eyes not thicker than their elongate peduncle: external double palpi with the second joint of their internal footstalk deeply notched at its internal apex: claws with naked sharp points.

Sp. 1. Maj. Squinado. Shell fasciculate-pilose; orbit above, with one spine; the sides with five strong spines: clypeus beneath the front with a short spine excavated above.


Inhabits the southern coasts of Devon and Cornwall. By the fishermen it is named Thornback or King-crab.

Subdivision 4.—Fingers not deflexed. External antennae with the first joint externally dilated.


Shell elongate-subtriangular, subtuberculated; the sides behind the eyes produced into a lanceolate projection: rostrum fissured, the laciniae approximating: external antennae with the first joint dilated, larger than the second: external double palpi with the second joint cmarginate at the internal apex.

Sp. 1. Hyas araneus. The lastiform process behind the eyes tuberculated behind.


Inhabits the Scottish sea in great plenty; on the English coast it is more rare.

Subdivision 5.—Second, third, fourth, and fifth pair of legs alike and slender.

Genus 15. INACHIUS. Fabr., Leach.

Shell slightly spined, with a spine on each side protecting the eye when retracted: eyes distant, scarcely thicker than their peduncles: external double palpi with the second joint of the internal footstalk truncate at its internal point: external antennae with the three first joints
thickest: second pair of legs thicker than the following ones: claws curved.

Sp. 1. In. Dorsettensis. Beak short, emarginate: the eleyips beneath produced into a spine: shell anteriorly, with four little tubercles placed transversely; then with three spines, the anterior one strongest; behind with three strong sharp spines, the middle one generally longest and strongest, forming a slightly recurved line; hinder margin with two distinct obsolete tubercles.


Inhabits the British seas.

C. Abdomen in both sexes six-jointed. Two anterior legs didactyle.

Fam. VII. Lithodiade. Leach's MSS.

Fifth pair of legs minute, spurious.

Genus 16. LITHODES. Latreille, Leach.

External double palpi with narrow cylindric footstalks: eyes approximating at their base: shell very spiny, anteriorly rostrate.

Sp. 1. Lith. Maja. Legs and shell with sharp spines: beak spiny, with the tip bifurcate: fingers with tufts of hair.


Inhabits the Northern sea, and in our seas is very rare, or at least very local; occurring only on the rocky shores of Yorkshire and of Scotland.

Fam. VIII. MACROPODIADA.

Second, third, fourth, and fifth pair of legs alike and slender. Eyes not retractile.

Genus 17. MACROPODIA. Leach. Macropus. Latr.

Shell slightly spined; beak long and fissured: eyes distant, subreniform, much thicker than their peduncles: external antennae half the length of the body; the second joint three times the length of the third: external double palpi slender; the internal footstalk with the two equal
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joints: palpi very hairy, the middle joint shortest, the third a little longer than the first: four anterior claws with their tips bent: four hinder ones abruptly curved at their base.

Sp. 1. Mac. Phalangium. Beak acuminate, much shorter than the antennae: shell behind the rostrum, with three tubercles placed in a triangle, the hinder tubercle largest: arms internally subscabrous and hirsute.


Inhabits the mouths of rivers, and is very common in Great Britain.

D. Abdomen of both sexes four-jointed. Two anterior legs didactyle.

Fam. IX. LEUCOSIADÆ.

Genus 18. EBALIA. Leach.

Shell rhomboidal, produced in front; the sides entire: anterior pair of legs depressed, much larger than the rest; arms subangulated; fingers subdactylæ: external pedipalpes with their external footstalk linear: abdomen of the male with its last joint at its base furnished with a dentiform process.


Order II. MACROURA.

This Order contains the Families Pagurii, Palinurini, Astacini, and Squillares of Latreille.

Division I.—Tail on each side with simple appendices.

Fam. I. PAGURIDÆ. Leach.

Legs ten; anterior pair largest and dactyle.

Genus 19. PAGURUS. Fabr., Latr., Bosc, Leach.

External antennæ with the second joint of their peduncle with a moveable spine affixed to the apex above: abdomen membranaceous: tail three-jointed, crustaceous: the second joint on each side appendiculated: four hinder legs spurious, short, didactyle.

The curious economy of the genus Pagurus attracted the attention of the ancients. One species is well described by Aristotle.

All the species are parasitical, and inhabit the cavities of turbinated univalves. They all change their habitation during their growth, first occupying the smallest shells, and latterly those of very
considerable dimensions. The abdomen is naked and slender, being covered merely with a skin of a delicate texture; but its extremity is furnished with appendages, by means of which it secures itself within the shell of which it makes choice. It is really astonishing with what facility these animals move, bearing at the same time the shell, which is destined to preserve the body from injury and to guard them from the attacks of fishes, which would otherwise devour them. All the species are termed indiscriminately Soldier-crabs and Hermit-crabs, from the idea of their living in a tent, or retiring to a cell.

Sp. 1. Pag. Streblonyx (common Soldier-crab). Arms hairy, muricated, the left largest; hands subcordate, fingers broad.


Inhabits the European ocean, and is very abundant in the British seas, inhabiting various kinds of univalve shells, changing its habitation as it grows. Pagurus araneiformis, Edinb. Encycl. vii. 396, is merely the young of this species.

Division II.—Tail on each side with foliaceous appendages, forming with the middle tail-process a fan-like fin.

a. Interior antennae with very long footstalks.

Fam. II. PALINURIDE. Leach.

*External antennae setaceous, and very long: legs ten, alike and simple.*

Genus 20. PALINURUS. Dall., Fabr., Lam., Latr., Bosc, Leach.

The animals of this genus have the power of producing a sound by rubbing their exterior antennæ against the sides of the projecting clypeus.


Inhabits the European ocean. It is commonly eaten in London, and is sometimes denominated Spiny-lobster or Sea Cray-fish.

Fam. III. GALATEIDE.

*External antennæ very long and setaceous: legs ten, anterior pair didactyle, fifth pair spurious.*

Genus 21. PORCELLANA. Lam., Latr., Bosc, Leach.

*External double palpi* with the first joint of the internal footstalk dilated internally: shell orbiculate subquadrate.

Sp. 1. Por. platycheles. Anterior margin of the shell with three entire teeth: claws very large and much depressed: wrists internally denticulated; hands externally deeply ciliated.

Inhabits the rocky shores of the southern and western coasts of Britain, concealing itself beneath stones, to the under side of which it adheres closely.


External double palpi with the internal edge of the first joint not dilated: shell ovate.

* Rostrum acuminately, acute, with four spines on each side. Anterior legs compressed. Abdomen with the sides of the segments obtuse. Tail with the intermediate lamella triangular, the tip emarginate, the apex of the laciniae rounded. Interior antennae with the first joint of the peduncle spinose.

a. Second joint of the internal footstalk of the external double palpi longer than the first.


b. Second joint of the internal footstalk of the external double palpi shorter than the first.

Sp. 2. Gal. spinigera. Anterior legs subgranulate squamose; above and on each side spinose: wrists and arms internally without spines.


** Rostrum elongate, spiniform; the base on each side bispinose. Anterior pair of legs subcylindrical. Abdomen with the sides of the segments acute. Tail with the intermediate lamella transverse-quadrangular; the apex subemarginate. Interior antennae with the first joint of the peduncle four-spinose. (External double palpi with the first joint of the internal footstalk longer than the second.)

Sp. 3. Gal. rugosa. Anterior legs spinose, especially internally: abdomen with the second segment anteriorly with six; the third with four spines.


Inhabits the European ocean and Mediterranean sea. It is very rare in Britain, but has been found on the Bamfiius coast and in Plymouth sound.
b. \textit{Interior antennae with moderate footstalks.}

\textbf{Fam. IV. Astacida. Leach's MSS.}

\textit{Antennae} inserted in the same horizontal line, interior ones with two sete, the exterior ones simple; \textit{legs} for walking ten, anterior pair of these largest.

\textbf{Stirps 1.—-Exterior lamella of the tail composed of one part.}

\textbf{Genus 23. GEBIA. Leach.}

\textit{Two anterior legs equal, subdidactyle, with the thumb short; interior antennae with an elongate peduncle; the second joint shortest, the third largest and cylindric: external double palpi with the third joint of the internal footstalk shortest; tail with broad lamella; the exterior ones costated, the middle one quadrate.}

Sp. 1. \textit{Geb. Deltinaea.} Abdomen with the back membranaceus; tail with the apex of the exterior lamella dilated and somewhat rounded; interior one truncate, and formed like the Greek delta.

Gebia deltinaea. \textit{Leach, Trans. Linn. Soc. xi. 312.—Mal. Podoph. Brit. tab. 31, fig. 9, 10.}

Inhabits beneath the sand on the southern coast of Devonshire, and is found by digging to the depth of two or three feet.

\textbf{Genus 24. CALLIANASSA. Leach.}

\textit{Four anterior legs didactyle; anterior pair largest, very unequal; second pair less; third pair monodactyle; fourth and fifth pairs spurious: interior antennae with an elongate biarticulate peduncle, the second joint longest: external double palpi with the second joint of the internal footstalk largest and compressed; tail with broad lamella; the middle process elongate-triangular, with the apex rounded.}

The thorax anteriorly abruptly subacuminate; the rostriform process divided from the shell by a suture; anterior pair of legs very much compressed, the hand articulated: the larger leg with the base of its wrist furnished with a curved process.

Sp. 1. \textit{Cal. subterranea.} Shell with the rostriform process with one longitudinal ridge, the point rounded.


This animal lives beneath the sand on the sea-shore. It was first described by Montagu, who found it by digging in a sand-bank in the estuary of Kingsbridge, on the southern coast of Devon.

\textbf{Genus 25. AXIUS. Leach.}

\textit{Four anterior legs didactyle; anterior pair largest, and somewhat unequal; third, fourth, and fifth pairs furnished with a compressed claw; interior antennae with a three-jointed peduncle, the first joint longest: external double palpi with the two first joints somewhat large.
and unequal: tail broad; the intermediate lamella elongate-triangular.

Sp. 1. *Ast. Skrynychus*. Rostrum margined, the middle carinated: thorax behind the rostrum, with two elevated abbreviated lines notched behind.


Inhabits the British sea.

**Stirrea 2. Exterior lamella of the tail bipartite: external antenna with a spine-shaped square at the first joint of the peduncle: anterior pair of legs didactyle.**

* Eyes subglobose, not thicker than their peduncles.

The coxae of the third pair of legs of the female, of the fifth pair of the male, perforated. These perforations are for the passage of the semen and of the eggs; and although placed differently in other genera, yet they serve the same functions.

Genus 96. ASTACUS. Leach's MSS.

Abdomen with the sides of its segments obtuse: middle tail lamella composed of one piece.

Sp. 1. *Ast. Gammarus*. Rostrum on each side with four teeth, and with one on each side of its base.


This species, which is the common lobster of our markets, inhabits deep clear water at the foot of rocks which hang over the sea. They breed during the early summer months, and are very prolific, Baxter having counted no less than 12,444 eggs under the abdomen. In warm weather they are very active; they have the power of springing backward in the water to a most astonishing distance into their holes in the rocks, as has been frequently observed by naturalists of credit. Their food consists of dead animal matter, and, it is said, also of sea-weed. The female is stated to deposit her eggs in the sand, but the young state is not known.

The common lobster inhabits the European ocean. It is found in very great abundance in the North of Scotland; but is much more common on the coast of Norway, from whence the London markets are for the most part supplied.

Genus 27. POTAMOBIUS. Leach's MSS.

Abdomen with the sides of its segments sharp: middle tail lamella bipartite.

Sp. 1. *Pot. fluvialitis*. Rostrum laterally dentated, the base with one tooth on each side.

Astacus fluviatilis. Fabr., Lutr., Leach.

**Eyes reniform, abruptly shorter than their peduncles.**

The corae of the third pair of legs of the female, of the fifth pair of the male, perforated.

Genus 26. NEPHROPS. Leach.

**External antennæ** with the first joint of their peduncle furnished at its apex with a squama, which is produced beyond the apex of the peduncle.


Inhabits the northern parts of Europe. It is found in the Frith of Forth during the summer months, often attaching itself to the lines of the fishermen: colour, when living, flesh red. Fabricius, Bose, and Latreille, cannot have seen this animal, since they all describe it as having four instead of six didactyle legs.

**Fam. V. PALIEMONIDÆ.**

**External antennæ** with a large squama at their base.

**Stirps 1.**—**External antennæ** inserted in the same horizontal line with the interior ones, which have two setæ: **tail** with the external lamella composed of but one part.

Genus 29. CRANGON. Lutr., Bosc, Leach.

**Second pair of legs** didactyle, of the same length with the third pair: pedipalpes with their last joint obtuse at its point.

Sp. 1. Cran. vulgaris. Thorax behind the rostrum, and on each side, as well as the arms beneath with a spire.


Genus 30. PONTOPHIILUS. Leach.

**Second pair of legs** didactyle, much shorter than the third pair: pedipalpes with the last joint acuminate.

Sp. 1. Pont. spinosus. Thorax with five ranges of spines, disposed longitudinally; three ranges dorsal and one on each side.

Pontophilus spinosus. Leach, Mal. Pod. Brit. t. 37. A.

Discovered by C. Prideaux, esq., amongst some rubbish from Plymouth Sound; a second specimen was afterwards taken off Falmouth by the late John Cranch, Zoologist to the Congo Expedition.

**Stirps 2.**—**External antennæ** inserted below the internal ones: **interior ones** with two setæ inserted in the same horizontal line: **exterior lamella of the tail bipartite.**

Anterior pair of legs, with one side didactyle, the other armed with a simple claw; second pair unequal, didactyle, slender; one very long, with the wrists and fore arm many-jointed; the other shorter, with the wrists many-jointed; other legs terminated by simple claws.

Sp. 1. Pro. canaliculata. Base of the rostrum with one tooth; intermediate lamella of the tail longitudinally canaliculated.


The thighs of the third and fourth pairs of legs are spinulose beneath; at the base of the rostrum there is an elevation dividing it from the thorax.

The above species, which forms the type of the genus, was discovered at Torcross, on the southern coast of Devon, by Montagu.

Stirps 3.— *External antenna* inserted below the internal ones; interior ones with two setae, one placed above the other. ( *External lamella* of the tail composed but of one part.)

a. *Internal antenna* with the *superior seta* excavated below. Claws spinulose.

Genus 32. PANDALUS. Leach.

Anterior pair of legs adactyle; second pair didactyle, unequal. *External double palpi* with the last joint of the internal footstalk longer than the preceding joint.

Sp. 1. Pan. annulicornis. Rostrum ascending, many-toothed, apex notched; inferior antennae annulated with red, and internally spinulose.


Genus 33. HIPPOLYTE. Leach.

Four anterior legs didactyle: *external double palpi* with the last joint of the internal footstalk shorter than the preceding joint.

Sp. 1. Hip. varians. Rostrum straight, with two teeth above and below; shell above and beneath the eyes with one spine.


Inhabits the rocky shores of the south of Devon. It varies much in colour, being often found red, green, and blueish green.

b. *Internal antenna* with the *superior seta* not excavated. Claws simple.

Genus 34. PENÆUS. Fabr., Latr., Bosc, Leach.

Six anterior legs didactyle: *external double palpi* with five exserted jointe, the last of which is obtuse.

Inhabits the Welsh Sea.

Steps 4.—External antenna inserted below the internal; internal ones with three setae. (External lamella of the tail composed of but one part.)

Genus 35. PALEMON. Fabr., Latr., Bos, Leach.
Four anterior legs didactyle; anterior pair smaller than the second pair: external double palpi with the last joint shorter than the preceding joint.

Sp. 1. Pal. serratus (common Praion). Rostrum ascending above, with from six to eight teeth, the apex emarginate; below with from four to six teeth.


Variety a. Rostrum with six teeth above.

Subvariety 1. Rostrum beneath with four teeth.

———2. five teeth.

Variety β. Rostrum above with seven teeth.

Subvariety 1. Rostrum beneath with four teeth.

———2. five teeth.

———3. six teeth.

Variety γ. Rostrum with eight teeth above.

Subvariety 1. Rostrum beneath with four teeth.

———2. five teeth.

———3. six teeth.

"Although all the above varieties are common, yet β occurs most frequently. In some may be seen the upper edge of the rostrum with ten, the lower with five teeth; and both edges with but three teeth. The apex is generally notched above; and in two specimens, which may be considered a rare occurrence, the point has been found entire. The situation of the teeth on the upper edge is variable, but in most instances the second tooth is at a greater distance from the first than the rest, which are generally equidistant, and rarely extend far beyond the middle, the rostrum from that part being edentate, with the exception of the emarginate apex."

Herbst, Latreille, and Leach, formerly considered this species as Cancer Squilla of Linné; but Dr. L. has, since the publication of the error, met with the true C. Squilla of that author, and has de-
scribed it in the eleventh volume of the Transactions of the Linnean Society, p. 343.

"Palamon serratus of Fabricius is distinct, and, if his description be correct, it is not even referable to this genus; he having expressly given as its specific character 'Antennis posticus bifidis,' (hinder antennæ bifid;) whereas, in his generic character, he has stated these organs to be trifid ('Antennæ superiores trifida:'.")

Genus 36. ATHANAS. Leach.

Four anterior legs didactyle; anterior pair larger than the second pair: external double palpi with the last joint longer than the preceding joint.


STIRPS 5.—External antennæ inserted below the internal: interior ones with a large scale at their base. Legs for movement sixteen.

Genus 37. MYSIS. Latr., Leach. PRAUNUS. Leach.

Legs bifid, the last joint of the four anterior pairs with the interior lacina unarticulate, ovate, compressed; of the other pairs of legs multiarticulate: external double palpi with the middle joint of the internal footstalk longest, the first very short.

At the base of the abdomen of the female is situated the external uterus, composed of two valve-like membranes, in which the young ones, just excluded from the egg, live and grow until they become strong enough to take care of themselves.

The animals of this genus swim with their head uppermost, and with their eyes spreading, which gives them a singular and grotesque appearance.

* Intermediate lamella of the tail emarginate.

Sp. 1. Mysis spinulosa. Tail with the intermediate lamella externally spinulose; the apex acutely emarginate; exterior lamella acuminate, and very broadiy ciliated.


"Colour when alive, pellucid cinereous: eyes black, red at their base: laminae of the external antennæ with a black longitudinal line and spots. A clouded spot on each side of the hinder part of the thorax, and another above the legs. Every segment of the body most beautifully marked with a reddish-rust coloured spot, disposed in an arborescent form; tail fin spotted with the same colour, mixed with black: pouch of the female with two rows of fuscous-black spots: underside of the abdomen regularly mottled with rufous black."
It was observed with young from the middle of June to the middle of July. The females are one-third more abundant than the males.

Length an inch and a quarter.

** Intermediate lamella of the tail entire.


Inhabits brackish pools of water, left by the tide at Lock Ranza in the Isle of Arran. Common in the month of August with young.

Length one-third of an inch.

Females more abundant than the males. Colour whilst living pel lucid cinereous, spotted with black and reddish brown.

Division III.—Tail with two setae; one on each side.

Fam. VI. NEBALIADÆ. Leach.

Genus 35. NEBALIA. Leach.

Thorax anteriorly with a moveable rostrum; anterior pair of legs longest, simple; other pairs equal, approximate, with the last joint bifid; antennæ two, inserted above the eyes, the last joint bifid and multi-articulate.


Nebalia Herbstdi. Leach, Zool. Miscel. i. 100. tab. 44.—Trans. Linn. Soc. xi. 351.—Supp. to Encycl. Brit. i. 422.

Inhabits the European Ocean; it is common beneath stones lying on black mud, on the southern coast of Devon.

Genus of doubtful situation.

Genus 39. MEGALOPOA, Leach.

The situation of this curious genus, which is figured in Dr. Leach's Malacostraca Brit. (tab. 25.), is still doubtful. It however decidedly belongs to the MACROURA, as Dr. L. has discovered to be the case, since the publication of the first volume of the Supp. to Encycl. Brit.

Legion II. EDRIOPHTHALMA.

The Malacostraca Edriophthalma, or at least a greater part of them, were placed amongst the MACROURA by Latreille, who considered them as forming a particular family of that order.

Section I.

Body laterally compressed.
Fam. I. Phronymaë. Leach's MSS.

Legs fourteen: antenna two, inserted one on each side of the front of the head. (Tail furnished with styles.)

Genus 1. PHRONYMA. Latr., Leach, Lamarck.

Head large, nanaut: antenna biarticulate, the first joint small: thorax seven-jointed, all its segments bearing legs: legs compressed, two anterior pairs with the antepenultimate joint furnished at its point with a foliaceous process; the penultimate joint with the point bifid and terminated with a small claw: third and fourth pairs simple, longer, somewhat thicker, terminated by a bent claw: fifth pair large, very long, thicker, didactyle; the first joint gradually thickened towards its point; the second subtrigone; the third ovate, and abruptly narrowed at its base; the last narrowed at its base; the fingers curved, and internally furnished each with one tooth: sixth and seventh pairs simple, terminated with a nearly straight claw: abdomen triarticulate, each segment, on each side, with a double appendice, placed on a peduncle: tail biarticulate, the first joint on each side furnished with a biarticulate process, terminated by two styles; second joint with four processes, each terminated by two styles; the inferior processes biarticulate, the superior triarticulate.

Sp. 1. Phron. sedentaria. Fifth pair of legs with the apex of the thumb and base of the fingers internally denticulated.


Inhabits the Mediterranean Sea and Zeland Sea, residing in a cell composed of a gelatinous substance, open at each extremity, where it sits in an incurved posture.

The only specimen of this most interesting, rare, and curious animal was taken by the Reverend Dr. J. Fleming, one of our most zealous naturalists, who found it on the 3d of November 1809, at Burray in Zetland, amongst rejectamenta of the sea, and communicated it to Dr. Leach.

Fam. II. Gammaridaë. Leach's MSS.

Body laterally compressed: legs fourteen, with lamelliform coxae: antenna four, inserted by pairs. (Tail furnished with styles.)

Stirps 1.—Antenna four-jointed, the last segment composed of many little joints; the upper ones very short.

Genus 2. TALITRUS. Latr., Bose, Leach.

Four anterior legs in both sexes subequal, monodactyle; upper antenna shorter than the two first joints of the under ones.
Sp. 1. *Tal. Locusta.* Antennae subtestaceous-rusous, of the male longer than the body, of the female shorter; body cinereous, varied with darker cinereous.


Inhabits the sandy shores of the European Ocean.

The specific name *Locusta* is probably derived from the form of its protruded mouth, which has a general resemblance to the same part in the Gryllidae.

It has never been observed in the water; it burrows in the sand, and leaps about on the shore. *Talitrus littoralis,* described in the seventh volume of the *Edinburgh Encyclopaedia,* is merely the female of *T. Locusta.*

The use of this animal (which is generally denominated Sand-hopper) in the economy of nature, appears to be that of contributing to the dissolution of putrid animal and vegetable matter; serving in return as food to the shore birds, who devour it with avidity.

**Genus 3. ORCHESTIA. Leach.**

Four anterior legs of the male monodactyle; second pair with a compressed hand; of the female, with the anterior pair monodactyle, the second didactyle: upper antenna not longer than the two first joints of the under ones.


Inhabits many of our shores, and is found at the mouths of rivers, but has never been observed in the water. It resides under stones and fuel, and in the evening it leaps about and is devoured by birds.

**Stirps 2.—Antenna four-jointed, the last joint composed of several little joints; upper ones rather shortest.**

**Genus 4. DEXAMINE. Leach.**

Four anterior legs sub-equal, monodactyle, furnished with a filiform-subovate hand: antenna with their first joint shortest; eyes oblong, not prominent, inserted behind the superior antenna; tail on each side with three double styles, and above on each side with one movable style.


Inhabits the sea of the western coasts of Britain.
Genus 5. **Leucotioë.** Leach.

*Anterior pair of legs didactyle; the thumb biarticulate; second pair with a dilated and compressed hand, furnished with a crooked thumb.*


Inhabits the British sea, but is very rare.

**Stirps 3.—Antenna** four-jointed, the last segment composed of several little joints; upper ones longest.

Subdivision 1.—*Four anterior legs monodactyle, second pair with a much dilated compressed hand.*

Genus 6. **Melita.** Leach.

*Anterior pair of legs monodactyle; second pair with the thumb inflexed on the palm: tail on each side with an elongate foliaceous lamella.*


Inhabits the sea shore on the Devonshire coast under stones.

Genus 7. **Miera.** Leach.

*Four anterior legs didactyle; thumb of the second pair bent on the side of the hand: tail with no foliaceous appendices.*


Inhabits the southern coast of Devonshire beneath stones.

Subdivision 2.—*Two anterior pair of legs monodactyle and alike.*

Genus 8. **Gammarius.** Latr., Leach.

*Superior antenna furnished at the base of the fourth joint with a little jointed seta: tail above with bundles of spines.*

*Tail with the superior double styles, having the upper style process very short.*


Inhabits ponds, ditches, and springs in great plenty.


Inhabits the sea on the southern coast of Devonshire in plenty.
Tail with the superior double styles, having the style processes subequal.

Sp. 3. **Gam. Locusta.** Eyes lunate.


Inhabits the British sea.


Inhabits the sea about Loch Ranza, in the Isle of Arran.

Genus 9. **AMPTHIE.** Leach.

Superior antennae with no seta at the base of their fourth joint: tail simple above; hands ovate.

Sp. 1. **Am. rubricata.**


Inhabits the sea of the southern coast of Devon.

Genus 10. **PHERUSA.** Leach.

Superior antennae with no seta at the base of their fourth joint: tail simple above; hands filiform.

Sp. 1. **Phe. Fucicola.** Testaceous-cinereous or gray cinereous mottled with reddish.


Inhabits fuci on the southern coast of Devon.

Steps 4. Antennae four-jointed; under ones longest, leg-shaped. (Four anterior legs monodactyle.)

Subdivision 1.—Second pair of legs with a large hand.

Genus 11. **PODOCERUS.** Leach.

Eyes prominent: four anterior legs monodactyle.

Sp. 1. **Pod. variegatus.** Body varied with red and white.


Inhabits the southern coast of Devonshire, amongst conservæ and corallines.

Genus 12. **JASSA.** Leach.

Eyes not prominent: four anterior legs monodactyle, with oval hands; second pair with its internal edge dentated.
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Sp. 1. Jas. pulchella. Thumb of the second pair of legs with its internal edge notched at the base; colour white painted with red.

Var. α. Hands of the second pair with an elongate obtuse tooth.

Var. β. Hands of the second pair with the internal edge tridentate.


Inhabits the sea of southern Devon amongst fuci.

Subdivision 2.—Second pair of legs with a moderate-sized hand.

Genus 13. COROPHIUM. Latr., Leach.

Sp. 1. Cor. longicorne.


Inhabits the coast of the European ocean. At low tide it may be observed crawling amongst the mud. It is very common at the mouth of the river Medway, where it was first observed by J. Henslow, esq.

Section II.

Body depressed: antennæ four: legs fourteen.

A. Tail without appendices.

Fam. III. CAPRELLIDÆ. Leach.

Body with all the segments bearing legs.


Genus 11. PROTO. Leach.

Second, third, and fourth pair of legs appendiculated at their bases.

To this genus belongs Spiotta pedata, and probably also ventricosa of Müller, with Cancer Gammarus pedatus of Montagu, which is probably the same with S. pedata of Muller. See Transactions of the Linnean Society, vol. xi. p. 6. t. 11. f. 6.

Genus 15. CAPRELLA. Lamarck, I atr., Bosc. Leach.

Second, third, and fourth pairs of legs not appendiculated at their bases; the third and fourth pairs spurious, subgelatinous, and globose.

The animals composing this genus inhabit the sea, living amongst Sertulariæ and marine plants, moving geometrically like the larvae of the Phænæidae.

The specific character may be taken from the number and situation of the spines on the head and back, form of the second pair of legs, &c.


Inhabits the southern coast of Devon.

Astacus atomos of Pennant and Squilla lobata of Müller belong to the genus Caprella, of which in the British Museum there are several undescribed species.

Stirps 2. Body broad.

Genus 16. LARUNDA. Leach. CYAMUS. Latr., Bosc. PANOPÉ. Leach.

Antennae four-jointed, upper ones longest: legs compressed, with strong claws; the third and fourth pairs elongate, spurious, cylindric, without claws; the two anterior pairs monadactyle.

External uterus, or pouch of the female, composed of four valves.

Sp. 1. Lar. Ceti. Bases of the third and fourth pairs of legs with processes resembling the figure 6; the hands of the second pair of legs anteriorly, with three obtuse teeth.


Inhabits whales, and according to Latreille it is also found on some species of the genus Scomber.

By the Greenland fishermen it is termed the Whale-louse.

Fam. IV. IDOTEADÆ. Leach.

Body with all the segments not bearing legs: (ventral appendages covered by two longitudinal plates.)


External antenna half the length of the body, or less; the third and fourth joints equal: body ovate.


Inhabits the Scottish seas.

Colour when alive ash-gray or fuscous, speckled with darker colour, and often variegated or mottled with white spots: legs pale.

The female seems to be very rare, as amongst 400 specimens of the animal, one only of that sex was found.

Length one inch and a quarter.
Genus 18. **STENOSOMA.** Leach.

*External antennae* as long as the body, the third joint longer than the fourth: body linear.

Sp. 1. *St. lineare*. Last segment of the tail somewhat narrowed at its base, and dilated towards its apex, which is truncate and notched.


Inhabits the European ocean. It sometimes occurs in the Firth of Forth, and amongst the Hebrides.

**B. Tail on each side, with one or two appendices.**

**Fam. V. ANTHURIDEA. Leach.**

*Antennae* inserted in nearly the same horizontal line: ventral appendages closed by two longitudinal plates.

Genus 19. **ANTHURA.** Leach.

*Antennae* short, subequal; inserted one after another in the same horizontal line, the internal ones a little longest: body linear: tail with the last joint but one very short; the last elongate, narrower, with two elongate lamellae on each side.


**Fam. VI. CYMOTHODEA. Leach.**

*Antennae* inserted in pairs, one above the other.

**Stirps 1. Tail with one lamella on each side.**

Genus 20. **CAMPTECOPEA. Leach.**

Tail with its last segment furnished on each side with a compressed, curved appendage: body six-jointed, the last joint of the same size with the others: antennae setaceous, upper ones longest, their peduncle biarticulate, the space between the antennae very great: anterior claws bifid.

Sp. 1. *Cam. hirsuta. Brown*; the last joint of the body with a few faint blueish spots.


Inhabits the southern coast of Devonshire, but is rather rare. Length one eighth of an inch.
Genus 21. NASSA. *Leach.*

**Tail** on each side of the last segment, with a straight subcompressed process attached to a peduncle: *body* six-jointed, the last joint largest: *antennae* setaceous, subequal; upper ones with a very large biarticulated peduncle, the first joint largest: space between the antennae easily to be discerned: *claws* bifid.

Sp. 1. _Na. bidentata._ Last segment of the body armed with two spines or teeth; colour cinereous, faintly streaked with blue, or reddish.


Inhabits the coasts of Wales and Devonshire.

**Stirps 2.** Tail with two lamellae on each side.

* Superior *antennae* with a very large peduncle. *Claws* bifid.

Genus 22. CYMODICE. *Leach.*

**Eyes** touching the anterior margin of the first segment of the body: *body* seven-jointed: *tail* at the base, on each side with two subcompressed but not foliaceous appendages, the exterior ones largest; the apex of the tail notched, with a lamella in the centre: *claws* bifid.

Sp. 1. _Cy. truncata._ Apex of the tail truncate.


This species is very rare, and has been found but three times on the southern coast of Devonshire.

Genus 23. DYNAMENE. *Leach.*

**Eyes** not reaching to the anterior margin of the first segment of the body: *body* seven-jointed: *tail* with two equal foliaceous appendages on each side of its base; the apex notched: *claws* bifid.

Dynamene. *Leach, Edin. Encycl. vii. 433._

There are several indigenous species of this genus, and their characters will be given under the article _Cymothroides_, in the *Dictionnaire des Sciences Naturelles*, by Dr. *Leach.*

Genus 24. SPIEROMA. *Lutr., Leach.*

**Eyes** not reaching to the anterior margin of the first segment of the body: *body* seven-jointed: *tail* with its apex entire; the base on each side with two equal foliaceous appendages: *claws* bifid.

Sp. 1. _Sph. serrata._ Body smooth, unarmed: tail very smooth on each side; obliquely truncated: lamellae elliptic, acute, the external ones externally serrated.

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** Superior antennae with a very large peduncle. Claws simple.

Genus 25. Eega. Leach.

Eyes large, granulated, oblong, oblique, marginal: tail with its appendages foliaceous.

Sp. 1. Eega emarginata. Tail with the last joint acuminate; the interior lamella internally obliquely truncated, externally emarginated.


*** Superior antennae with a moderate peduncle.


Eyes distinct, simple, lateral: head as broad as the first segment of the body.

Sp. 1. Ee. pulchra. Tail with the last joint semi-oval: body cinereous, variegated with black.

Genus 27. Limnoria. Leach.

Head as broad as the first segment of the body: eyes granulated.


Inhabits the British ocean, perforating buildings of wood, piles, &c. It is common at the Bell-rock, and on the coasts of Suffolk and Yorkshire. It generally produces seven young ones.


Head narrow and small: eyes obsolete: body with the first segment notched to receive the head.


C. Tail furnished with two seta.

Fam. VII. Apseudiade.


Body six-jointed: tail with six segments; the last largest, armed at the apex with appendices; feet fourteen; the anterior pair with a finger and thumb; the second pair compressed and dentated; the third and fourth alike and simple; the fifth with a double nail; the sixth and seventh spurious: the superior antennae with a bi-articulated peduncle armed at the apex with a jointed seta; the inferior antennae bifurcate.

Sp. 1. A. Talpa. Rostrum acute, with three excavated longitudinal grooves.
Inhabs the British ocean: length four lines: colour yellowish-white: is very rare.

D. Tail furnished with styles.

Fam. VIII. ASELlID. I.

*Interior antenna* distinct.

*Stirps* 1. Styles of the tail exerted: *anterior* legs monodactyle.


*Claws bident:* eyes moderate, lateral-subvertical: *internal antenna* shorter than the peduncle of the external ones.


Inhabits the southern coast of Devonshire, amongst marine plants.


*Claws simple:* eyes minute, lateral: *internal antenna* of the length of the setiferous joint of the exterior ones.

*Sp. 1. Asel. aquaticus.* Colour cinereous, either spotted with gray or whitish.

Inhabits ponds and ditches, and is generally considered a sign of the purity of the water.


*Genus* 32. *Jæra. Leach.

*Eyes* moderately large, situated between the sides and the vertex of the head.


Inhabits marine plants, and beneath stones on the southern coast of Devon.
Fam. IX. LIGIADÆ. Leach's MSS.

Interior antennae distinct. Style of the tail double, with double foot-stalks.

Genus 33. LIGIA. Fabr., Latr., Bosc, Leach. External antennæ with the last joint composed of several other joints.


Inhabits the rocky shores of the European ocean. The last joint of the antennæ varies much in the number of its segments, even in the two sides of the same individual.

Fam. X. ONISCIDÆ.

Antennæ two. Styles of the tail four, the lateral ones biarticulate.

* Body not capable of contracting into a ball.

a. External antennæ eight-jointed.

Genus 34. PHILOSCIA. Latr., Leach. External antennæ with their bases naked; tail abruptly narrower than the body.


Inhabits France, Germany, and England, under stones and mosses.

Genus 35. ONISCUS of authors.

Antenna inserted beneath the anterior margin of the head, on a prominent part.


Inhabits rotten wood and old walls throughout the greater part of Europe.

It was formerly used in medicine, and was supposed to cure agues, consumptions, &c. but has now, like many other medicines, deservedly grown out of fashion, and is rejected from the modern Pharmacopœias. It is commonly called Pig’s-lopse, Wood-lopse, Millepede or Carpenter.
b. External antennae with seven joints.

Genus 36. PORCELLIO. Latr., Leach.

External antennae inserted on a prominence under the anterior margin of the head: tail with its lateral styles conic, prominulous.


Inhabits Europe. This species is found under stones, in rotten wood, and on old walls. It varies much in colour, being at one time bluish black, at another time yellow. In Scotland it is called Sclater.

** Body contracted into a ball.

Genus 37. ARMADILLO. Latr., Leach.

External antennae seven-jointed, inserted on a prominence in a cavity on each side of the head: tail with the lateral styles not prominent.


Inhabits Europe amongst moss and under stones. It is commonly named the Pil-millepede, and paves the way to the Myriapoda: in general external appearance and in economy it is allied to the genus Glomeris.

Class II. MYRIAPA D I.

This Class was proposed by Dr. Leach in the Edinburgh Encyclopaedia, vol. vii., and has since been distinctly established, with its characters more decidedly shown, in a paper published in the eleventh volume of the Transactions of the Linnean Society, and also in the Supplement to Encyclopaedia Britannica, vol. i.

By Linne the animals composing this group were denominated Sco-lopandra and Julis, and were arranged with apterous insects. His pupil, J. C. Fabricius, in the Supplement to his Entomologia Systematica, placed them in a particular Class named Mitosata, comprehending all the species, like Linne, under the generic appellations of Julis and Scolopandra. Cuvier, in his Tableau Eamentaire, arranged the Myriapoda with insects, in which he was followed by Duméril, who has, however, adopted the new Genera proposed by Latreille.

They were arranged in the older works of Latreille along with insects; but in his last work he has placed them in a peculiar Order of the Class Arachnoidea, which he had denominated Myriapoda; and has divided them into two Families.
Lamarck arranged them with the Arachnoidea in three Genera; 1. Scolopendra; 2. Scutigera; 3. Julus; and in his last work he has adopted a fourth genus, Pollyxenus.

Having given a slight sketch of what has been done by systematic writers, I shall proceed with the arrangement proposed by Dr. Leach, which differs from them merely in considering them as constituting a distinct Class, and in disposing the species under some additional generic heads, which a minute examination of their structure has most fully warranted.

Classification.—All the Myriapoda have their head distinct from the body, furnished with two antennæ. Mandibles two. Maxillæ four, confluent and forming a lower lip. All or most of the segments of the body furnished with two or four legs.

The Chilognatha and Syngnatha, established as Families by Latreille, are adopted as Orders by Dr. Leach.


Order II. SYNGNATHA.—Antennæ composed of fourteen or more joints. Legs elongated. Body depressed, coriaceous or membranaceous.

Order I. CHILOGNATHA.

Fam. I. GOMERIDÆ. Leach.

Body contractile into a globe. Eyes distinct.

Genus I. GOMERIS. Latr., Dumér., Leach. ARMADILLO. Cuv. Antennæ with the two first joints shortest, the sixth largest including the last, which is very small; body elongate-ovate, convex above, arched beneath; first segment a little semicircular lamina; the second larger than the others; the last semicircular and arched; legs sixteen pairs.

Sp. I. Glo. marginata. Black; the margins of the segments luteous or orange.

Inhabits Britain, France, and Germany, under stones; but has generally been considered by British naturalists as a variety of *Armadillo vulgaris*.

**Fam. II. JULID.** Leach.

*Body* not contractile into a globe: *eyes* distinct.

**Genus 2. JULUS of authors.**

*Body* serpentineform, cylindric: *antennae* with the second joint longer than the third: *legs* a great many.

The British species of this obscure genus may be found described in vol. xi. of the *Transactions of the Linnean Society*. The following species, which is the most common, will best serve as an example of the genus.

Sp. 1. *Jul. sabulosus*. Black-cinereous, with two red dorsal lines; last joint mucronated: legs luteous.

*Julus sabulosus* of authors.

Inhabits Europe, lurking beneath stones, especially in sandy places.

**Genus 3. CRASPEDOSOMA.** Leach.

*Body* linear, depressed; the sides of the segments laterally prominent: *antennae* towards their extremities somewhat thicker, the second joint shorter than the third.

This genus was discovered by the late R. Rawlins, esq. one of the most promising naturalists of this country.

*♦ Middle of the segments prominent.*


Inhabitats the neighbourhood of Edinburgh, where it occurs in some plenty under stones and amongst moss. It was first noticed by Mr. Rawlins.

*♦♦ Hinder angles of the segments produced.*

Sp. 2. *Cras. polydesmoides*. Body reddish gray; belly pale; legs reddish, with their bases pale; produced angles of the body each furnished with a seta.


Inhabits Devonshire, under stones. It is common all along the borders of Dartmoor, and on the southern coast. It was once taken by Dr. Leach in the garden of the British Museum.
Fam. III. POLYDESMIDÆ. Leach.

Eyes obsolete.

Genus 4. POLYDESMUS, Latr., Dumér., Leach. Antennæ with the second joint scarcely longer than the first, and much shorter than the third: body linear; the segments laterally compressed, margined: eyes obsolete.

Sp. 1. Pol. complanatus. Reddish cinereous; last segment of the body mucronated.


Inhabits Europe, beneath stones.

Genus 5. POLLYXENUS. Latr., Leach.

Body elongated, linear, and depressed; the segments on each side with small bundles of scales, ending in pencils: feet twelve on each side: antennæ inserted beneath the head at the interior margin.


Length of the body from 1½ to 2½ lines.

Inhabits Europe. In Britain it is found in profusion beneath the bark of trees,

Order II. SYNGNATHIA.

Fam. I. SCOLOPEN DRADÆ. Leach.

Body with each segment bearing two legs: hinder legs distinctly longer than the others.

Stirps 1.—Legs on each side fifteen.

Genus 6. LITHOBIUS. Leach, Lamarck. Antennæ conic-setaceous; joints (about forty-five) conic-setaceous, the two first joints largest: under lip anteriorly broadly notched: the margin very much denticulated: eyes granulated.


Inhabits Europe, beneath stones.
The other species are described in the eleventh volume of the Transactions of the Linnean Society.

Stirps 2.—Legs on each side twenty-one.

Genus 7. CRYPTOPS. Leach.
Antenna conic-setaceous, composed of (seventeen) globose-subconic joints; under lip not denticulated; anterior margin scarcely emarginate: hinder legs with the first joint toothless: eyes obscure.
Inhabits gardens in and near Exeter. It has likewise been found near Plymouth in Devonshire.

Fam. II. GEOPHILIDÆ. Leach.
Body with each segment bearing two legs: hinder legs not distinctly longer than the others: legs many, varying in number in the same species.

Genus 8. GEOPHILUS. Leach.
Eyes obscure: (lip divided by a fissure?) mandibles strong: antenna cylindric in some, towards the apex gradually somewhat narrower in others; composed of (fourteen) subcylindric joints a little narrower at their base.

* Antenna with short joints.
Inhabits Devonshire, in garden fruit: it is not uncommon.

Inhabits the earth. It is very common in England.

Inhabits moss and beneath the ground. It is rare.
**Antenna with elongate joints.**


Inhabits the earth and under stones.

Obs.—*Scolopendra electrica* of Linne belongs to this genus.

**Arachnoida.**

**Arachnida.**

**Fischer.**

**Arachnides.** Lamarck, Latreille, Leach.

From ἀράχης, a spider, and εὔνοες, resemblance. A class of animals formerly arranged with Insects, but first shown to be distinct by the celebrated Lamarck, and established as such by Latreille, Cuvier, and Leach.

Linné arranged all of these animals with which he was acquainted with apterous insects, under the generic titles, Phalangium, Aranea, Acarus, and Scorpio; and in this disposition he was followed by Cuvier.

Lamarck, in his *Système des Animaux sans Vertèbres*, has included amongst the Arachnoida the Myriapoda, and certain animals which in the system proposed by Dr. Leach form a distinct order of insects, which will be mentioned hereafter.


Lamarck, in his *Extrait du Cours*, &c. has placed the Arachnoida with some genuine insects and Myriapoda; but he has formed for them a separate Order, which he terms *Arachnides palpata*; and disposes them into the following little groups of Genera.

1. **Pycnogonides.**


II. **Acarides.**

* Parasitic.*

a. Six legs.


b. Eight legs.

MODERN SYSTEM.

**Wanderers.**

a. Land.


b. Aquatic.


III. PHALANGIDES.


IV. SCORPIONIDES.


V. ARANEIDES.


Classification.—The following Classification is that lately published in the third volume of the Zoological Miscellany.

Order I. Polymerosomata.—Body composed of a series of segments: abdomen not pedunculated: mouth furnished with didactyle mandibles and with maxillae: eyes two, four, six, or eight: legs eight.

Order II. Dimerosomata.—Body composed of two segments; the abdomen pedunculated: mouth furnished with mandibles and with maxillae: eyes six or eight.

Order I. POLYMERO SOMATA. Leach.

Fam. 1. Sironidae. Leach.

Palpi simple. Mandibles didactyle.


Mandibles two; two-jointed, cylindric, compressed: their points armed with a forceps: palpi two, five-jointed: joints elongate, the second longest: body oval: eyes two, placed one on each side of the thorax on an erect peduncle: legs elongate, filiform; tibiae and tarsi two-jointed, the latter parts terminated by an arcuate claw.


Inhabits moss at the roots of trees and in woods.
CLASS III. ARACHNOIDEA.

Fam. II. SCORPIONIDÆ. Leach.

Palpi arm-shaped. Mandibles didactyle. Legs alike.

The animals composing this Family constitute a most natural groupe.

Stirps 1.—Tail none. Eyes two, or four. Pecten none.

"The ocelli of the animals of this division are placed on the sides of the anterior segment of the body or thorax. They want the tail and the pectinated processes near the base of the abdomen, by which they may very easily be distinguished from those of the second Stirps, with which they were formerly arranged by Fabricius under the title Scorpio. Two species only were known to Linne, who referred them to his artificial genus Phalangium. The greater number of the species live beneath the bark of decaying trees or under stones; but one at least is parasitical, and attaches itself to the legs of flies." Leach's Zool. Misc. vol. iii. Those genera of the second Stirps include the Scorpion, &c.

Genus 2. OBISIUM. Illiger, Leach.

Body cylindric: thorax composed of one segment: mandibles porrect, eyes four.


Inhabits France and England, under stones.

A valuable Monograph has been published on the British species of this and the following genus in the third volume of the Zoological Miscellany, and is illustrated with very accurate figures of the whole.

Genus 3. CHELIFER. Geoff., Leach.

Thorax composed of three parts: mandibles short: eyes two.


Chelifer fasciatus. Leach, Trans. Linn. Soc. ix.

Inhabits beneath the bark of willow and other trees.

Obs.—Of the second stirps there are no British genera.

Order II. DIMEROSOMATA. Leach.

Fam. I. PHALANGIDÆ. Leach.

Eyes two: anus simple.

Genus 4. PHALANGIUM of authors.

Eyes placed in a common peduncle: mandibles corneous, subcylindric, compressed, biarticular, inflexed or geniculatd at the second joint,
the apex of which bears a forceps with equal fingers: *palpi* formed like legs, terminated by a hook: *body* more or less oval. Second pair of legs almost six times the length of the body: *tarsi* all capillary, very slender, the first joints elongate, four times (or more) longer than broad.


**Genus 5. OPILIO. Leach.**

*Eyes* placed on a common peduncle: *mandibles* corneous, subcylindric, compressed, biarticulate, inflexed or geniculated at the second joint, the apex of which has a forceps with equal fingers: *palpi* formed like legs, terminated by a hook: *body* more or less oval. Second pair of legs three or four times the length of the body, the fourth and following joints a little elongate, twice as long as broad.


**Fam. II. ARANEIDE. Leach.**

**ARANEIDES. Latreille.**

*Eyes* six or eight: *anus* with nipples for spinning.

The animals composing this most natural family are familiarly denominated Spiders, and, as before observed, were included by Linné, Fabricius, and other authors in one genus, which they called *Aranea*; but as the species are very numerous, they were obliged to divide them into sections, which they distinguished by the situations of their eyes. These organs are inmoveable, and consist each of a single lens, which deprives them of the faculty of seeing in every direction.

"The *Araneides* are by far the most interesting animals of that class of which they form the type; and consequently their habits and structure excited the attention of naturalists at a very early period. Spiders frequently change their skins, and their skins are often found in their webs, being dry and transparent, with their mandibles attached to them. When about to cast their covering, they suspend themselves in some corner, and creep out of a fissure which takes place on their back, gradually withdrawing their legs from the skin, as if from a glove. They have likewise the power of reproducing their legs: the mode in which this takes place was first made known by that accurate observer of nature, Sir Joseph Banks."

"As he was writing one evening in his study, one of the web-spinning spiders, of more than the middle size, passed over some papers on the table, holding a fly in its mouth. Much surprised to see a spider of this description walking about with its prey, and
being struck with somewhat unusual in its gait, he caught it, and
placed it within a glass for examination, when, instead of eight, he
perceived it had but three legs, which accounted for the inability of
the creature to spin its web; but the curious circumstance of its
having changed its usual economy, and having become a hunting
instead of a spinning spider, as well as a wish to learn whether its
legs would be renewed, induced him to keep the animal in the glass,
from whence it could not escape, and to observe its conduct.

"On the following morning the animal ate two flies given to it,
by sucking out the juices, but left the carcases entire. Two or three
days afterwards it devoured the body and head of a fly, leaving only
the wings and legs. After this time it sometimes sucked and some-
times ate the fly given to it. At first it consumed two flies in a day,
but afterwards not more than one in two days. Its excrement, which
it voided, was at first of a milky-white colour, but afterwards the
white had a black spot in the centre, of a more solid appearance than
the surrounding fluid.

"Soon after its confinement it attempted to form a web on the
side of the vessel, but performed the business very slowly and clums-
sily, from the want of the proper number of legs. In about a fort-
night it had completed a small web, upon which it generally sat.

"A month after having been caught, it shed its skin, leaving the
slough on the web. After this change five new legs appeared, not
half as long as the other three legs, and of very little use to the ani-
mal in walking. These new members, however, extended themselves
a little in three days, and became half as long as the old ones. The
web was now increased, and the animal continued immovably sit-
ting on it in the day time, unless drawn from it, or attracted by a
fly thrown to it as its usual provision.

"Twenty-nine days afterwards it again lost its skin, leaving the
slough hanging in the web, opposite to a hollow cell it had woven,
so as to prevent it from being completely seen when lodged in it.
The legs were now larger than before the change of skin, and they
grew somewhat longer still in three or four days, but did not attain
the size of the old legs.

"The animal now increased its web, and being put into a small
bowl as a more commodious residence, soon renewed a better web
than the first. In this state it was left on the first of November.
No further observations have yet been made on the subject."

"The principal use of the Araneus, in the economy of nature,
seems to be that of preventing the too great increase of insects."

Species 1.—Legs simple, hinder eyes not placed on the anterior and su-
perior part of the thorax, nor forming an irregular hexagon. The
two exterior nipples of the anus longer than the others, and project-
ing. *Lip* not advancing between the maxillae nor prominent, but as long as broad.

* Eyes eight. *Mandibles projecting.*

**Genus 6. ATYPUS. Latr., Leach. Oletéra. Walekenüer.**

*Eyes* on each side geminated: *lip* very small and quadrate, inserted under the base of the maxillae: *palpi* inserted at the external base of the maxilla, which are dilated at that part.


Inhabits France and England. In the latter country it was discovered by Dr. Leach near Exeter, and it has twice occurred near London.

* 2* *Mandibles perpendicular. Eyes sir.*

**Genus 7. SEGESTRIA. Latreille, Walekenüer, Leach.**

Maxillae straight, longitudinal, with the base thickened, dilated externally, somewhat wedge-shaped, the middle longitudinally convex: *Lip* elongate-quadrate, longer than broad, the middle longitudinally convex or subcarinated: *legs*, the first pair longest, rest in proportion, the second, then the fourth, the third pair being shortest: *eyes* placed in a transverse line, the extremities somewhat recurved.


Inhabits rocks and old buildings. It is common in France, near Paris, and in England it is not rare.

**Genus 8. DYSDERA. Latreille, Walekenüer, Leach.**

Maxillae straight, longitudinal, with the base thickened and externally dilated at the insertion of the palpi: the apex internally obliquely truncated, and thence externally acutely terminated: *palpi* with the first joint short and nearly obsolete: *lip* elongate, quadrate, gradually narrowing towards its point: *eyes* forming the figure of a horse-shoe, the open part in front: *legs* with the first, then the fourth, then the second pair longest, the third shortest: *claws* with a little brush beneath.


Inhabits the south of France, and England, beneath stones. It is rare in this country, but has been taken in Devonshire, near Plymouth and Exeter, and near London.

* * * Mandibles perpendicular. Eyes eight.


Pulpi inserted under the lateral and external margin of the maxillae towards their middle: maxilla longitudinal, arcuated, gradually becoming broader from the base towards the middle, somewhat concave internally, smooth externally, their middle impressed, the points bent inwards above the lip, and obliquely truncated within: lip elongate, ovate-quadrate, or rather oval; the base transversely truncated, inclosing the maxilla: legs with the first, and afterwards the second pair longest.

* Lip somewhat oval; the external side of the maxilla much bent and arched.


* * Lip ovate quadrate.


Genus 10. CLUBIONA. Latr., Walck., Leach.

Maxillae straight and longitudinal: the basis a little dilated externally: the apex rounded and obliquely truncated on the inside: lip elongate, quadrate, gradually narrowing towards the point: legs, the first or the fourth pair longer than the second pair.

* The two outermost eyes on either side neither placed very close together, nor inserted on a distinct prominence. (The maxillae in all with an incrassated base; the fourth pair of feet (rarely the first) longest.)


Inhabits France and England under stones, constructing a globular cell of the size of a common hazel nut, in the centre of which are deposited a vast number of pale yellowish eggs agglutinated into a spherical mass.
The mandibles of the male are porrect, and rather more than half the length of the thorax; those of the female rather vertical.

** The two external eyes on each side placed rather close to each other. (Maxilla not always thickened at their base; the first and then the second pair of legs longest.)

A. *Maxilla* somewhat thickened at their base, and transversely impressed before the middle.

Sp. 2. *Clu. Nutrix*. Ungulæ black; thorax and mandibles light red; legs very light red; abdomen yellowish green, with an obscure longitudinal band.
It has once occurred in England, near Cheltenham.

B. *Maxilla* not thickened at their base; front not transversely impressed.

Sp. 3. *Clu. atror*. Brown; legs pale; tibiae with dark spots; middle of the back of the abdomen with a somewhat quadrature black spot, margined with yellow.

Inhabits old walls and the fissures of rocks. It is very common in Britain and France.


*Maxilla* straight and longitudinal, with their internal angle distinctly truncate, diameter equal, apex rounded; lip elongate, nearly quadrature, longer than broad, towards the superior angles a little narrower: legs, the anterior pair about the same length with the fourth pair; third pair shortest; eyes disposed in two transverse lines near each other, and bent backwards.

Sp. 1. *Ar. domestica*. Livid-cinereous; thorax of the male immaculate; of the female, on each side with a longitudinal blackish band: abdomen blackish, middle of its back with a longitudinal, maculose, dentated band, and the lateral lineolae livid.


Inhabits houses in Europe; spinning its web in a place where there is a cavity, such as the corner of a room. The mode of constructing the web is curious. Having chosen a convenient situation, she fixes one end of the thread to the wall, and passes on to the other side, dragging the thread along with her, till she arrive at the other side, where she fixes the other end of it. Thus she passes and repasses until she has made as many parallel threads as are necessary; she then crosses these by other threads. This net is intended for the capture of her prey; and, in addition to it, the animal prepares a cell for herself, where she remains concealed, and on the watch. Between the cell and the net the spider builds a bridge of threads, which,
by communicating with the threads of the large net, both gives her intelligence when any thing touches the web, and enables her to pass quickly in order to seize it.

Genus 12. AGELENA. Walekener, Leach.

*Maxilla* straight and longitudinal, their internal angle slightly truncate; diameters equal, apex rounded: *lip* not longer than broad, towards the superior angle a little narrower: *legs* moderately long, the anterior and fourth pairs of nearly equal length, the third pair shortest: *eyes* disposed in two transverse lines near to each other, and bent backwards.

**Sp. 1. *Ag. labyrinthica.* Griseous pale-reddish: thorax on each side with a blackish longitudinal line: abdomen black, above and on each side with white oblique lines forming obtuse angles, running together anteriorly in pairs; the weaving appendices or nipples conic, elongate.

Inhabits the fields. It is very common in most parts of Europe during the summer months. In Britain it is most abundant in the autumn. It spins a horizontal web on the ground, in which it watches for its prey, consisting of flies and other dipteron insects. The spider itself lives in a funnel-shaped cavity, often extending below the surface of the ground.

Genus 13. ARGYRONETA. Latreille, Walekener, Leach.

*Maxilla* short, straight, elongate quadrate, the sides of nearly equal diameters; anteriorly convex; the apex rounded: *lip* short, shorter than the *maxilla*; of a narrow elongate-triangular form; the anterior aspect convex; the apex obtuse or truncate: *legs*, the first, the fourth pair longest; the second pair shortest: *eyes* with the four middle ones forming a quadrangle, the two on each side set obliquely and subgeminated.

**Sp. 1. *Arg. aquatica.* Blackish-brown: abdomen black velvety, with some impressed dots on its back.


Inhabits Europe, frequenting slow running waters and ditches, spinning a web most beautifully constructed under the water, in which it lives, being surrounded with air, which shines through the water with a silvery lustre. The eggs are deposited in a globose silky bag. It is extremely common in most of the ditches round London, and may be observed, especially in the beginning of the summer, building its nest beneath the water, or running along the lines by which it is suspended.

**Stips 2.—*Legs* simple: hinder *eyes* not placed on the anterior and superior of the thorax, nor forming an irregular hexagon: *nipples*
of the anns short and nearly equal, of a conic form: lip nearly semi-circular, broader than long, and projecting between the maxillae: (eyes eight.)

* Eyes not describing the segment of a circle. Maxilla straightened towards their extremities, but not dilated.

Genus 14. SYCTODES. Latreille, Walekenäer, Leach.
Maxilla oblique and longitudinal, covering the sides of the lip; their bases thickened, the apex internally obliquely truncated: lip somewhat quadrangular, the base a little contracted: legs with the fourth, then the first pair longest; the third pair shortest.
Inhabits Paris, in houses. It has twice occurred near Dover, but both the individuals were females.

Genus 15. THERIDIUM. Walekenäer, Latreille, Leach.
Maxilla with an oblique direction covering the sides of the lip, converging towards their points; of equal breadth; the internal apex obtuse, or obliquely truncated: lip small, triangular, or semicircular; the apex truncate or subrounded: legs elongate, the first, then the fourth pair longest: eyes with four in the centre, forming a quadrangle, the under ones placed on a common elevation; two others on each side geminated, and situated on a common elevation.

Inhabits Europe, in the corners of buildings, walls, and rocks. It is figured by Lister, t. 11, fig. 11.

Genus 16. PHOLCUS. Walekenäer, Latreille, Leach.
Maxilla oblique, covering the sides of the lip, converging from the base to the apex: apex internally truncated: lip transversely quadrangular; the lateral angles of the apex rounded and somewhat margined: legs very long and very slender; the first, then the second and fourth (nearly equal) the longest: eyes inserted on a tubercle; two geminated and placed transversely in the middle; three on each side amassed in a triangle, one larger than the rest.
Inhabits houses in Europe; in the western parts of England it is extremely common. Its body vibrates like that of a tipulideous insect.
** Eyes not describing the segment of a circle. Maxillae straight, with their points dilated.

Genus 17. TETRAGNATHA. Latreille, Leach.

Eyes subequal; disposed in two straight and almost parallel transverse lines, the four middle ones forming nearly a regular quadrangle; maxillae straight, elongate and narrow, almost equally broad; the apex externally dilated and round; lip semicircular and somewhat notched; legs very long and very slender; the first pair longest, then the second, afterwards the fourth.

Sp. 1. Tet. extensa. Reddish; abdomen oblong, golden green, with the sides and two lines below yellowish; the middle below longitudinally black.

Aranea extensa. Linn., Fabr. Tetragnatha extensa. Latr., Walck., Leach. Inhabits Europe; frequenting moist places, in which it constructs a vertical web, sitting on it with its legs extended.

Genus 18. EPEIRA. Walckender, Latreille, Leach.

Latreille has divided this genus into sections, most of which would form good genera.

Eyes with the four middle ones placed on an abruptly formed tubercle in the form of a quadrangle, the two anterior ones largest and most distant; the lateral eyes on each side subgeminated and placed obliquely on a tubercle; maxillae subcircular, internally membranaceous; lip semicircular; short, with the point membranaceous; legs moderately long, hispid, the thighs rather strong; the first pair largest, then the second, afterwards the fourth pair: thorax inversely elongate subcordate, anteriorly broadly truncated: abdomen subglobose, large, much broader than the thorax.

Sp. 1. Ep. Diadema. Reddish; abdomen globose-oval, with an elevated angle on each side of its base; dorsal band broad, triangular, dentated, darker, with a triple cross of luteous white dots or spots, and with four impressed dots disposed in a quadrangle.

Aranea Diadema. Linn. Araignée à croix. De Geer. Epéira Diadema. Walck., Latr., Leach. Inhabits Europe. It frequents the borders of woods, rocks, and gardens, and is well known in Britain by the names Sceptre or Diadem Spider.

*** Eyes describing the segment of a circle.


Eyes generally subequal, placed in two transverse lines in a kind of semicircle; maxillae oblique, covering the side of the lip and in some degree converging; the internal apex truncate; lip somewhat oval
or nearly quadrate, generally longer than broad: legs, the first and second pair longest: the second rather longest; the third and fourth pair of legs much less, sometimes one being largest, sometimes the other.

The mandibles of the animals composing this genus are either perpendicular or somewhat flexed; in many conical with many short claws.

* Thorax convex, cordiform; the sides, especially behind, abruptly sloping, anteriorly broadly truncate; the largest legs not double the length of the body; the first and second pair much thicker than the others, sometimes one sometimes the other being longest. The first joint of the tarsi, with several moveable little spines, in a single or in a double series; the claws of the tarsi naked. Lip somewhat oval, the apex truncate or obtuse. Apex of the maxilla wedge-shaped.

Sp. 1. Tho. citreus. Thorax at the insertion of the eyes transversely elevated; the sides anteriorly produced and prominent: eyes equal: abdomen roundish, trigonal, broader behind, with a red line on each side: body yellowish citron-coloured.

Inhabits Europe, living in flowers. It is very common in Britain. The male is rare, smaller than the female; of a brown colour banded with yellowish green.

** Thorax convex, cordiform; the sides, especially behind, abruptly sloping, the anterior part broadly truncated; the larger legs not twice the length of the body, all of nearly an equal degree of thickness; the hinder four not much shorter; the anterior with four little spines: the claws of all the tarsi scarcely visible. Lips somewhat oval; the apex truncate or obtuse. Maxilla at their points wedge-shaped.

Sp. 2. Tho. lynceus. Lateral eyes largest, placed on an eminence, the tubercles of the hinder ones thickest: body pale yellowish-grey, variegated with punctures and spots of a blackish colour: abdomen very large, of a triangular-oval form, broader behind.

Inhabits France and Scotland. Latreille considers it to be much allied to Thomisus onustus of Walekenier.

*** Thorax depressed, somewhat oval, very obtuse before; the larger legs not twice the length of the body; all the legs of equal thickness: the tarsi hairy beneath, the first joint with a few little spines: the apex with two brushes under the claws: abdomen oblong: the maxilla beyond the insertion of the palpi, nearly of equal breadth, distinctly and abruptly truncated; lip somewhat quadrate: hinder eyes distant.

Sp. 3. Tho. oblongus. Pale-yellowish, with white hairs above: abdomen somewhat cylindrical, with obscure longitudinal lines.

Inhabits France, Denmark, and England, on plants.
Stirps 3.—Legs not formed for leaping. Hinder eyes placed on the anterior and superior part of the thorax, forming an irregular hexagon. (Hinder pair of legs longest.)

Genus 20. LYCOSA. Latreille, Walckenaer, Leach.

Maxillae straight, anteriorly convex; externally towards the side somewhat arenated; internally slightly margined, gradually narrowing towards the base; the apex obliquely truncated, forming almost an inverted triangle: lip elongate, quadrate: legs strong, the fourth pair longest, then the second; the third shortest.

Sp. 1. Lyc. saccata. Above smoky-black clouded with cinereous violosity; carina of the thorax obscure, reddish, with a cinereous violous line; base of the abdomen with a little bundle of griseous hairs: legs livid-red, with blackish spots.

Inhabits Europe. It is very common in Britain: the female may be observed in gardens carrying her bag of eggs, of a green colour: palpi, mandibles, and anterior margin of the thorax livid-red in the female, black in the male.

Genus 21. DOLOMEDES. Latreille, Walckenaer, Leach.

Maxillae straight, oval-quadrate; the apex externally rounded, internally obliquely truncated; lip somewhat square, the diameters nearly equal, the points of the angles rounded: legs elongate; the fourth pair longest, then the second; the third shortest: claws exserted, without brushes below.


Inhabits woods.

Stirps 4.—Legs formed for leaping: (Eyes eight. Thorax never arenated.)


Maxillae straight, longitudinal, subrhomboidal, or inverse-cuneate-ovate: lip elongate, suboval, the apex obtuse: palpi clavate: thorax truncate-ovate or parallelogrammic: eyes disposed in the form of a horse-shoe, the two middle ones largest: legs thick and short; the first pair thickest and not longer than the fourth pair; the second and the third pairs of nearly an equal length, and shorter than the two other pairs.

Sp. 1. Sal. scenicus. Black; margin of the thorax covered with white down: abdomen short ovate; above with a reddish-gray pubescence, with three transverse arenate lines, and the anus white; the first band basal and entire, the others acutely bent anteriorly, and interrupted in their middle.

Inhabits walls and palings. It is found in most parts of Europe, and is called in Britain the Hunting Spider.


Maxilla straight, longitudinal, subrhomboidal or inversely cuneate-ovate: lip elongate, suboval, with the apex obtuse: pulpi filiform: thorax elongate, narrow, subconic: eyes disposed in the form of a horse-shoe; the two middle eyes largest: legs slender, elongate, the first pair thickest and not longer than the fourth pair; the second and third pairs of nearly an equal length and shorter than the other pairs.

Sp. 1. Att. formicarius. Thorax anteriorly black, behind red: abdomen fuscous, with a white spot on each side: legs red.


Inhabits Europe, residing on plants and walls. It is very rare in Scotland, and has not been observed in England.

Class IV. A C A R I. Leach’s MSS.

In the Supplement to Encycl. Brit. vol. i. the animals of this Class were arranged with the Arachnoida and formed the Order Monomerosomata. Since that paper was written, Dr. Leach has, from a further investigation of their characters, separated them from the Arachnoida (in which they differ essentially), and considers them as a distinct class; they are for the most part parasitic, living on the bodies of other animals: to the lovers of the microscope these animals will afford an extensive field for their research and investigation; they are very numerous, highly interesting, and as yet but imperfectly known.

Character.—Body formed but of one segment: mouth rostriform, or in some furnished with maxillae and mandibles: legs six or eight: tracheæ for respiration.

Section I.—Legs formed for walking.

A. Mouth with mandibles.

Fam. I. T R O M B I D I A D E. Leach.

Pulpi porrect, and furnished at their extremities with a moveable appendage. Eyes two, placed on a pillar. Body apparently divided into two parts by a transverse line; the anterior division bearing the eyes, mouth, and four anterior legs.
Genus 1. TROMBIDIUM. Fabr., Latr., Leach.

Legs eight.
Sp. 1. Trom. holoscriceum. Subquadrate, blood-red, tomentose; the down short composed of cylindric papillae, which are rounded at their extremities.

Trombidiunm holoscriceum. Fabr., Latr.
Inhabits Europe, and is abundant in the spring.

Genus 2. OCYPETE. Leach.

Legs six.
Sp. 1. Ocy. rubra. Red; back with a few long hairs, the legs with many short hairs of a rufous ash-colour; eyes black brown.

Ocypete rubra. Leach, Tram. Linn. Soc. vii. 399. This curious little animal, which is not larger than a grain of small sand, is parasitic, and is frequently to be found on the largest tipulaceous insects, adhering to their legs. No less than sixteen specimens have been obtained from one insect.

Fam. II. GAMMASIDÆ. Leach.

Palpi porrect, simple.

Genus 3. GAMMASUS. Latreille, Leach.

Body depressed, the skin of the back partly or entirely coriaceous.

* Anterior portion of the back, and a triangular part behind, coriaceous.


Inhabits the excrements of horses and oxen, often attaching itself to Scarabæi, Histeres, &c. in great numbers.

** Back entirely coriaceous.

Sp. 2. Gamm. marginatus. Ovate, brown; belly coriaceous, the sides alone membranaceous and whitish; anterior legs nearly twice the length of the body.

Inhabits dung and dead animals.

Fam. III. ACARIDÆ. Leach.

Mouth furnished with mandibles: palpi simple, very short, not porrected.

Genus 4. ORIBITA. Latreille, Leach.

Body covered by a coriaceous skin; anterior part rostrated; the produced part inclosing the organs of mastication: abdomen subglobose: tarsi with claws.

Acarus geniculatus. Linn.
Inhabits trees and beneath stones. It is common in Sweden, Germany, and England.

Genus 5. NOTASPIS. Hermann.
Body covered by a coriaceous skin, the anterior part rostrated, the produced part inclosing the organs of mastication: abdomen subglobose, the sides anteriorly with a wing-like process: tarsi with claws.
Inhabits moss and beneath stones. It is not uncommon in the southern parts of Devonshire.

Genus 6. ACARUS of authors.
Body soft: mouth naked: tarsi with a pedunculated vesicle at their extremities.
Sp. 1. Acn. domesticus. White, with two brown spots; body ovate, the middle coarctate, with very long hairs: legs equal.
Inhabits houses, living in cheese and flour that have been kept too long.

B. Mouth furnished with a rostrum.
Fam. IV. Ixodiade. Leach.

Eyes obscure or concealed.

Stirps. 1.—Palpi and rostrum exerted.

Palpi equally broad, longer than broad.
Sp. 1. Ix. Ricinus. Scutum rounded, smaller; with the vagina of the rostrum and the legs fuscos: abdomen varying in colour.
Inhabits Europe, attaching itself to dogs. In Britain it is called the Dog-tick.

Dr. Leach has written a paper on the British species of this genus, which is published in the eleventh volume of the Transactions of the Linnean Society.

Stirps 2.—Palpi and rostrum hidden.

Genus 8. UROPODA. Latreille, Leach.
Body oval, orbiculate: back corneous, clypeiform, the disc being gradually convex; beneath flat: anus produced into a long filiform peduncle (by which it adheres to coleopterous insects): legs very short, pressed close to the body, the first pair shortest, the second pair rather longer, the third distinctly longer, the fourth pair longest.

*Mitte vegetative.* De Geer., vii. 123. pl. 7. fig. 15.

*Uropoda vegetans.* Latr., Leach.

Inhabits France and England, attaching itself to the legs, abdomen, and elytra of *Histeres, Aphodii,* &c. by its pedunculated anus.

**Fam. V. CHEyleTIDÆ. Leach.**

Eyes distinct: *palpi* concealed.

*Stirps 1.* — *Palpi* distinct.


Sp. 1. *Sar. Scabiei.* Subrotundate; legs short, reddish; four hinder ones, with a very long seta: the planta of the four anterior ones terminated by a swelling.


Inhabits the ulcers of the itch. *Acarus exulcerans* of Linnaé is probably this animal, or is at least referable to the same genus.

**Section II. — Legs formed for swimming.**

**Fam. HYDRACHNADÆ.**

*Mouth* with mandibles.


*Palpi* subcylindric, porrect, arcuate inflexed, four-jointed, the last acute unguiform: *mouth* produced into a conic rostrum: *body* globose: *legs* timbriated with hairs, and situated at equal distances from each other.


*Hydrachna geographica.* Müll. *Hydr. 59. tab. 3. fig. 3-5.* Latr., Leach.

Inhabits waters that flow gently. It is a most beautiful animal, and is very common near London.


*Palpi* incurved, the apex acute simple: *mouth* with a very short rostrum: *body* depressed: *legs* short, the four hinder ones remote: *eyes* two.

Sp. 1. *Lim. holosericea.* Body ovate, red, rugose, soft; *eyes* black.


Inhabits Europe. It is very common in most of our ponds during the summer months. It varies much in colour, but is generally found of a bright red or greyish-red colour, and of all the intermediate varieties of shape.
Class V. **Insecta.**

**History.**—*Insecta*, so named from *in* (into) and *secu* (to cut). This term was applied to these animals by the Latins; by the Greeks they were named *Entoma* (ἕντομα), from ἔν, into, and τέμνω, to cut. Insects were so named, because their bodies are composed of many joints or segments; on which account several of the ancient and older naturalists placed them with the classes *Crustacea*, *Myriapoda*, *Arachnoida*, and *Vermes*.

The oldest records on this subject are to be found in the sacred writings, where mention is made of locusts, flies, and caterpillars; and it is probable that Moses had acquired some knowledge of insects from the Egyptian sages, as his writings abound with passages relating to insects.

Hippocrates, as we are told by Pliny, wrote on insects; and the writings of the earlier Greek and Latin philosophers, quoted by Pliny, afford extracts of his labours.

Aristotle, in his *History of Animals*, has devoted a very considerable portion of his attention to insects, and has described their general external structure with great accuracy.

Aldrovandus, in 1602, published a very voluminous work, *De Animalibus Insectis*, in which he divides insects into *Terrestrial* and *Aquatic*.

In 1612, Wolfgang Frantzius published *Historia Animalium Sacra*, which contains some new observations, and a distribution of insects into *Aerial*, *Aquatic*, and *Terrestrial*.

Swammerdam, who published his *Historia Insectorum Generalis* in 1669, divided genuine insects into, 1st, Those which, after leaving the egg, appear under the form of the perfect insect, but have no wings, which parts are afterwards produced: 2dly, Those insects which appear, when hatched from the eggs, under the form of a larva, and, when full grown, change into a chrysalis, where it remains until its parts are fit to be developed: 3dly, Those which, having attained the pupa (chrysalis or nymphal) state, do not divest themselves of their skin. His other divisions refer to animals of the classes *Arachnoida*, *Crustacea*, and *Myriapoda*; and the whole of his work contains much valuable observation on the structure and economy of these animals.

In 1735, Linne published the first edition of his *Systema Naturae, sive Regna tria Naturae systematicè proposita per Classes, Ordines, Genera, et Species*, in which work Insects are distributed into four Orders, according to the number and form of their wings: 1. Coleoptera; 2. Angioptera; 3. Hemiptera; 4. Aptera.

With the last Order he included *Crustacea*, *Arachnides*, *Myriapoda*, *Vermes*, and certain *Zoophytes*; but in subsequent editions of this work
he separated the Vermes, as Aristotle had done before him, and established them as a class distinct from Insects.

Schäffer, in 1711, published a valuable work, under the title *Icones Insectorum circa Ratisbonam indigenerum*. The classification proposed by the author differs entirely from that of Linneé, and approaches in some respects that proposed by Geoffroy.

In 1761, Geoffroy published his most valuable System of Insects, under the title *Histoire abrégée des Insectes*, in which these animals are arranged into six sections.

In 1770, J. C. Fabricius, a pupil of Linneé, published a new system of entomology, under the title *Systema Entomologicum*, in which the principles of a new mode of classification, founded on the organs of deglutition and mastication, is for the first time developed. This system, which has undergone several modifications, is named the Cibarian System.

Scopoli, in 1777, published his *Introductio ad Historiam Naturaliam*, in which work he divides insects into five tribes, under the singular appellations of 1. *Scammoneridami-Lucifuga*; 2. *Geoffroy-Gymnoptera*; 3. *Roesellii-Lepidoptera*; 4. *Reaumurii-Proboscidea*; 5. *Frischii-Coleoptera*, identifying each tribe by the name of each author, who has, in his opinion, been most successful in the explanation of that to which his name is attached.

The *Lucifuga* includes the lice; *Gymnoptera*, his halterata, aculeata, and cancelata; *Lepidoptera*, the moths and butterflies; *Proboscidea* he has divided into terrestrial and aquatic; and the *Coleoptera* he divides into those inhabiting water, and those the land.

In 1789, Linneé produced the twelfth edition of his *Systema Naturae*, which was the last systematic work of that illustrious naturalist.


In 1798, J. C. Fabricius produced his last general systematic work, the *Supplementum Entomologie Systematicae*, which presents an outline of his system in its latest state; and which, being the result of much knowledge, demands a considerable portion of attention.

In the *Entomologie Helvetique*, a work published in 1798, Clairville, its author, has arranged Insects in the following manner:

* PTEROPHORA; MANDIBULATA. With wings and jaws.

Section 1. *Elytroptera*. Wings crustaceous.
**PTEROPHORA; HAUSTELLATA.** With wings and a haustellum.

Section 5. HALTERIPTERA. Wings with poisers.

6. LEPIDOPTERA. Wings with powder.

7. HEMMEROPTERA. Wings partly obscure, partly diaphanous.

**APTERA; HAUSTELLATA.** Without wings; with a sucker.

3. ROPHOPTERA. Sucker sharp.

**APTERA; MANIDIBULATA.** Without wings, with jaws.

9. PODODUNERA. Legs formed for running.

In 1800, Cuvier, with the assistance of Duméril, published his *Anatomic Comparaee*, in which the organization of Insects is treated at great length.

In 1801, J. B. Lamarck produced his *Système des Animaux sans Vertèbres*, in which work he has arranged some of the genuine Insects with the *Arachnida*; the rest he distributes into the following Orders:

* With mandibles and jaws.

Order I. COLEOPTERA. II. ORTHOPTERA. III. NEUROPTERA.

** With mandibles, and with a kind of proboscis.

Order IV. HYMENOPTERA.

*** No mandibles. A trunk or sucker.

Order V. LEPIDOPTERA. VI. HEMIPTERA. VII. DIPTERA. VIII. APTERA.

In 1806, Latreille published his *Genera Crustacorum et Insectorum*, in which he has denominated the true Insects *Insecta Pterodicera*; and has arranged them in the following manner:

Century I. ELYTHROPTERA.

Elytra two, covering the wings entirely.

Cohors I. ODONTOTA.

Mouth with mandibles, maxilla, and lip. Wings folded.

Order I. COLEOPTERA. II. ORTHOPTERA.

Cohors II. SIFHONOSTOMA.

Order III. HEMIPTERA.

Century II. GYMNOPTERA.

Wings naked,
CLASS V. INSECTA.

Cohors I. Odontata.
Mouth with mandibles, maxillae, and lip. Wings four.

Order IV. — Neuroptera. V. Hymenoptera.

Cohors II. Siphonostoma.
Mouth tubular, formed for sucking.

Order VI. Lepidoptera. VII. Diptera. VIII. Suctoria.

Latreille has retained the same general arrangement in his last work, Considerations Générales sur l'Ordre Naturelle, &c. but he has rejected the divisions into Legions, Centuries, and Cohorts.

Duméril, in his Zoologie Analytique, arranges insects into Eight Orders, the last of which also comprehends the Classes Arachnoïda and Myriapoda.

In 1812 Lamarck published a little work, entitled Extrait du Cours de Zoologie du Muséum d'Histoire Naturelle, in which he has continued the general arrangement published by him in 1801.

In 1815, vol. ix. of the Edinburgh Encyclopaedia was published, in which Dr. Leach gave the following arrangement of Insects into Orders, and has added to them the Parasita and Thysanura, which Latreille placed with the Arachnoïda.

Subclass I. AMETABOLIA.

Order I. Thysanura. II. Anoplura.

Subclass II. METABOLIA.

Century I. ELYTHROPTERA.
Insects with elytra.

Cohors I. Odontostomata.
Mouth with mandibles.

* Metamorphosis incomplete.

Order III. Coleoptera.

** Metamorphosis nearly coarctate.

Order IV. Strepsiptera.

*** Metamorphosis semi-complete.

Order V. Dermaptera. VI. Orthoptera. VII. Dictyoptera.

Cohors II. Siphonostomata.
Mouth with an articulated rostrum.
Order VIII. Hemiptera. IX. Omoptera.

Century II. MEDAMOPTERA.
Insects without wings or elytra.

Order X. APTERA.
Century III. GYMNOPTERA.
Insects with wings but no elytra.
Cohors I. Glossostomata.
Mouth with a spiral tongue.

Order XI. LEPIDOPTERA.
Cohors II. GNATHOSTOMATA.
Mouth with maxillae and lip.

Order XII. TRICHOPTERA.
Cohors III. ODONTOSTOMATA.
Mouth with mandibles, maxillae, and lip.

Order XIII. NEOPTERA. XIV. HYMENOPTERA.
Cohors IV. SIPHONOSTOMATA.
Mouth tubular, formed for sucking.

Order XV. DIPTERA.

As the above arrangement is subject to various objections, I shall adopt that since given by the same author in vol. iii. of his Zoological Miscellany.

Class V. INSECTA.

Subclass I. AMETABOLIA.
Insects undergoing no metamorphosis.

Order I. Thysanura.—Tail armed with setae.
Order II. Anoplura.—Tail without setae.

Subclass 2. METABOLIA.
Insects undergoing metamorphosis.

Order III. COLEOPTERA.—Wings two, transversely folded, covered by two crustaceous or hard coriaceous elytra, meeting (generally) with a straight suture. Mouth with mandibles. (Metamorphosis incomplete.)
Order IV. Dermaptera.—Wings two, longitudinally and transversely folded. Elytra subcrustaceous, abbreviated, with the suture straight. Mouth with mandibles. (Metamorphosis semi-complete.)

Order V. Orthoptera.—Wings two, longitudinally folded, covered by two coriaceous elytra, the margin of one elytron covering the same part of the other. Mouth with mandibles. (Metamorphosis semi-complete.)

Order VI. Dictyoptera.—Wings two, longitudinally folded, twice or more, covered by two coriaceous elytra; one elytron decussating the other obliquely. Mouth with mandibles. (Metamorphosis semi-complete.)

Order VII. Hemiptera.—Wings two, covered by two crustaceous or coriaceous elytra (the tips of which are generally membranaceous), horizontal, one decussating the other obliquely. Mouth with an articulated rostrum. (Metamorphosis semi-complete.)

Order VIII. Odonata.—Wings two, covered by two elytra which are entirely coriaceous or membranaceous; meeting obliquely with a straight suture. Mouth with an articulated rostrum. (Metamorphosis semi-complete or incomplete.)

Order IX. Aptera.—No wings or elytra. Mouth with a tubular, jointed sucking rostrum. (Metamorphosis incomplete.)

Order X. Lepidoptera.—Wings four, membranaceous, covered with meal-like scales. Mouth with a spiral tongue. (Metamorphosis incomplete.)

Order XI. Trichoptera.—Wings four, membranaceous; the pterigostia or wing bones hairy. Mouth with maxillae and lip. (Metamorphosis incomplete.)

Order XII. Neuroptera.—Wings four, membranaceous, generally of equal size, with numerous decussating pterigostia resembling a network. Mouth with mandibles, maxillae, and lip. (Metamorphosis incomplete or semi-complete.)

Order XIII. Hymenoptera.—Wings four, membranaceous, the hinder ones always smallest; the pterigostia not decussating each other, so as to resemble a net-work. Mouth with mandibles, maxillae and lip. (Metamorphosis incomplete.)

Order XIV. Rhipiptera.—Wings two, longitudinally folded. Mouth with mandibles. (Metamorphosis subcoarctate.)

Order XV. Diptera.—Wings two, with halteres or balancers at their base. Mouth tubular, formed for sucking. (Metamorphosis incomplete or subcoarctate.)

Order XVI. Omaloptera.—Mouth furnished with mandibles and
elongated maxillæ: lip simple. Wings two or none. (Metamorphosis coarctata.)

Subclass I. INSECTA AMETABOLIA.

Order I. THYSANURA. Leach.

THYSANOURA. Latreille.

Tail furnished with setæ or filaments: mouth with mandibles, palpi, labrum, and labium.

The body of the animals which compose this Order is generally covered with scales or hair. Their motion is extremely rapid, or performed by leaping.

Fam. I. LEPISMADÆ. Leach's MSS.

Palpi very distinct and prominent, or exserted: antennæ composed of a vast number of very short joints: tail with three exserted setæ.

Stirps 1.—Body depressed, and moving with a running motion: tail with three nearly equal filaments.


Antennæ inserted between the eyes: maxillary palpi slender, composed of five joints, the last of which is elongate and very slender: labial palpi with their joints compressed, dilated, and round: eyes small and remote.

Sp. 1. Lep. saccharina. Body covered with silvery scales. Inhabits Europe. It is very common amongst books, clothes, &c. and wanders about during the night. It is supposed to have been originally introduced into Europe from America, where it is said to live amongst sugar.

Stirps 2.—Body convex, with an arched back formed for springing. Tail with three setæ, the middle one longest.

Genus 2. FORBICINA. Geoff., Leach. LEPISMA. Linn., Olivier. MACHILIS. Latr.

Antennæ inserted under the eyes, shorter than the body: maxillary palpi thick, with six joints, the last conic: labial palpi with the apex membranaceous: eyes large and contiguous.


Inhabits all the temperate parts of Europe, and is found in woods and under stones.
Genus 3. PETROBIUS. Leach's Zoological Miscellany, vol. iii. tab. 145. LEPISMA. Fabr.?

Antenna longer than the body, inserted under the eyes: maxillary palpi six-jointed; the fifth joint inversely conic, the sixth conic: labial palpi with the last joint obliquely truncate, with the apex acute, and not membranaceous: eyes large and contiguous.


Inhabits all the rocky shores of Britain. Dr. Leach first observed this species on the Devonshire coast, and afterwards in Ireland, Scotland, and Wales. It is very active, runs fast, and leaps to a great distance. Dr. L. suspects that it has been confounded by Fabricius with Forbicna polypoda.

Genus 4. PETROBIUS. Leach. LEPISMA. Fabr.

Antenna with the last joint solid, not articulated: abdomen elongate, linear.

Sp. 1. Leach's Zoological Miscellany, vol. iii. tab. 145. LEPISMA. Fabr.?

Podura plumbea. Lead-coloured, shining, with griseous head and feet.

Inhabits Europe under stones.

There are a great number of species in this and the following genus, which are worthy of attention. Fabricius has placed these two genera together without the slightest distinction, and has described several species, which it is hoped some future zoologist will be induced to examine.


Antenna with the last joint solid, not articulated: abdomen elongate, linear.

Sp. 1. Pod. plumbea. Lead-coloured, shining, with griseous head and feet.

Inhabits Europe under stones.

Order II. ANOPLURA. Leach.

Parasita. Latreille.

Tail without setæ or filaments: mouth in some furnished with two teeth (or mandibles?) and an opening beneath; in others with a tubulose very shorthaustellum.

The animals of this Order are parasitical, and were by Latreille
placed in an order which he named *Parasita*. This name Dr. Leach has changed for the sake of harmony, and also to render the name more easy of retention in the memory, the characters being drawn from the same parts.

Their motion is slow, and their nourishment is derived from the blood of mammalia, birds and insects.

"It is almost an established fact, that every species of bird (and probably mammiferous animal) has its own peculiar parasite; and there is no instance of the same species of louse having been observed on two distinct species of birds, although some birds (as the raven oyster-catcher, &c.) are infested with several species of parasites." The importance of clearly ascertaining the truth is such to the ornithologist, that Dr. Leach has employed a considerable portion of time for the purpose of investigating and of describing the species with accuracy, little more than a bare catalogue of names and habitats having been given in the works of Linne, Fabricius, and Gmelin. The result of his examinations he does not consider himself as able to communicate at present; but it is his intention, when the subject has arrived at maturity, to give a paper on this Order to the Linnean Society of London.

**Fam. I. Pediculide. Leach.**

*Mouth* consisting of a tubulose, very short haustellum.


*Anterior pair of feet simple; two hinder pair didactyle; thorax extremely short, scarcely visible.*


Inhabits the eyebrows, &c. of men and women, being commonly known under the titles Crabs, Crab-lice, &c.

**Genus 7. Pediculus. Linn., Fabr., De Geer, Geoff., Redi, Hermann, Linn. Leach.**

*Feet* all armed with a finger and thumb; *thorax* composed of three distinct equal segments.


Pediculus humanus. Fabr., Linn., Latr., Leach.

Inhabits the bodies and garments of men, and is known by the name of the body-louse. On the continent of Europe, especially in Spain and Portugal, it is very abundant. In Britain it is of rare occurrence, and may have been introduced from the neighbouring countries.


Inhabits the heads of man throughout Europe. In Britain it is extremely common, especially in the heads and upper part of the necks of children, whence they are extracted by means of a fine-toothed comb, or are destroyed by rubbing calomel mixed with a little fat amongst the roots of the hair. This species has been by many authors confounded with the preceding species.


Thorax narrow and distinct from the abdomen: abdomen very broad.


Inhabits swine.

Fam. II. *Nirmidae*. *Leach.*

Mouth with a cavity, and two teeth or mandibles.


The character of this genus is given in that of the tribe. All the species inhabit birds. The term ricinus having been used in botany is rejected, and that of Dr. Hermann's is adopted.

Sp. 1. *Nir. Cornicis.* Whitish: head heart-shaped; segments of the thorax on each side produced into a tooth: abdomen oval, transversely banded with brown.

Ricinus Cornicis. *Latr.*

Inhabits the *Corvus Cornix* of Linné.

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Subclass II. INSECTA METABOLIA.

Order III. COLEOPTERA.

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

Class *Eleuterata*. *Fabr.*

This Order is divided into five great sections, from the general number of joints in the tarsi.

Section I.—Pentamera.

The number of joints in the tarsi is generally five, but in some of the aquatic genera the number is less.
Fam. I. Cicindelidae. Leach.

Maxillary palpi four, the interior ones two-jointed: labial two: antennae filiform, never moniliform: maxillae furnished at their extremities with a distinct articulated hook: mandibles with many teeth: feet formed for running; hinder ones with trochanters.

All the insects of this family live on other insects.


Thorax short, almost as wide as the head: abdomen elongate quadrate: elytra flat, separate, rounded: wings two: exterior maxillary palpi as long or longer than the labial: antennae inserted into the anterior margin of the eye: elyptus shorter than the labrum.

Sp. 1. Cic. sylvatica. Obscure anecous above; each elytron with an external lunule at the base, with a mark at the apex, and an intermediate transverse, narrow sinuated band of white; with many impressed punctures at the suture. (Pl. 3. fig. 3.)

Cicindela sylvatica. Linna., Oliv., Latr.

Inhabits Europe. Is found on Martlesome Heath, Suffolk, occasionally; near Christchurch in Hampshire; and near Cobham and Godalming in Surry it is very common.

There are three other British species, viz. 2. C. campestris, which is taken in sandy places and in highways in great plenty. 3. C. hybrida, found on the sea-shore near Yarmouth and Swansea. 4. C. Germanica, which is common at a place called Black Gang-way in the Isle of Wight, and is occasionally found in chalk-pits near Dartford, Kent, in the months of June and July.

Fam. II. CARABIDÆ.

The mandibles of the Carabidae are entirely porrected; their hinder legs are formed for running, and they feed on other insects.

"Professor F. A. Bonelli, of Turin, has lately written an admirable monograph on the European genera of this family. This is published under the title of Observations Entomologiques, and has been sanctioned by the Imperial Academy. From the parts studied it proves that Bonelli is a man of accurate judgement, and fully entitled to rank amongst the first entomologists of the present day." Leach's MSS.

Obs.—For the characters of most of the Genera in this extensive Family I am indebted to Dr. Leach, who with his usual liberality allowed me the free use of his MSS.

I. Anterior tibiae not notched within. Elytra entire, covering the whole abdomen. Antenna linear or setaceous.

Sterips 1.—Palpi with the fourth joint thicker than the third, the apex
dilated: antennae with the second joint as long or longer than the fourth: wings wanting, or two incomplete: abdomen oval or ovate.


Palpi with the fourth joint spoon-shaped: lip with the tooth of the notch simple: labrum bilobate: elytra denticed, embracing the sides of the abdomen: wings none, or very short.

Dr. Leach has observed that the palpi of the male are larger than those of the female. Anterior tarsi in both sexes simple.


Inhabits pathways in woods, roots of trees, beneath stones, and under moss.


Palpi with their last joint securiform: lip with the tooth of its notch simple: labrum bilobate: elytra not embracing the abdomen: wings very short or entirely wanting.

The males have their anterior tarsi more or less dilated, and their thorax is evidently narrower than that of the females.


Inhabits Europe. It is frequent in Britain at the roots of trees, under stones, &c.

Sp. 2. Car. catenulatus. Black: margins of thorax and elytra violet: thorax broader than long, deeply emarginate behind: each elytron with about fourteen striae; the fourth, eighth, and twelfth from the suture interrupted; the intervals with a distinct, somewhat rugose line: abdomen oval.


Inhabits the south of France, Germany, and Britain. It is sometimes found quite black, at other times with a tinge of fine violet: and is very plentiful in this country.

Sp. 3. Car. intricatus. Black violet above, black beneath: thorax narrow, with nearly equal diameters: elytra with irregular striae: the intervals punctate-rugose; each elytron with three elevated catenulate lines.


Inhabits Europe. There is but one instance of its having occurred in Britain. Dr. Leach took a single specimen under a stone in a wood opposite the Virtuous Lady Mine, on the river Tavy below Tavistock in Devonshire, in the last week in May.

Sp. 4. Car. nemoralis. Black; margin of the elytra and sides of the
thorax violet: elytra obscure, copper, rugulose, with three longitudinal rows of excavated spots.


Inhabits gardens, and is very common in this country.

Sp. 5. Car. monilis. Brassy-green or violet-black above, black beneath; each elytron with about fourteen elevated lines, two in the middle more distinct than the rest; the fourth, eighth, and twelfth from the suture catenulated: abdomen elongate-oval.


Inhabits France and Germany: in England it is found in gardens and pathways in June, July, and August.

Sp. 6. Car. morbillosus. Brassy or black copper above, black beneath; each elytron with three ribs, one at the suture; the interstices with a catenulated line, and on each side of it with a less distinct smooth punctate-rugose line: abdomen elongate-oval. (Pl. 3. fig. 17.)


Inhabits Europe. In Britain it is found occasionally under stones and moist places, and in abundance in rotten willows in the winter.

Stirps 2.—Palpi with the fourth joint not thicker than the other joints: antennæ with the second joint shorter than the fourth: wings two, generally complete: abdomen quadrate.


Palpi moderate, with equal joints: lip with the tooth of its notch simple: antennæ setaceous, straight: abdomen quadrate: wings two. (Anterior tarsi of the male with the three first joints very much dilated.)


Inhabits Europe; and although rare in Britain, has several times been taken near Dartmouth and Norwich.

Calosoma Inquisitor of Fabricius has been taken at Norwood in June by Mr. D. Bydder and Mr. W. Weatherhead, and by Dr. Leach near Tavistock in Devonshire; but it must be esteemed a rare British insect. It once occurred in great plenty near Windsor, on the white-thorn hedges, feeding on the larvae of lepidopterous insects.


Palpi moderately long: labial with equal joints: maxillary with the fourth joint longer than the preceding: lip with the tooth of its notch bifid: antennæ linear straight: abdomen elongate, quadrate: wings two: thorax truncate; the basilar angle straight. (Anterior tarsi of the male with their three first joints dilated.)


Carabus complanatus. Linné. (Pl. 3. fig. 18.) Carabus arenarius. Fabr.
Inhabits the sandy shores of the sea near Swansea beneath drifted wood, where it was first discovered by Sir J. Banks, and twenty years after was likewise taken in great profusion by Dr. Leach.

The other British species are *N. livida*, *N. brevicollis*, and *N. Gyllenhalii*.

**Genus 15. LEISTUS. Fröl., Clairv., Bonel., Panz. Pogonophorus. Latr., Leach, Gyll.**

*Palpi* elongate: *labial* with the third joint very long: *lip* with the tooth of its notch *bifid*: *antennae* linear, deflexed: *abdomen quadrato-oblong*: *wings* two: *thorax* with the base truncate, the angles straight: (*mouth* spinose: *anterior tarsi* of the male with the three first joints dilated.)


Carabus spinibarbis. Marsham.

Inhabits sandy situations, and under stones in May and June.

**II. Anterior tibiae emarginate within, or with an elevated internal spur. Elytra not truncate, most frequently covering the whole abdomen.**

A. *Palpi* elongate. *Anterior tarsi* of the male generally with only two dilated joints. *Thorax* on each side rounded. (*Palpi* with the last joint deeply truncate.)

**Genus 16. PANAGÆUS. Latr., Clairv., Bonel., Panz., Leach, Gyll.**

*Mandibles* acute, *simple*: *lip* with the tooth of its notch *bifid*: *neck* distinct: *mouth* acute: *palpi* with their fourth joint *triangular*: *wings* two: *thorax* suborbiculate, entire: (*anterior tarsi* of the male with the two first joints penicillate-dilated.)


Inhabits Europe. In Britain it is rare, but is occasionally found at the roots of trees, and in sandy situations.

**Stirps 3. — Mandibles obtuse or above towards their points emarginate-truncate or with a large and very obtuse tooth: *neck* none: *mouth* very obtuse: (body depressed.)**


*Palpi* with their last joint oval: *thorax* anteriorly and posteriorly notched: *wings* two. (*Anterior tarsi* of the male with the three first joints dilated.)


Inhabits Europe. In England it is found under stones, and in sandy situations.
B. Palpi moderately corrected. Anterior tarsi of the male with three or four dilated joints. (Neck none.)

* Anterior tibiae notched on their hinder or lower side.

Stirps 4.—Wings two (habit of the Cicindelidae).

Genus 13. NOTHIOPHILOUS. Duméril, Bonel., Panz., Leach.
Labrum quadrate, its apex rounded: labium on each side dilated rounded: lingula rather long, broad, corneous: thorax flat, subquadrate, subtransverse, as broad as the head and abdomen: eyes prominent: wings two. (Anterior tarsi of the male not distinctly dilated.)
Cicindela aquatica. Marsh.
Inhabits Europe, and is very common in Britain.

Genus 19. ELAPIRUS. Fabr., Latr., Bonel., Leach, &c.
Labrum transverse, truncate: lip on each side obliquely subtruncate: lingula short, narrow, membranaceous: thorax truncate-obcordate, convex and unequal, narrower than the head and abdomen: eyes very prominent. (Anterior tarsi of the male distinctly dilated.)
Inhabits the edges of ponds on Epping Forest, Coombe Wood, and Battersea Fields.

Labrum transverse: thorax narrower than the abdomen, and as broad as the head: eyes more or less prominent: wings two, generally perfect. (Anterior tarsi of the male with the first joint very much dilated.) Maxillary palpi with their last joint minute, abruptly narrower than the preceding joint.
Inhabits sandy places, and roots of grass.

Genus 21. CILLENUS. Leach's MSS.
Labrum transverse: thorax narrower than the abdomen and as broad as the head: eyes rather prominent: wings two, imperfect. Anterior tarsi with the second, third, and fourth joints transverse (of the male wider than those of the female: body depressed.)
Sp. 1. Cill. lateralis. Thorax purple bronze cordate with an impressed longitudinal line: elytra livid purple striated, with some impressed discoidal punctures, the striae running together behind, margins of the elytra inflexed, base of the antennæ and legs testaceous: head purplish or greenish-bronze.
Inhabits the sea-shore. First discovered by Dr. Leach near Porto Bello on the Frith of Forth, and afterwards taken at Cromer in Norfolk, in great profusion.
**Anterior tibiae notched on their interior side.**

Stirps 5.—Palpi with their fourth joint conic acute.

Genus 22. TRECHUS. Clairv., Latr., Bonel., Panz., Leach.

Wings complete: thorax narrower behind, the hinder margin straight, the angles subrounded (anterior and middle tarsi of the male with the four first joints dilated).

This genus is very nearly allied to the insects of the next Stirps.


Inhabits the roots of grass and gardens.

Gen. 23. EPAPIHIUS. Leach's MSS.

Eyes moderately large: wings none: thorax narrower behind, with the posterior margin straight, the angles acute. (Anterior tarsi of the male with two dilated joints.)


Carabus secalis. Payk.

Inhabits Europe: it is rare in Britain.

Genus 24. AÉPUS. Leach's MSS.

Eyes very minute: wings none: thorax subtriangulate, the posterior apex deeply truncate.

Sp. 1. *Aép. fulvescens*.

Colour somewhat fulvescent; head and antennae slightly tinted with ferrugineous.

Inhabits the southern coast of Devon, and is found under stones at the mouths of the rivers Tamar and Yalm.

Stirps 6.—Palpi with their fourth joint truncate, never conic. (Tarsi anterior and intermediate of the male with four dilated joints.)

Genus 25. HARPAIUS. Latr., Bonel., Leach, Panz.

Palpi with their fourth joint oval: thorax subquadrat transverse, with an impression on each side of its base: wings two.


Inhabits Europe. Is common in Britain, under stones and in sandy situations.

Stirps 7.—Palpi with their fourth joint never conic: wings two: tibiae anterior, not palmate-dentated: mandibles short and simple: lip with the tooth of its notch simple: thorax as broad as the base of the abdomen: Body broad convex: antennæ linear: tarsi anterior of the male with three dilated joints; intermediate ones simple.


Palpi with their fourth joint shorter than the third: labrum emarginate: anterior tibiae at their extremities with a triple spur: thorax quadrat, with its base transversely subimpressed: body gibbous oblong.


Inhabits Europe. Is found at the roots of grass in Battersea Fields. Its natural history is given in German's *Magazin der Entomologia* for 1813.

**Genus 27. OODES. Bonelli, Panz., Leach.**

*Palpi* with the third and fourth joints equal in length: *labrum* entire: *anterior tibia* at their extremity with a double spur: *thorax* broadest at its base, not transversely impressed: *body* slightly-convex oval.

Sp. 1. *Ood. helopoides.* *Panz.*

Inhabits Germany, and England on moist banks: it is sometimes found in Battersea Fields.

**Stirps 8.**—*Palpi* with their last joint never conic: *wings* two: *tibia* anterior not palmate-dentate: *mandibles* simple, or towards their bases denticulated: *lip* with the tooth of the notch simple: *thorax* obcordate, sessile, with the lateral impression obsolete or solitary: *body* depressed: *antenna* linear: *tarsi* of the male with three dilated joints; intermediate *tarsi* simple.

**Genus 28. LORICERA. Latr., Clairv., Bonel., Panz., Leach.**

*Antenna* setaceous, pilose, with the first five joints globose clavate: *neck* distinct.


Carabus pilicornis. *Marsh.*

Inhabits moist banks at the roots of grass.

**Stirps 9.**—*Palpi* with their last joint never conic: *wings* two: *tibia* anterior not palmate-dentate: *mandibles* simple, or towards their bases denticulated: *lip* with the tooth of the notch simple: *thorax* obcordate, sessile, with the lateral impression obsolete or solitary: *body* depressed: *antenna* linear: *tarsi* anterior of the male with three dilated joints; intermediate *tarsi* simple.

**Genus 29. CALLISTUS. Bonelli, Panz., Leach.**

*Palpi* with their last joint oval, subacuminate and of the same length with the third joint: *labrum* much notched, its base narrowed: *thorax* convex punctate, the basal angles straight: *body* convex.


Carabus lunatus. *Fabr.*

Inhabits Europe. It is very rare in Britain.

**Genus 30. AGONUM. Bonelli, Panz., Leach.**

*Palpi* with the last joint oval, truncate and of the same length with the third joint: *labrum* transverse, quadrate, entire: *thorax* flat, smooth, the basal angles rounded: *body* depressed.

Sp. 1. *Ag. sex-punctatum.*

Carabus sex-punctatus. *Fabr.*
Inhabits moist places. In Coombe Wood it has been found very abundant. (Pl. 3, fig. 20.)

Genus 31. SYNUCIIUS. Gyllenhal, Leach.
Intermediate palpi with their last joint cylindric elongate, the apex truncate; hinder palpi with their last joint thickened at their extremity, the apex obliquely acuminated: thorax, labrum, and body as in Agonum.
Carabus vivalis. Illig.
Inhabits

Genus 32. ANCHOMENUS. Bonelli, Panz., Leach.
Palpi with their fourth joint oval, scarcely truncate, of the length of the third joint: labrum quadrate, transverse entire: thorax flat, smooth, the basal angles straight: body rather depressed.
Harpalus prasinus. Latr., Leach.
Inhabits

Stirps 10.—Palpi with their last joint never conic: wings two: tibiae anteriores not palmate-dentate: mandibles simple, or towards their base denticulated: lip with its notch-tooth bifid: thorax obcordate or suborbiculate-sessile: body moderately or very much elongated: tarsi anterior of the male with three or four dilated joints; intermediate tarsi simple.

* Antennae compressed, narrower towards their extremities (thorax obsolete).

Genus 33. PLATYSMA. Bonelli, Panz., Leach.
Palpi with their fourth joint cylindric, its base attenuated; those of the maxillae with their fourth joint shorter than the preceding: thorax with the base on each side with two striae, the exterior stria very small: basal angles straight: (body depressed.)
Sp. 1. Pl. nigritum.
Inhabits damp woods.

Genus 34. CILÆNIUS. Bonelli, Panz., Leach.
Palpi with the fourth joint oval, of the length of the third joint: thorax with its base on each side with one stria: (body punctulate, varied with colour; elytra generally with a pale margin.)
Inhabits moist banks and woods.

Genus 35. EPOMIS. Bonelli, Panz., Leach.
Palpi with their fourth joint triangular, compressed: maxillary ones with their fourth joint shorter than the third: thorax with one stria on each side of its base.
Carabus cinctus. Panz.
Inhabits the fields near Bristol and Plymouth.

**Antenna linear.**

Genus 36. SPHODRUS. Clairv., Bonel., Panz., Leach.
Palpi with their fourth joint cylindric: labial attenuated at their base, shorter than the third: mandibles elongate: antenna with their third joint elongate, as long as the two first taken together: thorax obcordate, the base on each side with one stria, the angles straight: (wings sometimes abbreviated; front tarsi of the male with four dilated joints.)

Carabus leucophthalmus. Linné.
Inhabits houses.

Genus 37. AMARA. Bonelli, Panzer, Leach.
Palpi with their fourth joint oval, of the length of the third: mandibles short: antenna with their third joint shorter than the first: thorax broad, its base transversely impressed; hinder angles straight.
This genus contains Carabus vulgaris of Linné, and its affinities, all of which have the fore tarsi of the male with three dilated joints.

***Antenna compressed, thicker towards their extremities. Palpi with their fourth joint elongate, oval, or subcylindric.***

Genus 38. BLETIHS. Bonelli, Panz. Heloriim. Leach.
Mandibly palp with the fourth joint oval of the length of the third: mandibles short: antenna with their third joint shorter than the first: thorax obcordate, the base on each side with one stria (elytra with large excavated dots): anterior tibiae with their notch near the apex: anterior tarsi of the male with four dilated joints: wings perfect.

Car. multipunctatus. Fabr.
Inhabits moist places; it occurs occasionally in Battersea Fields.

Genus 39. CALATHUS. Bonelli, Panz., Leach.
Mandibly palp with the fourth joint of the length of the third: labrum entire: mandibles with their base subdenticulated: thorax trapetiform, rather flat, behind on each side punctulate impressed: body elliptic: wings generally abbreviated: anterior tarsi of the male with three dilated joints.

Carabus cisteloides. Illig.
Inhabits under stones and the bark of trees.

Genus 40. POECILLUS. Bonelli, Panz., Leach.
Mandibly palp with the first joint of the length of the third: labrum truncate entire, or scarcely notch'd: mandibles with their base subdenticulated: thorax with its base narrower, with two striae on each side, the exterior stria very small, or with obliterated impressed dots: wings sometimes abbreviated: (anterior tarsi of the males with three dilated joints.)
Sp. 1. *Pod. cupreus*.
Carabus cupreus. *Linné.
Inhabits sand-pits and path-ways.

Strips 11.—Palpi with their last joint never conic: wings two: tibia anterior not palmate-dentate: mandibles sharp within or strongly unidentate: lip with the tooth of its notch simple: thorax obcordate, its base very narrow or pedunculated: body convex most often elongate: head large: tarsi anterior of the male with three or four dilated joints; intermediate tarsi simple.

Genus 41. **STOMIS**. Clairville, Bonelli, Panz., Leach.
Mandibles very porrect without teeth internally, that of its right side with its middle incised: palpi with the fourth joint oval, maxillary ones with the fourth joint larger than the third: labrum bilobate: lip on each side subrounded: antenna longer than the thorax, the third joint as long as the fourth: thorax oblong: wings none: (anterior tarsi of the male with three dilated joints.)

Sp. 1. *Sto. pumicatus*.
Inhabits moist banks at the roots of grass.

Genus 42. **BROSCUS**. Panzer, Leach. **CEPHALOTES**. Bonelli.
Mandibles moderate, their middle internally with one tooth; labial palpi with their fourth joint obconic; maxillary ones with the same joint of the length of the third, cylindrical: labrum transversely quadrate, entire: lip rounded on each side: antenna as long as the thorax, with the third joint as long as the fourth: thorax with equal diameters: wings perfect: (anterior tarsi of the male with three dilated joints.)

Carabus cephalotes. *Fabr*.
Inhabits the sea shores near Swansea.

Strips 12.—Palpi with their last joint never conic: wings two or none: tibia anterior palmate dentate: thorax pedunculated: lip with the tooth of its notch simple.

Genus 43. **CLIVINA**. Latr., Clairv., Boncl., Panz., Leach.
Mandibles denticulated from their base to their apex: thorax quadrate: anterior tibia externally and at their apex digitated: wings two, sometimes incomplete.

Inhabits sandy situations.

Genus 44. **DYSCHIRIUS**. Panzer, Leach.
Mandibles denticulated at their base: thorax globose: anterior tibia with their extremities (rarely also externally slightly) digitated: wings two perfect.

Clivina gibba. *Latr.*, *Leach.*
Inhabits moist places; is pretty common at Battersea.

**Sterps 13.**—Palpi with their last joint oval, wings none: *tibiae* anterior not palmate-dentated: *thorax* sessile; *lip* with the tooth of its notch bifid: *tibiae* of the third pair of legs behind spinulose: *(elytra with no impressed discoidal spots: anus in both sexes very smooth.)*

*Antenna setaceous.*

**Genus 45. ABAX.** *Bonelli*, *Panzer*, *Leach.*

*Body* broad, equal depressed: *elytra* united, their shoulders carinate plicate: *antennae* rather longer than the *thorax*: *thorax* transversely quadrate, the base on each side with two striae, the basal angles straight: *(anterior tarsi of the male with three dilated joints.)*


Inhabits beneath the bark of trees and under stones.

**Sterps 14.**—Wings incomplete or none: *tibiae* anterior simple: *thorax* sessile: *lip* with the tooth of its notch simple and obtuse: *(elytra obliquely emarginate-truncate, without any larger impressed, discoidal spots.)*


*Labrum* subquadrate, emarginate: *maxillary palpi* with the fourth joint rounded oval, of the labial palpi compressed, its apex more or less dilated: *wings* none, or very imperfect.


Carabus *humeralis*. *Fabr.*
Inhabits moist banks.

**III.**  *Anterior* *tibiae* notched at their internal side before the apex. *Elytra* abruptly truncated, shorter than the abdomen. *Wings complete* in both sexes.

**Sterps 15.**—Palpi short filiform: *lip* with its notch simple, or with a bifid tooth: *mandibles* dentate at their base: *palpi* with their fourth joint deeply truncate: *thorax* oblong: *body* convex: *wings* two or none: *neck* none: *labrum* transverse: *tarsi* with their fourth joints simple.


*Lip* with the tooth of its notch wanting: *labrum* not or scarcely emarginate: *labial palpi* with their fourth joint rounded, oval: *elytra* slightly truncated: *legs* moderately long: *wings* two.


Carabus *crepitans. Linné*, *Marsh.*
Inhabits under stones, near Gravesend in profusion, and occasionally beneath clods of earth in ploughed fields in May.  *(Pl. 3. fig. 19.)*
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STIRPS 16.—Palpi short, filiform, the fourth joint truncate, with the tooth of its notch acute; mandibles without teeth; thorax transverse; body depressed, broad; wings two; neck none; labrum entire.

Genus 48. LAMPIRIAS. Bonelli, Panz. ECHIMUTHUS. Leach. Tarsi with their fourth joint simple; antennae linear; wings short.
Sp. 1. Lam. cyanocephala. Intense blue-green; first joint of the antennæ, thorax, thighs, and tibiae red; elytra with punctured striae, the spaces between the striae punctured; knees black. Carabus cyanocephalus. Linne, Schönhcr. Echimuthus cyanocephalus. Leach.
Inhabits Europe: is very rare in Britain, where it was first discovered by Dr. Leach.

Sp. 2. Lam. chlorocephala. Intense green; the three first joints of the antennæ, thorax, and legs red; elytra with punctured striae, the spaces between the striae very obsoletely and irregularly punctulated; tarsi black. Carabus cyanocephalus. Marsham.
Inhabits the broom and under the bark of trees. It is very abundant occasionally in Coombe Wood, near London, and is not uncommon in other parts of Britain:—it has been considered as L. cyanocephala by all British collectors.

Genus 49. LEBIA. Latr., Bonelli, Panz., Leach. Tarsi with their fourth joint bifid; antennæ more slender at their base; wings long. The palpi of this genus are scarcely truncate.
Inhabits Europe: in Britain it is very rare.

STIRPS 17.—Palpi short, filiform; lip with the tooth of its notch acute; mandibles dentated at their bases; palpi with their fourth joints scarcely truncated; thorax with subequal diameters, or longer than broad; body depressed, flat, narrow; wings two; labrum emarginate.

Genus 50. DROMIUS. Bonelli, Leach. Tarsi with their fourth joint simple; head not remarkably produced behind; thorax obcordate, margined flat, a little broader than long.
Inhabits beneath the bark of trees during the winter months.

Genus 51. DEMETRIAS. Bonelli. RISOPHILUS. Leach. Tarsi with the fourth joints bifid; head behind very much produced; thorax rather longer than broad, obcordate, margined, narrower than the head.

Lebia atricapilla. *Latr.*

Inhabits beneath the bark of trees.


Risophilus monostigma. *Leach.*

Inhabits Europe amongst the roots of plants. It is very common near Swansea.

Genus 52. ODACANTIIA. *Fabr., Latr., Bonel., Clairv., Panz., Leach, Cyl.*

*Tarsi* with their fourth joint simple: *head* behind much produced: thorax oblong, subcylindric, narrower than the head.

Sp. 1. *Odacantha melanura*.

Attelabus melanurus. *Linne*.

Inhabit marshes in Norfolk and near Swansea.

STIRPS 18.—*Palpi* very much elongated, the fourth joint with its apex dilated: *lip* with the tooth of its notch bifid: *labrum* trilobate, the middle lobe largest: *mandibles* very prominent: (maxilla with a very thin perpendicular claw: *tarsi* with the fourth joint bifid: neck distinct.)

Genus 53. DRYPTA. *Latr., Fabr., Bonel., Panz., Leach, Cyl.*

Thorax cylindric: head narrowed or lengthened behind: *mandibles* much elongated and very prominent: exterior maxillary and labial palpi terminated by a large nearly obconic joint, (maxillary ones much lengthened:) *lip* elongate linear, with two auricles.

Sp. 1. *Dryp. emarginata*. Blue, punctate, villose: mouth, antennæ, and feet red: thorax with an impressed longitudinal line; elytra with punctured striae; apex of the first and middle of the third joint of the antennæ brown.


Inhabits Europe. In Britain it is rare; but has been taken near Hastings and Faversham.

Fam. III. DYTICIDÆ. *Leach.*

HYRGENANTHIAR. *Latreille.*

DYTICUS. *Geoffroy.*

DYTISUS. *Linne, &c.*

All the Dyticidæ inhabit the water, both in the state of larve
and when perfect, living on other insects. The anterior and middle tarsi in some of the genera have but four joints.

A. With a scutellum, feet formed for walking: tarsi, the whole of them with five joints; claws didactyle.

STIRPS 1.—Hinder thighs covered at their base with a shield-shaped plate.

Genus 54. HALIPLUS. Latr., Gyll, Leach. CREPIDOTUS. Illig. HOPPLITUS. Clairv.

"* Body oblong oval. Elytra with elevated ridges." Leach.

Labial and external maxillary palpi subulate.
Inhabits running streams.

"** Body oval. Elytra striated." Leach.

Inhabits ponds and ditches.

STIRPS 2.—Hinder thighs without the shield at their base: (eyes prominent.)

Genus 55. PÆLOBIUS. Schönherr, Leach. HYGROBIA. Latrille.

HYDRACHNA. Fabr.

External maxillary palpi with the last joint subclavate.

Dytiscus Hermanni. Marsh., Oliv.
Inhabits ponds. The last segment of the abdomen when rubbed against the elytra produce a noise.

B. Scutellum none. Feet, hinder ones, for the most part formed for swimming.

STIRPS 3.—The four anterior tarsi with four, the two posterior with five joints.

Genus 56. HYHYDRUS. Latr., Gyll., Illig., Schönh., Leach.

Body nearly globose: the four anterior tarsi with the last joint short; the hinder feet with but one claw.

Sp. 1. Hyp. ovatus. Obscure, ferrugineous, impunctate; the base of the elytra with an impression at the base of the suture.

Dytiscus ovatus. Linne.
Inhabits ponds.

Genus 57. HYDROPORUS. Clairville, Leach. HYHYDRUS. Illig., Schönh., Gyll.

Body oval; the breadth exceeding the height: the four anterior tarsi with four joints; the last joint slender; claws didactyle.
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* Body elongated.
Inhabits ponds and ditches.

** Body oval.
Dytiscus confusens. Marsham.
Inhabits ponds and ditches.

STIRPS 5.—All the tarsi with five articulations.

Genus 58. NOTERUS. Clairv., Latr., Leach.
Antenna with a fifth or seventh joint dilated: hinder feet but slightly adapted for swimming.
Dytiscus crassicornis of authors. Dytis clavicornis. De Geer.
Inhabits stagnant waters.
Dytiscus sparsus. Marsh., i. 430.
Inhabits stagnant waters near London.

Antenna with the joints simple: hinder feet well adapted for swimming.
Sp. 1. Lac. hyalinus.
Inhabits canals and slowly running waters.
Dytiscus minutus. Linné, Marsh., Gyll.
Inhabits stagnant waters.

C. With a scutellum: hinder feet compressed and formed for swimming: all the tarsi with five articulations.

STIRPS 6.—Tibiae posterior elongated: claws on the hinder feet didactyle.

Genus 60. COLYMBETES. Clairville, Latr., Leach.
External maxillary palpi with the second and third joint equal; fourth long, obtuse at the apex.
Inhabits stagnant waters.
Sp. 2. Col. maculatus. (Pl. 3. fig. 15.)
Inhabits ditches.

Genus 61. HYDATICUS. Leach, Edinb. Encycl. vol. ix.
External maxillary palpi with the second joint short, third and fourth long but equal and subulated: anterior tarsi of the male patelliform: female with the thorax rough on both sides: elytra smooth.

*Dytiscus parapleurus.* Marsh.

Inhabits ponds: is of rare occurrence near London.


External maxillary palpi with the second joint obconical, third elongate obconical, fourth longer, nearly cylindrical, and rounded at its apex. *Anterior tarsi* of the male patelliform: elytra of the female sulcated.


*Dytiscus sulcatus* of authors.

Inhabits ponds and stagnant waters, and is very common.


External maxillary palpi with the third and following joint of equal length; the last gradually increasing from the middle: *anterior tarsi* of the male patelliform: (Pl. 3. fig. 13. a.) elytra of the female sulcated.

Sp. 1. *Dyt. marginalis.* Ovate, olive-black above, luteous red beneath; the scutellum of the same colour with the elytra: clypeus, whole margin of the thorax, and border of the elytra, red clay-colour; bifurcation of the sternum lanceolate. (Pl. 3. fig. 13. c.)

Inhabits Europe. In Britain it is common in ponds at all seasons of the year.

*Dytiscus circumflexus* of Fabricius is abundant in the ponds near London. It is distinguished from *marginalis* by its more elongate shape, by the bifurcate process of the sternum being spine-shaped, and by the colour of the scutellum, which is invariably ferruginous. (Pl. 3. fig. 13. b. sternum.)

Fam. IV. GYRINIDÆ. Leach.

Internal maxillary palpi composed of one part: antenna very short: eyes divided so as to appear as four: four hinder feet compressed, foliaceous, formed for swimming.

Genus 64. *GYRINUS.* Linn., Fabr., Latr., Gyll., Leach.

"*Elytra naked, with punctured stria."* Leach.

Sp. 1. *Gyr. Nutator.* Oval: elytra with punctured striae: the inflexed margin testaceous. (Pl. 2. fig. 2. a. antenna magnified, b. the hinder leg magnified.)

Inhabits stagnant waters.

"**Elytra smooth, villose."* Leach.


*Gyrinus Moderii.* Marsham.

Inhabits rivers and running waters.
Mandibles with their extremities entire: antennae filiform or setaceous, often pectinated or serrated: body convex.

1. **Pulpi filiform.**


Antenna filiform, serrated in both sexes: thorax with the hinder margin applied to the base of the elytra: body cylindric linear.

Sp. 1. Bup. biguttata. Green above, blue-green beneath; scutellum transversely impressed: apex of the elytra serrated; a white villose spot on each side of the suture, and three on the sides of the abdomen.


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

Sp. 2. Bup. viridis. (Pl. 3. fig. 9. a. antenna magnified.)

Inhabits the birch and nut-tree.

Genus 66. TRACHYS. Fabr., Gyll., Leach.

Antenna serrated and filiform: thorax with the hinder margin lobed and applied to the base of the elytra: scutellum obsolete: body short, ovate or triangular.

Sp. 1. Tra. minuta. Coppery-brown above; front impressed; elytra with slightly elevated spaces and transverse undulating bands of white hair.


Inhabits the birch and nut-tree in June and July.

Genus 67. APHANISTICUS. Latr., Leach.

Antenna massive.


Buprestis emarginatus. Fabr.

Inhabits France and England.

II. **Pulpi terminated by a thick joint.**

Genus 68. MELASIS. Oliv., Fabr., Latr., Leach. Elater. Linn.

Tarsi with entire joints.


Inhabits Germany and the south of France. In England it has been once taken by Mr. J. Curtis, of Norwich, an excellent artist and an industrious entomologist; and several times near Windsor, where it was first observed by Mr. Herschel.
Fam. VI. ELATERIDÆ. Leach.

Palpi thick at their extremities: antennæ filiform: body formed for leaping: hinder thighs with a trochanter.

Genus 69. CERATOPHYTUM. Leach. Cerophytum, Latr.

Mandibles without notch at their extremities: tarsi with their last joint but one bifid.

Cerophytum Elateroides. Latr., Leach.

Inhabits Germany, Switzerland, France, and England. In the latter country it was discovered by Mr. Millard in the New Forest, Hants.

Obs.—Latreille referred this genus to the preceding family (as a section of his family Sterriæ); but it has been referred to the Elateridae by Dr. Leach in his MSS.

Genus 70. ELATER of authors.

Mandibles notched or bifid at their extremities: tarsi with all their joints entire.

This genus should be divided into several others, but the characters have not yet been developed. They may be divided into the following sections, as given by Latreille in his Genera Crustaceorum et Insectorum.

* The last joint of the antennæ with the apex so abruptly acuminated as to give the appearance of a twelfth joint.

Sp. 1. Elat. ferrugineus. Antennæ serrated; colour black: thorax with the exception of the hinder margin and elytra red, finely punctated, pubescent: elytra with punctured striae.


Inhabits rotten trees, especially willows. In Britain it is very rare. It sometimes occurs in Kent; varies in size and colour. In Dr. Leach's collection (now in the British Museum) is a variety with the thorax entirely black.

** Last joint of the antennæ oval or oblong, not abruptly acuminated.

I. Body not linear, but three times as long as broad; abdomen oblong-triangulate.

A. Antennæ (of the male at least) pectinated or serrated.


Elater castaneus. Linn., Fabr., Panz., Leach.

Inhabits
B. Antennæ simple: joints conic.


*Elater murinus. Linn., Fabr., Marsh., Leach.*

Inhabits Europe. Is common on thistles, willows, and under stones in sandy situations.

II. Body linear, nearly four times longer than broad: thorax oblong-quadrate.

Sp. 4. *Elat. marginatus*. Black: front retuse: antennæ, sides of the thorax, feet, anus, and hinder margins of the abdominal segments, brownish-yellow; suture and outer margin of the elytra black.

*Elater marginatus. Linn., Fabr., Oliv., Marsh., Leach.*

Inhabits various herbaceous plants in fields.

Plate 3. represents fig. 7, *Elat. aneus, Linn.* *E. cyanus, Marsh.*—fig. 6. *E. semiruber, Hoffmannsegg's MSS.* A species very common in the New Forest, Hampshire; and has, together with many other species, been confounded under the general name *sanguineus.*

Fam. VII. Telephoride. *Leach.*

Tarsi with the last joint but one bifid: antennæ filiform, composed of ten joints: elytra soft, flexible: thorax nearly quadrate or semicircular.

Genus 71. DASCILLUS. *Latr.* *Atopa*, *Paykull, Fabr.*, *Leach.*


Maxillary palpi filiform, the last joint somewhat cylindric: labial palpi not bifurcate: body ovate: feet simple.


Inhabits hedges and woods.


Maxillary palpi filiform, the last joint somewhat cylindric: labial palpi bifurcate: body sub-ovate or round-ovate: feet with their tibæ simple, and their thighs not thickened.

Sp. 1. *El. pallida*. Sub-ovate, pale-red, punctulated, pubescent: eyes, antennæ (with the exception of their base), apex of the elytra, and abdomen, blackish: thorax somewhat semicircular, transverse, lobate behind.

*Eloides pallida. Latr.* *Cyphon pallidus. Fabr., Leach.*

Inhabits the white-thorn and umbelliferous plants.

Maxillary palpi filiform, the last joint somewhat cylindric: labial palpi bidentate: body ovate, inclining to round, convex: feet with their tibiae terminated with a strong spine: hinder thighs thickened and formed for leaping.


Inhabits aquatic plants in ditches.


Maxillary palpi with their apex acute: labial short, somewhat cylindric: antennae with their internal edge pectinated: maxillae with one process: mandibles notched at their points: body soft, anteriorly arcuate, indexed.


Inhabits Europe. Is found in Darent Wood, Kent, amongst grass in tolerable abundance, some years.


Mandibles with their entire end pointed: antennae compressed, more or less serrate, inserted near each other: palpi of the maxillae with the last joint somewhat triangular, having their points broader: head with the mouth produced into a kind of rostrum: maxillae with one process: elytra nearly of equal breadth: thorax somewhat quadrate, the anterior margin transverse, straight.

Sp. 1. Ly. minutus. Elytra with four elevated lines: thorax black, with the margins much elevated; last joint of the antennae reddish.


Inhabits oaks and hedges; is rare in England.

Genus 76. LAMPYRIS of authors.

Mandibles pointed at their tips, sharp, and entire: antennae approximate, the joints cylindric and compressed, the third of the same length as the following joints, the second small: head concealed by the thorax: mouth small: maxillae with a double process: maxillary palpi with the last joint triangular-ovate, compressed, the apex acute: eyes very large: body soft, of the male with elytra and wings; of the female apterous: thorax semicircular.

Sp. 1. Lam. noctiluca. Common Glow-worm. (Pl. 3. fig. 1. ♂. fig. ♀. ♀.)

Mandibles with their apex acute and entire: antenae distant: joints cylindrical, elongate: maxilla bifid: body soft: palpi with their last joint secundiform: elytra the length of the abdomen.

Sp. 1. Tel. fuscus. Cinereous-black: mouth, base of the antennae, thorax, back of the abdomen, sides of the belly and anus, red: thorax with a black spot. (Pl. 3. fig. 4.)


Inhabits various plants in the spring and beginning of summer.


Antennae distant, joints elongate, cylindrical: maxilla bifid: mandibles with their points entire and very sharp: body soft: palpi with their last joint ovate, acute: elytra shorter than the abdomen: head attenuated behind more or less.

Sp. 1. Mal. flavus. Head much attenuated behind: thorax not broader than long, margined all round, the middle longitudinally impressed: body yellowish: antennae (base excepted), vertex, and dorsal mark of the thorax blackish: elytra with punctured strie, yellow at their points.


Inhabits the oaks of England and France.

Fam. VIII. MELYRIDÆ. Leach.

Tarsi with the last joint but one bifid: mandibles notched: maxilla bifid: antenae filiform, composed of ten joints: elytra soft, flexible: thorax quadrate or semicircular.

Genus 79. DASYTES. Payk., Fabr., Latr., Leach. MELYRIS. Olivier, Lam., Illig. TILLUS. Marsh.

Head somewhat transverse, retractile even to the eyes: tarsi with nails apparently bifid: antenae with short pectinated joints nearly as broad as long: lip with the apex deeply notched, almost bifid: body without papillae.

Sp. 1. Das. ater. Oblong, black, widely punctate, hairy, the hairs black and cinereous: head with a double impression in front, which is ovate and roughish.


Inhabits Europe, amongst grass and moss.


Head somewhat transverse, retractile even to the eyes within the thorax: tarsi with apparently bifid nails: antennae with conic or cylindric-conic joints, longer than broad, in some few pectinated: labium
with apex entire or scarcely notched: body with two papillae on each side, one under the anterior angle of the thorax, the other at the base of the abdomen.

Sp. 1. Mal. aneus. Brassy-green: head anteriorly red-yellowish: elytra blood-red, with the base and half the suture brassy-green. (Pl. 3. fig. 5.)


Inhabits various plants.

Fam. IX. Tillide. Leach.

Elytra thicker at their extremities, serrated in some, solid in others: elytra covering the whole abdomen: body cylindric: thorax narrow behind.

Stirps 1.—Tarsi with first joint very distinct, longer than the preceding joint.


Maxillary palpi filiform: labial palpi securiform, nearly completely serrated: thorax cylindric or somewhat cordate.

* Thorax cylindric.


Inhabits oaks in June.

T. ambulans of Marsham is a mere variety of this species.

** Thorax subcordate.

Sp. 2. Til. unifasciatus. Black, pubescent: elytra red at their base, with a white transverse band in the middle.


Inhabits England.


Maxillary palpi filiform: labial palpi securiform: antennae with their extremities thick and not serrated: thorax somewhat cordate.


Inhabits trees in Europe.

Stirps.—Tarsi with the first joint very short, the upper part concealed by the base of the second articulation.
Palpi secundiform: antennae with the ninth and tenth joints obconic, the last oval, obliquely truncate: eyes not notched: thorax conico-cylindric, narrower behind.
Sp. 1. Op. mollis. Fuscous, villous: base and apex of the elytra and a middle transverse band with the under parts of the thighs yellowish gray. Abdomen red. (Pl. 12. fig. 1.)
Inhabits Europe, under the bark of trees and in the wood of decayed willows, eating the larvae of other insects.

Genus 84. NECROBIA. Latr., Oliv., Leach. Dermestes. Linn.
Antennae terminated by an obconic joint: antennae with the three last joints forming an oblong triangulate mass, obtuse both externally and internally.
Inhabits Europe, feeding on decayed animal substances.

Fam. X. Silphiadæ. Leach's Zool. Misc. vol. iii.
Antennae gradually thickening towards their extremities, or terminated by a solid or perfoliate club: elytra covering the greater portion of the abdomen: body oval or parallelopiped.

Stirps 1.—Palpi very distinct: mandibles with their apex entire.

Antennae not much longer than the head, terminated abruptly in a perfoliated knob: elytra truncated in a straight line, the external margin not channelled or keeled: body long quadrato.
Sp. 1. Necr. spinipes. Black: antennae ferruginous at their points: elytra with their external margin and a double transverse undulated band of orange: trochanters of hinder thighs produced into a spine.
Sp. 2. Necr. Vespillo. (Pl. 2. fig. 6. a. antennae magnified.)
Inhabits putrid fungi and dead animals.

Genus 86. NECRODES. Wilkins's MSS. Leach.
Body elongate oval: thorax orbicular: apex of the elytra obliquely truncate: hinder thighs of the male thicker than the rest.
Sp. 1. Necr. littoralis. Black: antennae with the three last joints ferruginous: elytra with three elevated lines, the two external ones connected by a tubercle: hinder tibiae of the male arcuate; the thighs toothed.
Inhabits dead bodies, on the banks of rivers or on the shores of the sea.

Genus 87. OICEOPTOMA. Leach.
Body oval: thorax nearly semicircular, transverse, emarginate before: antenna with the club abrupt, distinct: elytra whole (female in general emarginate).
* Elytra whole in both sexes.
Inhabits Europe, in dead animals and putrid fungi.
** Elytra of the female with the apex emarginated.

Genus THANATOPHILUS. Leach.

Genus 88. SIILPHA. Linn., Leach, Fabr., Latr., Marsh.
* Elytra with elevated lines.
Body oval: thorax nearly semicircular, truncate in front: antenna with a gradually formed club.
Sp. 1. Sil. obscura. Black, dull above, finely punctate, shining beneath: thorax smoothly punctate, the punctures small and close. Each elytron with three elevated straight lines.
Inhabits Europe. Is very common under stones and on pathways in the spring and summer.
Sp. 2. Sil. quadrinaculata. (Pl. 2. fig. 7. a. antenna magnified.)
Inhabits oaks.
** Elytra smooth.
Inhabits pathways in sandy situations.

Genus 39. PHOSPHUGA. Leach’s Zool. Misc. vol. iii.
Body oval or nearly rounded: thorax semicircular, anterior part truncated: elytra whole: antenna with the three last joints abruptly increasing towards their apex.
Inhabits beneath the bark of trees and under moss in winter, sandy situations and pathways in spring.
Phosphuga subrotundata. Leach, Zool. Misc. vol. iii. 75.
Inhabits Ireland, beneath stones; is very rare.
Antenna, with an abrupt club composed of five somewhat hemispheric joints: body acuminated at each extremity; elytra truncated; palpi filiform: scutellum distinct.
Sp. 1. Sea. quadrirnaculatum. Body black, shining; thorax somewhat coarctate on each side behind; elytra widely punctured, with two blood-red spots on each; tibiae striated.
Inhabits Germany, France, and England, in fungi and rotten wood.

Antenna, with a club composed of five somewhat oval joints: body acuminated at each extremity; elytra truncated; palpi filiform: scutellum none.
Obs.—The hinder margin of the thorax at the middle is produced into an angle.
Inhabits the Boletus versicolor and other fungi.

Antenna straight, with a five-jointed club: maxillary palpi with the last joint subulate, conic; labial palpi with the last joint obtuse; thorax with the hinder angles obtuse.

The species of this genus are numerous, and have afforded the subject of a learned and interesting monograph, by that excellent entomologist, W. Spence, esq. published by the Linnean Society in the eleventh volume of their Transactions.
Sp. 1. Cho. oblonga. Narrow, oblong; thorax narrower behind, the hinder angles obtuse, the middle slightly foveolated: antennae somewhat filiform.
Inhabits moss and under stones.

Antenna straight clavate, the club five-jointed: maxillary palpi with the last joint subulate, conic; labial with the last joint obtuse; thorax with the hinder angles acute; elytra more or less striated.
Inhabits moss.
*Antennae* straight clavated, club five-jointed; *maxillary palpi* with the last joint subulate, conic; *labial* with the last joint obtuse; *thorax* with the hinder angles acute; *elytra* never striated. 

*Antennae* incurved, shorter than the thorax, the basal joints distinctly thicker than the rest; club five-jointed, the joints transverse; *palpi* of the maxilla with the last joint subulate; *labial palpi* with the last joint obtuse. 

*Body* depressed; *back* plain; *tarsi* with elongate slender joints; *antennae* with a compact three-jointed club. 
Sp. 1. *Crypt. cellaris*. Testaceous ferrugineous, widely punctate, slightly pubescent; thorax finely denticulated, on each side distinctly undentate, anterior angles dilated, rounded, ending behind in an obsolete tooth. 

*Body* depressed, back plain; *tarsi* with elongate slender joints; *antennae* with a three-jointed much pefoliated club; *tarsi* with the three first joints short. 
Sp. 1. *Engis humeralis*. Elliptic, black, shining, punctate; *antennae*, head, thorax, humeral spot on the elytra and feet red approaching to blood red: 

*Body* depressed; back plain; *tarsi* with the third joint neither bifid nor dilated; *palpi* terminated by a thick joint; *mandibles* prominent; *antennae* with a three-jointed club.
Inhabits beneath the bark of trees.

Genus 99. **NITIDULA.** Linn., Fabr., Payk., Olivier, Marsh., Leach.

*Mandibles* prominent: body short, depressed; back plain: thorax generally broad: *antennae* with the third joint twice as long as the second; club abrupt and orbicular, composed of three joints.

Sp. 1. *Nit. bipustulata.* Body elliptic, brown, blackish: thorax emarginate; elytra with a red spot on each.

*Nitidula bipustulata.* Linn., Latr., Fabr., Marsh.

Sp. 2. *Nit. discoidea.* (Pl. 2, fig. 5. a. *antennae* magnified.)

*Nit. discoidea.* Marsh.

Inhabits dead carcases, dried bones, *boleti,* and under the bark of trees.

Genus 100. **IPS.** Fabr., Herbst, Gyll., Leach. **NITIDULA.** Latr.

*Mandibles* prominent, strong, and much bent at their points: body elongate-quadrate; back plain: thorax transverse-quadrate: *antennae* with the third joint twice as long as the second; club abrupt and orbicular, composed of three joints.

Sp. 1. *Ips quadrupustulatus.*

Inhabits the decayed stumps of trees under the bark.


*Antennae* with the third joint not twice as long as the following joint; club composed of three joints: *mandibles* prominent: body oval or oblong; back plain: thorax broad behind, with the angles pointed: elytra covering the abdomen.

Sp. 1. *Bit. tomentosus.* Antennae shorter than the thorax: thorax short, the posterior angles broadly depressed, reflected; body oval, black, with a reddish-yellow down; antennae and feet yellow red.

Inhabits the white-thorn and umbelliferous plants in May and June.


*Antennae* with the third and following joint scarcely differing in length; club compressed, perfoliate, obconic, composed of three joints: thorax rounded, without angles behind: elytra very short: body depressed, back plain: *mandibles* prominent.

Sp. 1. *Cat. rufulabris.* Black, shining, with gray down.

*Cercus rufulabris.* Latr.

Inhabits *funei* near Hull.
Stirps 3.—Labial palpi scarcely distinct: antennae placed in an excavation of the thorax; mandibles with their apex arcuate and acute.

Genus 103. MICROPEPLUS. Latr., Leach.
Antenna with the club composed of but one joint: maxillary palpi with the last joint subulate.
Staphylinus porcatus. Paykull.
Inhabits sandy ground.

Fam. XI. Staphylinidae.
Antenna gradually thickening towards their extremities, or terminated by a perfoliated mass: elytra covering about half the abdomen, or less, but very rarely more; body long, and more or less narrow.

Gravenhorst has written an admirable monograph on this family, entitled Monographia Coleopterorum Micropterorum.

This is a very extensive family; several hundred species are found in this country. They inhabit fungi in all its states; dung, roots of grass, flowers, under the bark of trees; and may be found in immense numbers in sand pits, and in the dung of animals, from which they may be driven by immersing the dung in water in the spring and summer months; by this means many hundred specimens may be obtained in a single day: the smaller species should be placed on a piece of gummed paper, with the legs and antennae carefully extended to show their characters. It is necessary to collect great numbers of them, as they demand a very minute examination, which, in many instances, requires the aid of a microscope, the characters being so very obscure.

Division I.—Anterior margin of the head (bearing the mandibles) immediately behind the eyes, terminated by a transverse straight line, (or with a line slightly bent in the middle,) not rounded or crooked at their sides. Antenna inserted below the middle part of the abovementioned line. Thorax long. Neck distinct. Body very long and narrow. Elytra covering a very small portion of the abdomen.

Genus 104. STAPHYLINUS. Linn., Fabr., Latr., Oliv., Lam., Gravenh., Leach.
Palpi filiform: antennae towards their extremities distinctly thicker. Moniliform, the last joint obliquely truncate or emarginate: lip deeply emarginate.
Sp. 1. Staph. erythropterus. Black; the greater part of the antennae, elytra, and feet red; hinder margins of the head and thorax, the
breast, and a double series of spots on each side of the abdomen, golden-yellow tomentose. (Pl. 4, fig. 10.)

Inhabits Europe in dung, and under stones.

Obs.—Several new genera have been formed from this genus, of which the following species may be considered as the types:

Genus Creophilus. Kirby.
Staph. maxillosus of authors.

Genus Velleius. Leach.
Staph. dilatatus. Paykull.
Staph. concolor. Marsham.

Genus Emus. Leach.
Staph. hirtus of authors.

Genus Staphylinus.
Staph. crythropterus.

Genus Ocypus. Kirby.
Staph. cyanens.

Genus Gyronypus. Kirby.
Staph. fulgidus.

To my kind and valuable friend Dr. Leach I am indebted for the above and following notice of new genera, as lately established by the celebrated entomologists whose names are affixed.


Palpi subulate, with the last joint acicular and minute: antennae nearly filiform, joints nearly conic, those towards the extremities more rounded, and somewhat globose: lip deeply notched, nearly bilobate.

Sp. 1. Lath. elongatum. Pubescent, minutely but widely punctated, black, shining; with the mouth, antennae, apex of the elytra, and feet, red-brown: head ovate: antennae about the length of the thorax, with the outermost joints nearly globose: thorax elongate-quadrilateral, with obtuse angles, the breasts equal, the middle dorsal line smooth.


Inhabits putrid vegetables, and under stones.

Obs.—Lathrobium depressum may be considered as the type of the Genus Acerenium of Leach.
Division II.—Anterior margin of the head circumscribed by a curved line, the antennae inserted on this side of the level of the line. Elytra covering half the abdomen or more. Thorax generally longer than broad, or with equal diameters.

Subdivision 1.—Maxillary palpi longer than the labial one, with their extremities thickest; the last joint obscure. Body linear. Head with a distinct neck. Thorax orbicular or cylindric.

Antennæ inserted before the eyes, insensibly thickening towards their extremities; the third joint very long; eyes moderately large.
Sp. 1. Pad. riparius. Body red, shining: head, antennæ (four basal joints excepted), apex of the abdomen, and knees, black: elytra blue, with white impressed dots. (Pl. 4. fig. 12.)

Inhabits banks and under stones.

Obs.—Paederus orbiculatus is the type of the Genus Rugilus of Leach.

Antennæ inserted at the exterior margin of the eyes, abruptly thicker at their extremities, the inferior joints cylindric, the outer ones conic globose: eyes nearly globose, large.

* Tongue long, anus without setæ.
Sp. 1. Stenus biguttatus. Black, with gray down, minutely punctate, somewhat rugulose: vertex of the head with an elevated line: thorax behind with an impressed little line; each elytron with a reddish round spot. (Pl. 4. fig. 13.)


** Tongue obsolete. Anus with two setæ.

Genus DIANOUS. Leach.

Subdivision 2.—Maxillary palpi not much longer than the labial, not thicker at their extremities; the last joint distinct.

A. Mandibles strong, with their external edge with one or more teeth. Head free.

a. The second, third, and fourth joints of the tarsi very short; the last joint as long as the others united.
Genus 108. OXYPORUS. Fabr., Oliv., Lam., Leach, Grav., Lutr. 
Antennæ scarcely longer than the head, terminated by a perfoliated mass: maxillary palpi filiform; the labial ones terminated by a very large lunate joint: thorax semicircular: head broader than the thorax.

Sp. 1. *Oxy. rufus*. Red; suture and apex of the elytra, anus and breast, black. (Pl. 4, fig. 11.)


Inhabits *boleti* and other fungi.

Genus 109. OXYTELUS. Grav., Lutr., Leach.

Antennæ somewhat broken, incurved, thicker externally, with the last joints foliaceous above; the extreme joint globose ovate; the basal joint very long conic: palpi subulate: anterior tibia very spiny, with their extremities notched or narrowed externally, with their tarsi capable of being reflected from their sides.

Sp. 1. *Oxy. carinatus*. Black, shining, distinctly and widely impresso-punctate: front unequal, somewhat inclined to be rugulose; the anterior space between the eyes rather smooth: thorax impressed on each side; the middle with three grooves, and four carinae; the two middle ones joining together: feet blackish: tibiae with very short little spines.

Oxytelus carinatus. Grav., Lutr.

Inhabits dung.

Obs.—The following genera have lately been formed from this genus:

Genus OXYTELUS. Lutr.

Palpi acuminata.


Genus BLEDIUS. Leach.


Genus CARPELIMUS. Kirby.

Palpi capitate.

Genus ERISTHETUS. Knoch.

Palpi with their last joint ovate.


Taken on an old oak near Plymouth by Dr. Leach.


Palpi filiform: antennæ thicker towards their extremities, the last joints rounded, somewhat perfoliate: thorax transverse-quadrat, the anterior angles rounded.

Sp. 1. *Omal. rivulare*. Blackish, punctate; base of the antennæ and
feet pale brown: head with two impressions between the eyes: thorax marginated, impressed at the hinder angles; back with two grooves: elytra twice as long as the thorax, obscure brown.


Inhabits dunghills.

Obs.—The following species may be considered as types of as many genera:

Genus Elonium. Leach.
Omalium striatum.

Genus Omalium. Gravenhorst.
Omal. depressum.

Genus Anthobium. Leach.
Omal. melanocephalum.

b. Tarsi with elongate joints, the last joint shorter than the others united.

Antennae nearly filiform, the second and third following joints obconic: palpi filiform: thorax elongate, somewhat cordiform, narrow, and truncate behind.


Inhabits France and England; in the latter it is rare.

Genus 112. PROTEINUS. Latr., Leach.
Antennae evidently thicker towards their extremities: palpi subulate: thorax transverse.

Sp. 1. Prot. brachypterus. Depressed, flat, black, shining, smooth, silky above; mandibles, basal joint of the antennae, and feet, brown red: head a little narrower than the thorax, triangular: thorax short, smooth, anteriorly a little narrower, the sides somewhat rounded, very slightly margined, the hinder margin twice as broad as long, the angles slightly prominent and somewhat reddish: scutellum very small: elytra elongate-quadrate, externally marginate, the hinder and external margins rounded: abdomen with the four last joints naked.

Proteinus brachypterus. Latr.

Inhabits France and England.
B. Mandibles without denticulations on their internal edge. Head inserted into the thorax more or less.

a. Antennæ wide apart, inserted before the eyes; the fifth and following joints longer than broad: tibiae spinose.

Genus 113. TACHINUS. Grav., Latr., Leach. OXYPORUS. Fabr.
Palpi filiform.

Inhabits the dung of oxen and horses.

Obs.—The following may be considered as types of the
Genus Tachynus. Grav.

Genus Bolitobius. Leach.
Tach. analis.

Genus 114. TACHYPORUS. Grav., Latr., Leach. Staphylinus.
Palpi subulate.
Sp. 1. Tach. chrysomelinus. Black, shining, smooth: thorax, elytra (base excepted), and feet, red yellow: thorax somewhat transverse: abdomen with the extremity truncate.

Inhabits flowers, the roots of grass and moss.

b. Antennæ more or less approximate, inserted at the anterior internal margin of the eye, fifth and following joints broader than long: tibiae not spiny.

Obs.—Tachyporus Granum. Gravenh. is the type of the Genus Cypha.
Kirby.

Head with the hinder part received into the thorax.
Sp. 1. Alco. canaliculata. Red fuscous, feet paler: head and the two last joints (save one of the abdomen), black: elytra together trans- verse-quadrates; back of the thorax excavated with an impressed longitudinal line in the middle.
Inhabits sandy banks and under stones.
Obs.—Of this genus the following species may be considered as types of the undermentioned genera:

**Genus Aleochara.** Grav.

**Genus Drusilla.** Leach.

**Genus Falagria.** Leach.

**Genus Autalia.** Leach.

**Genus Lomechusa.** Grav., Latr., Leach.
Inhabits dry sand spots under stones.

Obs.—**Genus Dinarda.** Leach.
The type of this genus is Lomechusa dentata. Grav.

**Fam. XII. Pselaphidae.** Leach.

**Dimera.** Latreille.
_Elytra abbreviated: tarsi with three articulations: clavcs monodactyle._

"Latreille supposed that these animals had but two joints to their tarsi, and therefore placed them in a peculiar section of the Coleoptera; observing, however, that they are allied to _Aleochara_, to whose family they are even referred by Kirby."

Dr. Leach considers them as constituting a distinct family, whose situation is intermediate between the _Staphylinidae_ and _Seydmenidae_, to both of which they are intimately allied; but may be distinguished from either by the structure of their claws, and from the latter also by their abbreviated elytra.

In the third volume of the _Zoological Miscellany_ is given an excellent monograph of the genera of this family, in which are enumerated nineteen British species, five of which are new, and none of them were known to Mr. Marsham, who has not described one species in his _Entomologia Britannica._

1. _Antenne with eleven joints_. Maxillary palpi elongated.

**Stirps 1.**—_Body elongated and depressed._

Antennae with the first and second joint thick: maxillary palpi with the last joint conical.


Inhabits ———. Taken in Norfolk by Mr. J. Curtis.

STIRPS 2.—Body short and convex.

A. Maxillary palpi with the last joint securiform.

Genus 118. BYTHINUS. Leach. Pselaphus, Family II. Reichenbach.

Antennae with the first joint round and considerably larger than the second, which is but a little increased, of the male internally acutely produced; the third and succeeding to the eighth joint round and of an equal size, ninth and tenth larger, eleventh oval, the last acute: maxillary palpi with the first articulation filiform, increasing towards the apex; second oval, third securiform, the base with a large angle.


Inhabits sand-pits.

Genus 119. ARCOPAGUS. Leach.

Antennae with the first and second joint increasing; the first elongated, the second round; the third and following to the eighth nearly globose; ninth increasing, nearly globose and lenticular; the tenth larger; the eleventh and remainder increasing, oval, the apex of the last joint acuminate: maxillary palpi with the first joint filiform, gradually increasing to a club; the second elongate-oval; the third oval securiform, base angular.

* Antennae with the first joint cylindrical.


Inhabits woods, under moss.

** Antennae with the first joint internally dilated.


Genus 120. TYCHUS. Leach.

Antennae with the first and second joint enlarged and nearly round, the first a little more lengthened and thicker than the second; third and following to the eighth nearly globose; third and fourth a little longer than the fifth, which is somewhat larger; ninth and tenth globose, increasing, and lenticular, the tenth larger than the ninth; the eleventh with the others gradually increasing.


Inhabits ———? Taken near London and Bristol, as well as in the vicinity of Norwich.
CLASS V. INSECTA.

B. Maxillary palpi with the last joint clavate.

Genus 121. BRYAXIS, Knoch, Leach. PSELAPHUS, Fam. III. A. Reich.

Antennae with the first and second joint enlarged and nearly cylindrical; third and following to the seventh nearly cylindrical; the fifth the longest, eighth small and subglobose, ninth and following gradually increasing: maxillary palpi with the first joint clavated, narrow at the base; second nearly globose; third conical.

* Fuscule of the thorax connected by a furrow. Antennae with the apex of the last joint acute, third and four following joints, elongated.

Inhabits the roots of grass on the sloping banks Battersea fields.

** Thorax with the furrow very conspicuous. Antennae with the last joint nearly obtuse; the third and following to the seventh, short. (Ninth subglobose; tenth lenticulated.)

Sp. 2. Bry. impressa.
Ps. impressus. Reich., Monog. Ps. t. 2. f. 15.
Inhabits —— Norfolk.

C. Maxillary palpi with the last joint clavate.

Genus 122. PSELAPHUS. Herbst, Latr., Leach, &c. PSELAPHUS, Fam. i. Reichenbach.

Antennae with the first and second joint elongated and nearly cylindrical; third and following to the eighth nearly globular and equal; ninth and tenth increasing, nearly equal and globular; eleventh and remainder gradually increasing: maxillary palpi with the first joint filiform, the apex almost abruptly clavated; second nearly globose; third with the apex gradually clavated.

Sp. 1. Psel. Herbstii. (Pl. 1. fig. 15.) magnified: the line beneath shows the natural size.
Inhabits banks and river sides.

Obs.—The Pselaphi are obtained by seeking at the roots of grass, in sand-pits, &c. but being so exceedingly minute they easily escape the eye of the entomologist unless he looks very close to the ground; the usual practice is either to sit or lie down, and by this means many highly interesting and rare insects may be taken whilst the entomologist rests from a more laborious mode of collecting.

Fam. XIII, SCYDMENIDAE. Leach.

PALPATORES. Latreille.

Body ovoid, rounded at each extremity: palpi very long: tarsi short: elytra hard, covering the abdomen: antennae gradually thicker towards their extremities.

Antennae gradually thickening towards their extremities: maxillary palpi terminated by an aciculare obscure joint.


Fam. XIV. Ptinidae. Leach.

PTINORES. Latreille.

Antennae much longer than the head, filiform, or terminated by three large joints not united into a mass.

Stipes 1.—Antennae uniform, not terminated by three joints, larger than the rest.


Antennae simple filiform, approximate, inserted between the eyes: eyes projecting: thorax hood-like: abdomen nearly oval: elytra united in the male.

Sp. 1. Ptin. Fur. Red-fuscous: thorax with four tubercles transversely striated, the two middle ones highest, with tufts of hair, contracted and margined behind: abdomen ovate, rounded at the base: elytra villose, with two yellow-gray bands; the second joint of the antennae shorter than the third: under part of the body with short gray-yellow hairs.


Inhabits houses, and commits great devastation in museums.

Obs.—Ptinus testaceus of Marsham is merely the male of this species.

Genus 125. GIBBIUM. Latr., Leach.

Antennae simple, setaceous, inserted behind the eyes: eyes not prominent: thorax simple: abdomen nearly globular: elytra united in both sexes.


Inhabits houses. It has been three times taken in Bristol.

Obs.—Ptinus sulcatus, Marsham, forms the type of the genus Meziun, Leach's MSS., and is akin to GIBBIUM.


Antennae inserted before the eyes, very much pectinated in the males, serrated in the females: body long-ovoid, nearly cylindric: thorax somewhat globose.


Inhabits old trees and houses, perforating them to destruction.

Obs.—*Ptilus serraticornis,* Marsham, is the female of this insect.

Stirps 2.—Antenna terminated by three joints differing from the rest in size.

Genus 127. *ANOBIUM.* Fabr., Oliv., Lamarck; Latr., Leach.


*Antenna* eleven-jointed, with the three last joints abruptly thicker than the others; the ninth and tenth joints obconic; the tenth oval.

* Elytra not striated.

Sp. 1. *Anob. tessellatum.* Thorax bilobate behind, the lateral margins reflexed: body fuscous, sprinkled with villose, obscure luteous spots: elytra not striated


Inhabits the wood of rotten trees, especially willows, during the winter months.

** Elytra striated.

Sp. 3. *Anob. striatum.* Fuscous, with grayish down: thorax with a gibbous protuberance, unisulcate above, with the angles compressed: hinder margins somewhat margined: elytra longitudinally punctate.


Inhabits rotten trees.

Fam. XV. *DERMESTIDÆ.* Leach.

*Dermestini.* Latreille.

*Antenna* slender, longer than the head, and terminated by a large ovoid mass.

Stirps 1.—*Sternum* not produced to the mouth, or over it like a neck-cloth: *tibiae* spinose.


*Antenna* with an ovate club, the last joint short, not (or but little) longer than the preceding joint: body narrow oval: thorax with the hinder margin straight or obtusely lobed: *palpi* very short: *maxillary palpi* shorter than the maxilla, or scarcely as long.


Inhabits decayed animal substances, paper, &c. is common in houses.

Antenna with an elongate-ovate club, the last joint longer than the preceding (especially in the male), triangular or conic: body broad-oval: thorax with the posterior margin narrowly and acutely lobed: maxillary palpi exerted, longer than the maxilla; the last joint elongate-cylindric, very long in some.

Sp. 1. Att. Pellio. Black; middle of the antenna and of the tarsi obscure red: hinder margin of the thorax with three spots, and the elytra with a spot on each side of the suture villose-white: antennae of the male with the last joint ensiform, very long.

Inhabits skins in houses, old wood, and paper.

STREPS 2.—Sternum produced over the mouth like a neckcloth: tibiae not or but slightly spined.


Body narrow-oval: antennae with an oval or oblong club with the internal edge simple.


Inhabits birch trees (beneath the bark) in the months of March and April: the larva spins a silken web in which it changes to a pupa.

Fam. XVI. BYRRHIDÆ. Leach.

BYRRHI. Latreille.

Body ovoid: feet entirely or semicontractile: sternum anteriorly produced to a mouth in the form of a neckcloth: antennae thicker towards their extremities: tarsi with five very distinct articulations: antennae straight, not inserted in the cavity of the eyes: feet perfectly contractile: mandibles but little or not at all prominent.


Antennae shorter than the thorax with the club solid: palpi filiform, short: body orbiculate-ovate: scutellum very minute.


Inhabits the blossoms of various plants.

Antennae as long as the thorax, with the three last joints large, forming an oval club: palpi short, with the last joint secunform: body elliptic, narrow, depressed.


Inhabits European plants; is very rare in Britain.


Antenna: a little shorter than the thorax, with the four or five terminal joints gradually thicker, compressed: palpi short, the last joint longest, thick, somewhat ovate: body somewhat ovate, very convex above: scutellum minute.


Inhabits pathways and sandy situations.

Fam. XVII. Histeridae. Leach.


Antennae geniculated, terminated by a nearly solid club of three articulations: elytra shorter than the abdomen, the margin of the sides inflexed: tarsi with five joints; contractile.

The insects of this Family are numerous: their habitation is the dung of animals, and some are found in rotten wood. A valuable paper has been published in the third volume of the Zoological Miscellany, from which the following is selected.

Stirps 1.—Body thick, nearly globose or quadrate: tibia elongated and straight: tarsi long and slender: sternum simple.

Genus 134. ABRAEUS. Leach's Zool. Misc. vol. iii.

Antennae with the first articulation somewhat elongated, second and third nearly cylindrical, straight: fourth short; fifth, sixth, and seventh, nearly globose and equal; eighth nearly globose, lenticular; ninth, tenth, and eleventh forming a short oval club.


Hister perpusillus. Marsh.

Inhabits the dung of animals.

Genus 135. ONTHOPHILUS. Leach's Zool. Misc. vol. iii.

Antennae with the first joint long, the second cylindrical, closely joined at the base; third obconic; fourth and fifth short and obconic; sixth and seventh shorter and nearly globose; eighth nearly lenticular; ninth, tenth, and eleventh forming an oval club.
Inhabits dung.

Stirps 2.—*Body* depressed: *tibia* broad: *tarsi* short: *sternum* dilated, the fore part forming a cavity for the head, which is capable of being retracted even to the mandibles.

A. *Tibia*, the four posterior with two series of spines.

Genus 136. **HISTER** of authors.

*Body* above nearly convex: *thorax* with the anterior part straight.

a. Elytra with the outer stripe extending their whole length.

b. Thorax with the sides not striated.

* Elytra with no marginal stria.


b. Thorax with the sides not striated.

* Elytra with no marginal stria.

Sp. 3. *Hist. parvus*. Marsh., Leach.

** Elytra with a marginal stria.

Sp. 1. *Hist. unicolor* of authors.
Inhabits dung.

** Elytra without the marginal stria.


b. Thorax with the sides not striated.

** Elytra with a marginal stria.


b. Elytra with the external stria abbreviated.


B. Four posterior tibiae with only one row of spines.

Genus 137. **DENDROPHILUS**. Leach’s *Zool. Misc*. vol. iii.

*Body* with the upper part nearly convex: *thorax* short, the anterior part straight.


*Hist. punctatus*. Ent. Heft.

Genus 138. **PLATYSOMA**. Leach.

*Body* with the upper part plain: *thorax* transverse or nearly equall quadrate.

* Elytra without stria. Body finely punctured.


** Elytra without external stria. Body not punctured.

**CLASS V. INSECTA.**

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**Elytra externally striated. Body without punctures.**


Subdivision 3.—Antenne straight, not inserted in the cavity of the eyes. Feet semicontractile.


Antenne nearly filiform, the last joint largest, somewhat oval.


*Chrysomela buprestoides.* Marsh.

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**Fam. XVIII. Parnidæ. Leach.**

Antenne inserted in the anterior canthus of the eye: elytra not shorter than the abdomen.


Antenne composed of three joints, the last joint articulated: tarsi with five joints.

Obs.—The insects of this genus inhabit the roots and blades of grass at the sides of ponds and ditches; the method of finding them is to loosen the grass in those places, by which means the insects will be found floating on the water: we have several species in this country that have not yet been clearly defined, but have been confounded with *proliféricornis.*

Sp. 1. *Par. sericeus.* Leach’s MSS. (Pl. 3. fig. 10. a. antenne magnified.)


Antenne composed of eleven joints, the seven last forming a dentate or serrated mass: tarsi with four joints.

Sp. 1. *Het. marginatus.* Blackish villose; sides of the thorax and abdomen with spots on the elytra, margins of the abdomen, and feet pale luteous. (Pl. 3. fig. 11.)

Inhabits marshy places, burrowing in the muddy and clayey banks of ponds.

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**Fam. XIX. Helophoridæ. Leach.**

Mandibles without teeth at their extremities: body oblong: antenne terminated by a club.

**Stirps 1.—Clypeus whole:** maxillary palpi with the last joint thick and oval.
Genus 142. HELOPHORUS. Leach. ELOPHORUS. Fabr., Oliv., Latr., Gyll.

Eyes sessile: thorax transverse.

* Thorax and elytra furrowed.

Inhabits ponds, floating on the surface and walking on aquatic plants.

** Thorax and elytra with elevated lines.


Genus 143. HYDROCHUS. Germar., Leach. ELOPHORUS. Fabr., Illig., &c.

Eyes rather prominent: thorax elongated.

Inhabits ponds, and may frequently be found in the mud at the sides.

Stirps 2.—Clypeus entire.


Maxillary palpi with the middle and last joint slender and acute.


Genus 145. HYDRENA. Kugellan, Leach.

Maxillary palpi with the last joint long and acuminated.


Fam. XX. HYDROPHILIDÆ.

Mandibles at their points bidentate: body oval or round: antennae terminated by a club.

Stirps 1.—Clypeus emarginate: sternum simple: antennae with six articulations.

Genus 146. SPERCHEUS. Fabr., Latr., Leach.

Inhabits stagnant waters.

Stirps 2.—Clypeus whole: sternum simple.

A. Elytra with the apex whole. Scutellum small.

Genus 147. BEROSUS. Leach's Zool. Misc. vol. iii.

Body narrow before: thorax convex: eyes rather prominent.

Sp. 1. Ber. luridus of authors.
Inhabits ponds.
Genus 148. HYDROBIUS. Leach.
Body oval, convex, obtuse: eyes simple.
* Elytra striated.
Inhabits ponds.
** Elytra smooth.
Inhabits ponds.

B. Elytra with the apex truncated. Scutellum small.

Genus 149. LIMNEBIUS. Leach.
Body rather depressed: eyes simple.
Inhabits ponds and ditches.

STRIPS 3.—Clypeus whole: sternum produced into a spine.

Genus 150. HYDROUS. Linne's MSS., Leach.
Scutellum large: anterior tarsi of the male dilated in the middle with unequal claws: antennae with their last joint acuminated.
Sp. 1. *Hydr. picus* of authors.
Inhabits ponds and ditches.

Genus 151. HYDROPHILUS of authors.
Body with the posterior part slightly obtuse: antennae with the last joint obtuse: scutellum moderate: anterior tarsi in both sexes simple.
Sp. 1 *Hydr. caraboides* of authors. (Pl. 3. fig. 16.)
Inhabits ponds; is very common.

Fam. XXI. SPHERIDIADÆ. Leach.
Antennæ terminated by a club: maxillary palpi very long: mentum large, clypeiform: head with the front rounded, cowl shaped: feet formed for walking: tarsi with the basal joint as long or longer than the second joint (in the male with the last joint on the anterior tarsi large). The insects of this family are very nearly akin to the Hydrophilii.

Body somewhat hemispheric: eyes immersed: thorax transverse: tibiae spinose, armed with heels: sternum behind produced into a conic spine.
Sp. 1. *Sph. scarabaeoides.* Black, shining, smooth: scutellum forming a long triangle: feet very spiny: each elytron at the base with a blood-
red spot, and a livid reddish spot at the apex. (Pl. 3. fig. 12. a. antenne magnified.)

Inhabits dung.

Antenne with the club imbricated (Pl. 3. fig. 12. b. magnified): anterior tarsi in both sexes simple.

Inhabits dung.

Sp. 2. Cer. melanocephalum.
Inhabits dung and flowers.

Fam. XXII. COPRIDE. Leach.

Coprophaugi I. Latreville.

Labial palpi very hairy, the last joint smaller than the preceding: scutellum none or very obscure: elytra taken together not longer than broad: postcivior ficiet situated near the anus: antenne eight- or nine-jointed, terminated by an abrupt lamellated mass: anterior tibia large and dentated: mentum not very large: mandibles membranaceous: maxilla membranaceous: chypus semicircular.

Subdivision 1.—Labial palpi, with the last joint very distinct. Thorax much shorter than the elytra; much broader than long. Anterior tibia long, arcuate.

Scutellum none: abdomen elevated, convex: anterior tibia longer than the others; externally with three strong teeth terminated by a tarsus: antenne nine-jointed.

Inhabits dung in sandy situations and lanes, entering the earth two or three inches beneath the surface.

Subdivision 2.—Labial palpi with the last joint not distinct. Thorax longer than the elytra. Tibiae all terminated by a tarsus.


Inhabits dung; this and many others are very abundant under dung in April and May.
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Fam. XXIII. Aphodiadæ. Leach.

COPIROPHAGI II. Latreille.

Labial palpi nearly smooth, filiform, the joints nearly equal, cylin-
dric: feet all separated by equal distances; hinder ones distant from
the anus: scutellum distinct.

Genus 156. APHODIUS. Illiger, Fabr., Latr., Leach. Scarabæus
Oliv., Marsh., Linn.


Inhabits dung in the spring of the year.

This genus may be divided, for the sake of convenience, from the
clypeus.

1. Clypeus smooth, cingulate.
2. Clypeus smooth, entire.
3. Clypeus tuberculata.

Fam. XXIV. Geotrupidæ. Leach.

GEOTRUPINI. Latreille.

Antenna eleven-jointed, terminated by a lamellated club: anterior tibie
large, dentate: mentum not large: mandibles corneous, porrect: la-
brum prominent: clypeus rhomboidal.

Genus 157. GEOTRUPES. Latr., Duméril, Lam., Leach. Scar-

Antenna terminated by an oval lamellated club: thorax shorter than
the abdomen, not horned: hinder feet distant from the anus: head
not produced behind the eyes: scutellum obvious.


Inhabits Europe; boring cylindrical holes beneath the dung, and flying
about in the dusk of the evening.


Antenna terminated by an oval lamellated club: thorax shorter than
the abdomen; on each side in front with a long process which ex-
tends along the sides of the head: hinder feet distant from the anus:
head not produced behind the eyes: scutellum obvious.

Sp. 1. Typ. vulgaris. (Pl. 1. fig. 1.)


Inhabits the dung of horses on heaths, in the spring of the year.

Obs.—Scarabæus mobilicornis, Marsh., forms the genus ODONTEUS,
Köpfe.

Fam. XXV. Melolonthidæ. Leach. SCARABÆIDES. Latr.

Antenna ten-jointed (in some nine), terminated by a lamellated club:
mandibles corneous in part: clypeus triangular or quadrate: anterior
tibia large and dentate: mentum not large.
Division I.—Thorax almost quadrate, more or less transverse. Mandibles entirely corneous.

Subdivision 1.—Labrum prominent even beyond the clypeus. Maxilla inferiorly armed with a horny hook, simple or bifid. Body nearly globular or ovoid. Elytra tumid, embracing the sides of the abdomen.


Antennee distinctly longer than the head, composed of nine joints, the first of which is cylindric and a little hairy: body nearly globular: wings none.


Inhabits the sandy shores of the sea.

Genus 160. PSAMMODOUS. Gyll., Leach.

Body elongate, convex: antennee distinctly longer than the head: wings two: thorax transversely striated.


Aphonius Sulcicollis. Illig.

Inhabits sandy places. Taken at Swansea by Mr. W. S. Millard, a most assiduous and successful collector of British insects.


Antennee scarcely longer than the head, composed of ten joints, the first obconic and very hairy: body ovoid: maxille with a simple hook.


Inhabits sandy places.

Subdivision 2.—Labrum not projecting beyond the clypeus. Body not globose. Elytra not embracing the sides of the abdomen.

* Body subcylindric.


Antennee with a lamellated club not capable of being folded: the lamella very short, resembling the teeth of a saw: body cylindric: maxille coriaceus, bilobate.

Sp. 1. Sin. cylindricum. Black, shining, impressed-punctate, cicatriculose; the punctures umbilicated, the umbilici perforate. (Male with a conic-compressed horn, the female with a short horn on the head.)
Inhabits old trees, especially the ash. Is very abundant near Cheltenham and near Plymouth.

** Body ovoid-oblong.**

**Genus 163. MELOLONTHA.** Fabr., Oliv., Lam., Latr., Leach.
Elytra with their external edge not sinuated, very slightly narrower at their base than at their points: tibiae armed with very distinct heels.
Sp. 1. Mel. vulgaris. (Common Cockchafer.)
Inhabits various trees in May and June.

**Genus 164. ANOMALA.** Köppe, Leach's Mss.
Elytra with the external edge not sinuated, very slightly narrower at their base than at their points: tibia terminated by very distinct heels: antennae of both sexes nearly equal in size, with a lamellated club: body ovate or short ovate convex.
Inhabits the sandy coasts of the sea.

The following may be considered as the type of the

Elytra with their external edge sinuated: tibiae with very obscure spurs or heels.
Inhabits heaths.

**Division II.—Thorax as long as broad, nearly orbicular, or almost ovoid and truncate at their extremities.** Mandibles partly membranaceous, sometimes entirely corneous. Maxillo terminated by a membranaceous or coriaceous lobe. Labrum not prominent.

**Genus 166. TRICHIUS.** Fabr., Latr., Leach.
Antennae with the first joint very large: clypeus quadrate: palpi short, with their first joint very large: clypeus quadrate: tarsi with equal nails.
Sp. 1. Tr. fasciatus.
Inhabits Europe on umbelliferous plants, but is rare in Britain.
Sp. 2. Tr. nobilis. (Pt. 1. fig. 2. a. antennae magnified.)

**Stirps 2.—A triangular scale interposed between the posterior angles of the thorax, and the exterior of the base of the elytra.

Marille almost membranaceous, or coriaceous: mentum of a moderate size: thorax triangular, with the anterior point truncate: elytra abruptly sinuated at their internal side towards the base.


Inhabits the flowers of roses, the larvae live in decayed wood.

Fam. XXVI. Lucanide. Leach.

Lucanides. Latreille.

Antennae with a pectinated club: anterior tibiae large and dentated: palpi four: labrum generally wanting: mandibles very strong, corneous, dentated, exserted: mentum corneous.

Genus 168. LUCANUS of authors. Platycerus. Geoff.; Palpi long: lip bifid, very hairy, the lacine resembling pencils.

Sp. 1. Luc. Cervus. (Stag Beetle.) (Pl. 1. fig. 3.)

Section II. HETEROMERI.

Four anterior tarsi five-jointed, hinder pair four-jointed: antennae eleven-jointed, never lamellated or furnished with a pectinated head.

Fam. XXVII. Blapsidæ. Leach.

Mentum small, or moderately large, quadrate or orbicular: palp terminated by a thick joint; the last joint of the maxillary one secundiform.


Back flat: thorax almost quadrate: antennae with the third joint much longer than the fourth: elytra with their extremities pointed.


Inhabits dark cellars and damp places.

Fam. XXVIII. Tenebrionide. Leach.

Mandibles bifid at their extremities: head more or less triangular, without a contraction behind, at its junction with the thorax: tarsi with entire joints: antennæ moniliform, not perfoliated or serrated: maxilla unguiculated.


Body oval: maxillary palpi terminated by a thick joint: antennæ filiform; the last joint globose or turbinated.


Inhabits sandy places: is very abundant on the sea shore near Swansea, South Wales.

Body oval: maxillary palpi with their last joint obtrigone: antennae gradually thicker towards their extremities: the last joints transverse, compressed.

Sp. 1. Opat. sabulosum. (Pl. 2, fig. 3. a. antenna magnified.)


Inhabits sandy places.


Thorax behind as broad as the elytra: body elongate: antennae scarcely gradually thicker towards their extremities: the eighth, ninth, and tenth joints transverse: the last subglobose: mentum somewhat quadrate: the upper margin rounded: maxillary palpi with their last joint thick.

Sp. 1. Ten. Molitor. (Pl. 4, fig. 1.)

Inhabits houses; the larvä in meal and flour; and is well known under the name of meal-worm.

Fam. XXIX. Diaperidae. Leach.

Mandibles bifid at their extremities: head more or less triangular, without a contraction behind, at its juncture with the thorax: tarsi with entire joints: antennae not moniliform, their extremities perforated or serrated.

Stirps 1.—Body linear, or nearly so. Thorax almost quadrate. Antennae terminated by a club. Maxillae unguiculated.


Antennae with the last six joints forming a thick, fusiform, downy mass.

Sp. 1. Sar. muticum. (Pl. 2, fig. 16. a. antenna magnified.)


Inhabits sandy places. In Britain it is rare, or at least very local. It has been found in gravel-pits near Norwich by Mr. Joseph Hooker, and near Hampstead by Mr. Stephens, in the months of June and July.

Stirps. 2.—Antennae not moniliform. Body oval, or nearly orbicular: a little longer than broad.

a. Antennae not serrated at their extremities.


Anterior tibiae elongate-trigonate: tarsi short: antennae gradually thickening towards their extremities, where they are perforated: body oval.
Sp. 1. Phal. cadaverina.
Tenebrio cadaverina. Fabr.
Inhabits sandy places.

Antenna gradually enlarging towards their extremities, from the fourth joint perfoliated: body nearly hemispheric, very convex above.
Sp. 1. Dia. Boleti of authors.
Chrysomela Boleti. Linn., Marsh.
Inhabits the boleti of trees: is rare.

Genus 176. TETRATOMA. Herbst, Fabr., Payk., Leach.
Antenna terminated by a club of four joints, the other joints very small: body oval: tibia not spiny.
Inhabits fungi.

Antenna abruptly terminated by a five-jointed club, the eighth joint (the second of the club) very small: thorax almost hemispheric: tibia spinose.
Sp. 1. Lei. picea.
Inhabits sandy places in Europe.

b. Antenna terminated by joints, resembling in their form the teeth of a saw.

Palpi filiform; maxillary ones with their last joint almost cylindric: antenna arcuate: body oval, convex, generally rough: thorax transverse, emarginate before; the sides often with acute margins.
Inhabits boleti and other fungi.

Stirps 3.—Antenna nearly or quite filiform, with their extremities simple.

a. Mandibles with their extremities bifid.

Maxillary palpi terminated by a securiform joint: antenna as long or longer than the thorax: thorax quadrate or semicircular: body convex.
Sp. Hick lanipes.
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Inhabits Europe under the bark of trees.

b. Mandibles with their points entire. Tarsi with denticulated nails.


Body ovate: *antennae* serrated: *feet* rather long.


Cistela ceramboides. *Fabr., Latr., Oliv., Leach.*

Sp. 2. *Cist. sulphurea.* (Pl. 4. fig. 6.)


Fam. XXX. MELYANDRYADE. *Leach.*

Mandibles bifid at their extremities: head more or less triangular, without a contraction behind, at its juncture with the thorax: *four anterior tarsi* with the last joint but one bilobate: *maxillary palpi* with the last joint large, securiform, or obtrigonate.

Stirps 1.—Hinder tarsi with entire joints.

Genus 181. SERROPALPUS. *Oliv., Payk., Illig., Latr., Leach.*

**DIRCA.** *Fabr.*

*Antennae* filiform: body almost cylindrical, and very long.

An insect of this genus has lately been taken in this country, and was first discovered in Windsor Forest. In July 1817, being in Hampshire in company with my friend Mr. John Chant, we took four specimens from a rotten oak near Lyndhurst.

Genus 182. ORCHESIA. *Latr.* **DIRCA.** *Fabr., Leach.*


Hinder feet formed for leaping: *antennae* clavate: body elliptic.


Inhabits boleti.

Stirps 2.—Tarsi altogether with their last joint but one bilobate.

Genus 183. MELANDRYA. *Fabr., Latr., Leach.* Chrysomela.

**Linn. SERROPALPUS.** *Illig., Bosc.*

*Antennae* simple, filiform: *maxillary palpi* terminated by an elongate securiform joint: body nearly elliptic: thorax trapezoidal, broad behind.


Inhabits rotten trees.

Antenna simple, growing insensibly thicker towards their extremity: marialary palpi double the size of the labial, with the last joint large, securiform; labial palpi with the last joint ovate: body elongated (generally villose).


Inhabits the white-thorn in May and June.

Fam. XXXI. Pyrochroidae. Leach.

PYROCHOIDES. Latreille.

Head cordiform, abruptly strangulated at its junction with the thorax: tarsi with their penultimate joints all bilobate: body elongated, depressed, or convex and cylindric: thorax almost cordate.

Stirps 1.—Antennae pectinated, serrated, or branched.


Antenna pectinated or serrated: thorax orbicular.

The prevailing colour in this genus is red and black.


Inhabits white-thorn hedges in May and June.

Sp. 2. Pyr. coccinea. (Pl. 3. fig. 3.)

Inhabits the woods of Kent.

Stirps 2.—Antennae simple.

Genus 186. SCRAPTIA. Latr., Leach.

Labial palpi terminated by a semilunar, or large triangular joint: thorax almost semicircular.


Scraptia fuscus. Latr., Leach.

Inhabits boleti.


Labial palpi terminated by a small truncate joint: thorax almost cordiform, produced into a porrected horn in front: antenna simple.


Inhabits sandy situations; and has been taken in profusion on the sandy sea shores of Swansea.


Labial palpi terminated by a small truncate joint: thorax almost cordiform, not anteriorly produced.
Lyttta fusca. *Marsh.*
Inhabits dung in the neighbourhood of stables.

Fam. XXXII. MORDELLAE. *Leach.*

**MORDELLANE. Latreille.**
*Head* cordiform, abruptly strangulated at its junction with the thorax: *hinder tarsi* (sometimes the others) with their penultimate joint entire: *body* elevated, arcuate, laterally compressed, and terminated by a point: *head* very large; *elytra* very short, or very narrow and pointed behind: *hinder feet* large: *tibiae* with spurs.

*Tarsi* with all the joints simple: *palpi* almost filiform: *antennae* pectinated or flabellate: *scutellum* none, or concealed.

Inhabits Europe. In Britain it is extremely rare. The larvae inhabit the nests of *Vespa Crabro* (the hornet). *Mordella paradoxa* of Marsham, which is distinct from the Linnean species, has been found in the nest of a wasp.

*Tarsi* with all their joints simple: *maxillary palpi* terminated by a securiform joint: *antennae* simple, or very slightly serrated: *scutellum* distinct.

Inhabits the blossoms of the crab-tree, white-thorn, &c.

Sp. 2. *Mord. fasciata. (Pl. 4, fig. 3.)*

*Penultimate joint* of the four anterior *tarsi* bilobate: *maxillary palpi* with the last joint securiform: *scutellum* none.

Sp. 1. *Anas. frontalis.*
Inhabits flowers, especially those of the umbellate plants.

Fam. XXXIII. CANTHARIDE. *Leach.*

**CANTHARIDE. Latreille.**
*Head* large, cordiform: *neck* distinct: *mandibles* not notched at their points: *thorax* almost quadrate, or cordiform: *elytra* flexible: *tarsi* generally with entire joints.
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Stirps 1.—Antenna of equal thickness, tapering towards their points, or subclavate, longer than the thorax, composed of globular or obconic joints: elytra covering only a part of the abdomen; short, oval, diverging at the suture: wings none: tarsi with all their joints entire.

Genus 192. MELOE of authors.
Abdomen very large, generally soft: antenna various.

Obs.—Dr. Leach has written an excellent monograph on this genus, which will be found in the eleventh volume of the Transactions of the Linnaean Society, and is illustrated by highly finished figures of the species by that celebrated artist and excellent naturalist Mr. Sowerby. An enumeration of the species and habitats will be found in the calendar.

Stirps 2.—Antenna composed of cylindric or obconic joints, longer than the thorax.

Elytra soft, elongate, linear, with the sides somewhat inflexed, the back convex, rounded: maxillae with two membranaceous laciniae, the external one acute within, subuncinate: antenna with the first joint larger than the others; the second very short, transverse; the rest obconic, the last ovoid.

Sp. 1. Canth. vesicatoria, (Spanish fly,) (Pl. 4. fig. 5.)


Inhabits Europe: is found on the ash, but is rare in England: it is the common blister-fly of the shops.

Fam. XXXIV. ÕDEMIRADÆ. Leach.

ŒDEMERITES. Latreille.

Antenna filiform or setaceous: rostrum not very flat, and dilated at its extremity: head produced into a kind of rostrum.


Antenna inserted at the anterior internal margin of the eyes: rostrum not elongate: eyes prominent: elytra tubulate: palpi with the last joint broader than the penultimate joint.

Sp. 1. Õdem. caerulea.


Inhabits Europe on the flowers of umbelliferous plants.

Genus 195. MYCTERUS. Clairv., Oliv., Leach. RHINOMACER. Fabr., Latr. MYLABRIS. Schaffer.

Antenna inserted before the eyes on the rostrum: rostrum elongate,
narrow: eyes globose, prominent: clytra hard: palpi with the last joint compressed.
Mycerus curculionides. Leach.
Inhabits Europe: has been taken in South Devon by the late Mr. John Cranch, of Kingsbridge, zoologist in the late unfortunate expedition to the Congo. For a most interesting biographical account of this indefatigable naturalist, see Capt. Tuckey's Narrative, and Journal of Arts, No. IX.

Fam. XXXV. Salpingideæ. Leach.
Antennæ thicker at their extremities: rostrum very flat, and dilated at its extremity: head produced into a rostrum.
Antennæ inserted before the eyes: clytra rigid.
Inhabits Europe under the bark of trees.

Section III. TETRAMERA.

Tarsi with four joints.
Division I.—Head anteriorly rostrated; the mouth at the apex of the rostrum.

Fam. XXXVI. Bruchideæ. Leach.
Bruchideæ. Latreille.

Palpi obvious, filiform, not very minute: rostrum broad: labrum exserted: antennæ eleven-jointed, subclavate, with the club formed of distinct joints, in some: filiform, or gradually thicker towards their points, in others; serrated or pectinated.

Antennæ clavate, the club elongate: eyes not emarginate: clytra covering the anus above: body ovate, oblong: abdomen somewhat elongate-quadrate.
Inhabits boleti in woods: is rare in Britain.
Genus 198. ANTHRIBUS. Paykull, Fabr., Latr., Geoff., Leach. 
Macrocephalus. Oliv.


Macrocephalus scabrosus. Olivier.

Inhabits the elm and horse-chestnut.


Payk., Latr., Leach.

Antennae clavate: eyes not emarginate: elytra covering the anus above; abdomen elongate, narrow: thorax roundish, nearly equally broad: rostrum at the base much narrower than the head, the longitudinal diameter many times exceeding the breadth: tarsi with the second joint not including the third.


Inhabits pine-trees.


Antennae nearly filiform: eyes emarginate for the insertion of the antennae: body short, oval, thick: elytra not covering the anus above.


Inhabits the south of Europe and the north of America. The larva is frequently found in peas.

Fam. XXXVII. CURCULIONIDÆ. Leach.

CURCULIONITES. Latreille.

Palpi very small, conic-subulate, scarcely discernible: rostrum rounded, thick, often proboscis-shaped: labrum none: antennae with distinct joints, the eighth or ninth generally clavate, the club regular, the joints coriaceous: head from the eyes more or less narrowed, distinctly produced into a rostrum: mandibles small or minute: mentum not cylindric-cordate: body rarely cylindric: anterior tibiae never triangular.

A. Antennae straight, not geniculated at the second joint. Body of all, from the base of the thorax, narrower, not cylindric.

Genus 201. ATTELABUS. Linn., Fabr., Oliv., Latr., Leach. 
Curculio. De Geer.

Head behind simply elongate, produced with no neck: tibiae with one
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hook at their joints: body ovate: abdomen quadrate, rounded behind: labium corneous, quadrate; the middle of the upper margin emarginate, obtusely unidentate.


Inhabits the nut-tree and willow.


Head with a distinct neck: tibia with one hook at their joints: body ovate: abdomen quadrate, rounded behind: labium corneous, quadrate, the middle of the upper margin emarginate, obtusely unidentate.


Inhabits the nut-tree, and is very common.


Head elongate behind the eyes, with no neck: clypeus dentate: tibia with very short heels: abdomen quadrate, rounded behind: body ovate, narrowly produced before: thorax conic-cylindric, broader behind (often with a spine on each side in the male): labium membranaceous, small, the apex rounded, villose, entire.


Inhabits Europe, and is found in England on the nut- and plum-tree, but is very rare.

Genus 204. DEPORAUS. Leach's MSS.

Head elongate, with no neck: clypeus subdentate: tibia with short heels: abdomen quadrate-rounded behind: hinder thighs thick and formed for leaping.


*Rhynchites Betulae*. Herbst.

Inhabits the oak, birch, and hazel.


The Rev. William Kirby has given an admirable paper to the *Linnean Society of London*, in which upwards of sixty species of this genus are described, in the ninth volume of their *Transactions*. He has added a supplement which is published in the tenth volume.
The whole of the insects of this genus are very small; they are in general found at the roots of grass, on the blossoms of clover, &c. and in sand-pits: in the months of April, May and June, they may be taken in profusion.

B. Antennae geniculated, the basal joint very much elongated, generally received in a lateral oblique groove, (at the base at least,) or the sides of the rostrum. (Antenna in all clavate, the club generally composed of firmly connected joints, the last acute. Tarsi with the last joint but one bifid, or emarginate above, cordate.)

a. Antenna inserted beyond the base of the rostrum, larger than the head; the club distinctly many-jointed, ovate. Mandibles generally obtuse. Tibiae at the apex ciliated with spines, in a few terminated by a strong hook. Body ovate or elliptic. Colours various.

Genus 206. CURCULIO of authors. Brachyrinus. Latr.

Body ovate, convex, narrower before; thorax round or conic-cylindric, narrower than the base of the elytra: scutellum extremely minute: abdomen ovate-conic, subovate, or globose: lip minute: antenna eleven-jointed: hinder feet not formed for leaping.


Inhabits Europe, and is very abundant in this country on the oak in May and June.


Body elongate-ovate: rostrum as broad as the head: lip small, entire, transverse-quadrate, corneous, narrower than the mentum.


Lixus paraplecticus. Leach.

Inhabits the *Phellandrium aquaticum*.

Genus 203. RHYNCHÆNUS. Fabr., Oliv., Leach. CURCULIO. Linn., Geoff., Lam., Latr.

Body oblong-ovate, twice as long as broad; antenna eleven-jointed, the club distinct: wings perfect: rostrum moderate.


Inhabits the *Pinus sylvestris*.

Genus 209. BALANINUS. Germar.

Body oblong, twice as long as broad; antenna twelve-jointed; wings perfect: rostrum very long and very slender.
Inhabits the nut-tree: the larva living on the kernel of the fruit is called the nut-maggot.


*Body* oblong-ovate, twice as long as broad: *antennae* with the club three-jointed beginning at the ninth joint, or four-jointed beginning at the eighth joint: *wings* none.

Inhabits Europe: is rare in Britain, but has been taken near Dover and Hastings.


*Body* round-oval, half as long again as broad: *abdomen* short, triangular-quadrate: *anus* naked: *rostrum* applied to the breast: *coleoptera* subquadrate, the diameters nearly equal: *hinder feet* not formed for leaping: *mentum* corneous, sub-obtigionate.

Inhabits


*Body* quadrate-ovate, thick, a little longer than broad: *abdomen* large, subquadrate, a little narrower and rounded behind: *anus* not naked: *rostrum* applied to the breast: *coleoptera* convex, as broad as long, inflexed behind: *hinder feet* not formed for leaping.

Inhabits the water betony.


*Body* ovate: *abdomen* elongate-quadrate, rounded behind: *elytra* inflexed behind, covering, or at least touching the *anus*: *hinder feet* formed for leaping.

Inhabits the alder.
b. Antennae inserted at the base of the rostrum. Tarsi inflected to the internal side of the tibia.

Body elliptic-oval, flat above; eyes immersed, oblong, encircling the head beneath; rostrum thickened at the insertion of the antennae; elytra plain, not covering the anus above; anus acutely prominent; feet strong.  
Inhabits

Body very much lengthened, sublinear or subcylindric, narrow before; elytra covering the anus above; tibia terminated by a hook internally; back flat, depressed.  
Inhabits trunks of trees in Windsor Forest.

Obs.—In addition to the above in Germar’s and Zincker Sommer’s Magazin der Entomologie, vol. iii. for 1817, notice is given of the following genera as lately established, (the species mentioned may be considered the types).

Genus Magdalis. Germar.  

Genus Bagous. Germar.  

Genus Sitona. Germar.  

Genus Curculio.  

Genus Gryphus. Germar.  

Genus Lepyrus. Germar.  

Genus Pachygaster. Germar.  
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Genus Hypera. Cermar.

Genus Thylacites. Cermar.

Division II.—Head not gradually prolonged into a rostrum. Tarsi not spongy beneath. Antennae forming a solid mass, shorter or not much longer than the head.

Fam. XXXVIII. Bostricidæ. Leach.

Bostricini. Latreille.

Body cylindric or globose: head globose: tibia compressed, the anterior ones dentated: antennæ eight- or ten-jointed; the first joint elongate, the two or three last joints forming a large mass: pulpi very small, generally conic, rarely filiform.

Stirps 1.—Club of the antennæ commencing before the ninth joint.


Tarsi with the penultimate joint bifid: antennæ with the club commencing at the eighth joint, very little or not at all compressed.


Inhabits this country, perforating the bark of the pine.


Tarsi with entire short joints: antennæ with the club much compressed, beginning at the seventh joint, distinctly annulated: body not linear.


Inhabits Europe, under the bark of trees, which it gnaws into various labyrinth-like passages.


Tarsi with entire long joints: antennæ with the club much compressed, commencing at the sixth joint: annulations not or but slightly distinct: body linear.
Sp. 1. Pla. cylindricus?
Scolytus cylindricus. Oliv.  
Discovered to be a native of Britain by Mr. D. Bydder, who took it in the New Forest of Hampshire from beneath the bark of trees.

Stirps 2.—*Antenna* with the club beginning at the ninth joint.

Tarsi with the last joint but one bifid: *antenna* with the club compressed, obovoid, the apex rounded.  
Inhabits beneath the bark of the elm.

Genus 220. HYLESINUS. Fabr., Latr., Leach.  
Tarsi with their penultimate joint bifid: *antenna* with the club little or not compressed, ovoid, the extremity pointed.  
Inhabits Europe, under the bark of trees.

Fam. XXXIX. CISIDÆ. Leach.  
*Body* ovoid or oblong; in some depressed, in others linear: *palpi* filiform or bent at their extremities: *antenna* ten-jointed, increasing towards their extremities or terminated by a perfoliated mass.

Stirps 1.—*Antenna* with the club three-jointed, perfoliated.

Genus 221. CIS. Latr., Leach.  
Antenna twice as long as the head: *body* oval, depressed.  
Sp. 1. *Cis Boleti*.  
Inhabits the Boletus versicolor.

Stirps 2.—*Antenna* with a nearly globose two-jointed club.

Genus 222. CERYLON. Latr., Leach.  
*Body* elongate: *thorax* quadrate, with the hinder margin straight, contiguous with the elytra: *abdomen* not pedunculated.  
Sp. 1. *Cer. histeroides*.  
Inhabits Europe, beneath the bark of trees.
Genus 223. MONOTOMA. Herbst, Leach. CERYTON. Latr.

Body elongate, linear; thorax quadrate, with the hinder margin distant from the base of the elytra; abdomen somewhat pedunculated.


Fam. XI. MYCETOPHAGIDÆ. Leach.

Body ovoid or oblong; in some depressed, in others linear; palpi filiform or bent at their extremities; antenna eleven-jointed; mandibles little or not at all prominent.

Stirps 1.—Antenne gradually thickening towards their extremities. Tarsi with the first joint longer than the following one.


Body oval; antenna with the last joint elongate, ovate; maxillary palpi prominent.


Stirps 2.—Antenne gradually thickening towards their extremities, or with a three-jointed club.

a. Tarsi with the first joint longer than the second. Palpi very short, the maxillary ones but little or not at all prominent. Antenne as long as the thorax or less.


Antenne with the second joint larger than the third.

Sp. 1. Lat. porcatus.


**Antennae** with the second and following joints to the eighth joint nearly equal.

* Sp. 1. Sil. frumentarius.


Silvanus frumentarius. Latr., Leach.

Inhabits damp cellars in old wood and paper.

Stirps 3.—**Antennæ** eleven-jointed. *Mandibles* prominent or exserted.

* Mandibles small. *Body long and linear.*

Genus 227. LYCTUS. Fabr., Payrk., Leach.

**Antennæ** with a two-jointed club; *thorax* long and linear.

* Sp. 1. Lyc. oblongus.

Lyctus oblongus. Latr., Leach. Lyctus canaliculatus. Fabr. Ips ob-


Inhabits old wood.

**Mandibles large. *Body elongate, much depressed, nearly equally broad.*

Genus 228. TROGOSITA. Fabr., Oliv., Illig., Latr., Lam., Leach.

**Thorax** almost quadrate, separated from the abdomen by a remarkable interval; *antennæ* moniliform, shorter than the thorax, compressed towards the apex; *labrum* exserted, coriaceous, small, hairy in front.

* Sp. 1. Tro. mauritanica.

Tenebrio mauritanicus. Rossi, Marsh. Trogosita caraboides. Fabr.,


Inhabits Europe, under stones on the banks of rivers.

Fam. XLI. PRYONIDÆ. Leach.

**Lip** much widened at its extremity, cordiform; *body* elongate; *antennæ* long, generally inserted in a notch in the eyes; *labrum* very small or almost none.

Genus 229. PRIONUS. Geoff., Fabr., Oliv., Latr., Leach.

**Thorax** with the sides gently sloping, dentated; *antennæ* serrated, a little shorter than the body; of the male twelve, of the female eleven-jointed.

* Sp. 1. Pri. coriarius.

Cerambyx coriarius. Linn., Marsh. Prionus coriarius. Latr., Fabr.,

Oliv., Leach.

Inhabits old trees; flies in the evening.
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Fam. XLII. Cerambycidae. Leach.

Cerambycini II. Latr.

Lip much widened at its extremity, cordiform: body elongate: labrum very apparent: antennae inserted in a notch in the eyes.

Subdivision 1.—Head vertical. Palpi almost filiform.

Genus 230. LAMIA. Latr., Fabr., Leach.

Antennae ten-jointed, longer than the body.

This genus is divided into sections.

A. Body depressed.

Sp. 1. Lam. ædilis.


Inhabits the trunks of trees, but is very rare in Britain.

B. Body not depressed.

Sp. 2. Lam. nebulosa.


Inhabits dried faggots in woods, hurdles, &c.

Sp. 3. Lam. Textor. (Pl. 2. fig. 24.)


Inhabits the wood of willow-trees in Hampshire and near Bristol.

C. Body linear. Thorax not spined at the sides.

Sp. 1. Lam. oculata.


Inhabits the trunks of trees, but is very rare in England.

Genus 231. SAPERDA. Leach.

Antennae eleven-jointed, longer than the body: body linear: thorax without spines.


Inhabits the trunks of trees, but is very rare. Dr. Leach suspects this species to be Saperda Cardui Fabr.

Subdivision 2.—Head mutant. Palpi with the last joint thicker than the others.

Genus 232. CERAMBYX. Linn., Fabr., &c.

Antennae longer than the body: palpi with the last joint obconic, compressed: thorax with a spine on each side.


Inhabits willows in Europe, emitting, whilst alive, a fine smell of musk.


Labial palpi with the last joint obtrigolute: thorax without spines, globose: antennæ shorter than the body: hinder thighs clavate.
Sp. 1. *Cly. Arietis.* (Pl. 2, fig. 25.)
Inhabits trunks of trees in sunny weather.

**Genus 234. CALLIDIUM. Fabr., Latr., Leach. Cerambyx. Linn., Marsh.**
Labial palpi with the last joint obtrigonate: thorax orbicular, depressed or but little convex: antennæ setaceous, as long as the body: hinder thighs abruptly clavate.
Inhabits Europe. In Britain it is generally found on palings. I lately bred a specimen from a larva found in a Norway deal, and I am informed by an intelligent carpenter from whom I received the larva, that he has frequently met with them in new wood. Mr. Kirby has given an interesting history of this species in the *Transactions of the Linnean Society,* vol. v.

**Genus 235. MOLORCIIUS. Fabr.**
Elytra abbreviated.
Inhabits flowers and hedges.

**Fam. XLIII. LEPTURADÆ. Leach.**
Lip much widened at its extremity, cordiform: body elongate: labrum very apparent: antennæ inserted between the eyes.

**Genus 236. LEPTURA of authors.**
Thorax not spined on each side.
Inhabits various flowers in hedges, and is pretty common.
Sp. 2. *Lep. quadrijunciata.* (Pl. 2, fig. 26.)
Inhabits umbelliferous plants; is rather scarce.

**Genus 237. RHAGIUM. Fabr., Leach. LEPTURA. Linn., Latr., Marsh.**
Thorax with a spine on each side: antennæ setaceous.
Inhabits umbelliferous plants in woods, and may be found in decayed stumps of trees in the winter months.

**Genus 238. HARGIUM. Leach's MSS.**
Thorax with a spine on each side: antennæ thickest in their middle
Inhabits England, but is very rare.

**Fam. XLIV. Criocerid.æ. Leach.**

*Lip* not cordiform: *maxillæ* with their external division not resembling a two-jointed palpus: *body* elongate: *thorax* cylindric or quadrate: *mandibles* bifid or notched at their extremities.

Genus 239. DONACIA. *Fabr., Payk., Hoppe, Oliv., Latr., Leach.*

*Leptura. Linn., Marsh.*

*Antenna* with elongate-cylindric joints, those of the base obconic: *eyes* not notched: *abdomen* elongate, triangular: *hinder thighs* thick.

*Hinder thighs dentated.*


Inhabits aquatic plants.

**Hinder thighs simple.**

Sp. 2. *Don. simplex.*

Leptura simplex. *Marsh.*
Inhabits aquatic plants.

Obs.—Donacia Zosteri *Fabr.*, and Equiseti, both of which have lately been taken in Britain, constitute the genus *Macrolea* of Hoffmansegg.

Genus 240. CRIOCERIS. *Geoff., Oliv., Lam., Leach.*

*Antenna* moniliform, with the exception of the basal joints which are globose: *eyes* notched: *neck* distinct: *abdomen* quadrate.

Sp. 1. *Cri. merdigera. (Pl. 2. fig. 14.)*

Inhabits the white lily.

**Fam. XLV. Chrysomelid.æ. Leach.**

CHRYSomELiXE. *Latreille.*

*Lip* not cordiform: *maxillæ* with their external division resembling a biarticulate palpus: *body* more or less ovoid or oval: *thorax* transverse, or not longer than broad.

**Stirps 1.—Pulpi** very small: *antennæ* inserted near each other between the eyes, at a distance from the mouth: *body* shield-shaped: *thorax* semicircular.

Genus 241. CASSIDA of authors.

*Antenna* thicker towards their extremities, their base concealed by the *thorax*: *body* nearly orbiculate.


Inhabits the Mentha sylvestris.
Stirps 2.—*Maxillary palpi* very apparent: *antenna* inserted very near to each other, between the eyes, towards the middle of the face.

Division I.—*Feet not formed for leaping.*

**Genus 242. GALERUCA. Geoff., Latr., Fabr., Oliv., Leach.**

*Palpi* with the two last joints very slightly different in size, the last conic: *antenna* shorter than the body, the joints obconic; the second joint half the length of the third.

Sp. 1. *Gal. Tanaceti.* (Pl. 2, fig. 13.)  
Chrysomela Tanaceti. Marsh.  
Galeruca Tanaceti. Latr., Fabr.

Inhabits chalk-pits.

**Genus 243. ADIMONIA. Schrank, Leach.**

*Palpi* with the two last joints not very different in size, the last joint conic: *antenna* shorter than the body, the joint obconic, with the second and third joints shorter than the fourth joint.

Sp. 1. *Ad. nigricornis.*  
Crioceris nigricornis. Fabr.  
Galeruca nigricornis. Latr.  
Chrysomela halcenis. Marsh.  
Adimonia nigricornis. Leach.

Inhabits hedges.

**Genus 244. LUPERUS. Geoff., Oliv., Latr., Leach.**

*Palpi* with the two last joints nearly equal in size, the last conic: *antenna* as long as the body, the joints cylindric, elongate.

Lupenus flavipes. Latr., Leach.  
Crioceris flavipes. Fabr.

Inhabits bushes in damp woods.

Division II.—*Hinder feet formed for leaping, the thighs being incrassated.*


*Antenna* with the second joint generally a little shorter than the first.

*Body ovate.*

Altica oleracea. Latr., Panz.  
Chrysomela oleracea. Marsh.  
Haltica oleracea. Leach.

Inhabits sand-pits, and nettles in hedges.

*Body nearly orbiculate.*

Sp. 2. *Hal. testacea.*  
Chrysomela testacea. Marsh.  
Haltica testacea. Leach.

Inhabits sand-pits, and nettles in hedges.

Stirps 3.—*Maxillary palpi* very apparent: *antenna* inserted before the eyes, gradually thickening towards their points: *head mutant,* forming an obtuse angle with the thorax.
Division I.—Mandibles short, obtuse, truncated or terminated by a very short point: antenna with the four last joints globose or turbinated.

Subdivision 1.—Antenna with the last four joints turbinated. Body hemispheric or oval. Thorax transverse.

Genus 246. CHRY SOMELA. Latr., Fabr., &c.

Palpi terminated by two joints of nearly an equal length, the last almost ovoid truncate or nearly cylindric: sternum not produced.

* Thorax with the sides incrassated, as if margined: body ovate quadrato.

Inhabits nettles in lanes.

** Thorax with the sides not incrassated. Body ovate quadrato.

Chrysomela Litura. Fabr., Latr., Marsh., Leach.
Inhabits the broom.

*** Body elongate-ovate quadrato.

Sp. 3. Chry. marginella.
Chrysomela marginella. Fabr., Latr., Marsh., Leach.
Inhabits plants growing by the side of ditches.

Obs.—Chrysomela tenebricosa Linn. forms the Genus Timarcha (of Hoppe)?

Subdivision 2.—Antenna with the four last joints semi-globose, almost forming a club. Body elongate-quadrato. Thorax as long as broad.

Genus 247. HELODES. Payk., Fabr., Oliv., Leach.

Palpi short, thicker at their middle, the last joint short-obconic.

Inhabits flowers in meadows.

Stirps 4.—Maxillary palpi very apparent: antenna inserted before the eyes: head vertical: palpi with the last joint conic-cylindric: body short-cylindric.


Antenna simple, filiform, about the length of the body.


Inhabits the flowers of the dandelion.
Genus 249. CLYTHRA. Laicharting, Fabr., Oliv., Latr., Leach. 
Antennae short, serrated, exserted: palpi alike.

Inhabits the oak, but is very local.

Fam. XLVI. EROTYLIDÆ. 
Antennæ moniliform below, terminated by an ovoid club: thorax elevated at the middle; tibia elongate-triangular.

Stirps. 1.—Palpi all terminated by large semilunar or securiform joints.

Genus 250. TRITOMA. Fabr., Oliv., Latr., Leach. 
Body short-ovate, the back elevated in the middle: thorax with the middle of the hinder margin dilated into an angle.

Sp. 1. Trit. bipustulatum. (Pl. 2. fig. 9.) 
Tritoma bipustulatum. Fabr., Payk., Latr., Leach. 
Inhabits boleti.

Body oval.

Inhabits dead trees and fungi.

Stirps 2.—Maxillary palpi filiform, or thicker towards their extremities,

* Tarsi with the penultimate joint bilobate. Body hemispheric, but not contractile into a ball.

Genus 252. PHALACRUS. Latr., Payk., Leach. 
Antennae with a three-jointed club.

Anisotoma bicolor. Illig., Fabr. 
Inhabits various flowers.

** Tarsi with the joints entire. Body nearly globose, contractile into a ball.

Genus 253. AGATHIDIIUM. Illig., Latr., Leach. 
Antennæ with a three-jointed club.

Inhabits sand-pits.

Section IV. TRIMERA.

Tarsi all three-jointed.

Fam. XLVII. COCCINELLIDÆ. Leach.

Antenne shorter than the thorax: maxillary palpi terminated by a large secundiform joint: body hemispheric: thorax transverse, the hinder margin arcuated.

Genus 254. COCCINELLA of authors.
Thorax (even behind) narrower than the elytra: body hemispheric, approaching to ovate.
Coccinella septempunctata of authors.
Inhabits Europe.

Genus 255. CHILLOCORUS. Leach.
Thorax lunate, without hinder angles: body entirely marginated.
Inhabits white-thorn hedges.

Fam. XLVIII. ENDOMYCHIDÆ. Leach.

Antenne longer than the thorax: maxillary palpi not terminated by a large joint: body more or less ovoid: thorax almost quadrate.

Genus 256. ENDOMYCHUS. Payk., Fabr., Leach.
Antenne with the greater portion of their joints very short, nearly cylindric; the ninth joint longer than the one before it, the last with the apex truncate or obtuse: palpi with their extremities thicker: thighs not abruptly clavate: body ovate: thorax short, with the base gradually enlarging from the apex, not narrowed behind: mandibles with their points distinctly bifid or bidentate.
Inhabits beneath the bark of the stumps of trees: this is a very local insect. In Coombe Wood, Surrey, they occurred for a year or two in profusion in the months of May and June. The larvae resemble the female glow-worm, but are not more than a quarter of an inch in length, and are found beneath the bark of trees, particularly those in moist places.
Genus 257. LYCOPERDINA. Latr., Leach.
Antenna moniliform, gradually thickening towards their extremities, the ninth joint scarcely longer than the one before it: maxillary palpiliform; labial palp with the last joint large, almost ovoid; tarsi abruptly clavate: body elongate-oval: thorax with the anterior angles a little dilated, narrowed behind: mandibles with their points very acute, undivided.
Inhabits the Lycoperdium or puff-ball.

Order IV. DERMAPTERA. De Geer, Leach, Kirby.

Order Coleoptera. Linné, Marsham.
Order Orthoptera. Latreille, Lamarck.

Characters of the Order.
Elytra somewhat crustaceous and abbreviated, of a square form; the suture straight: wings membranaceous, externally coriaceous, large, folded transversely and longitudinally: anus armed with forceps, which is hornv and moveable: body linear depressed: antenna inserted before the eyes, composed of from twelve to thirty joints; the first articulation largest, the second very small, the others short, obconic or nearly globose: mandibles with their points bidentate: palpi filiform, terminated with a very obscure tuberculiform little body or spine: tarsi three-jointed, villose beneath: eyes triangular-orbicular, and but little prominent.

Obs.—The genera are founded on the number of joints in the antennae.

Genus 258. FORIFICULA of authors.
Antenna composed of fourteen joints.
Sp. 1. For. auricularia. Forceps at the base internally denticulated, and a little beneath with a tooth on each side: elytra yellowish-brown, with the disk darker.
Forficula auricularia of authors.
Inhabits Europe. Mr. Marsham has considered the sexes of this insect as two species, under the names auricularia and neglecta.

Genus 259. LABIA. Leach.
Antenna twelve-jointed.
Sp. 1. Lab. minor. Forceps denticulated within. (Pl. 4. fig. 16.)
Forficula minor. Fabr., Panzer, Leach.
Inhabits dung-hills, under clods of earth, stones, &c. The forceps of
the male are somewhat larger than that of the female, which charac-
ter Mr. Marsham has considered as specific.

Genus 260. LABIDURA. Leach.

Antennæ with about thirty joints.

Porcella gigantea. Fabr.
Inhabits Europe. It was discovered to inhabit Britain by the Rev. Wil-
liam Bingley, who observed them on the sea-coast under stones near
Christchurch, Hampshire, where they occurred in great abundance.

Order V. ORTHOPTERA. Leach.

Class Ulonata. Fabr.
Order Hemiptera. Linne.

Characters of the Order.

Elytra coriaceous, the internal margin of one overlapping the same
margin of the other; wings membranaceous, the anterior margin co-
riaceous, longitudinally folded; palpis short; body elongate, narrow:
tarsi with three or four very rarely with five joints.

Fam. I. Achetide. Leach.

Gryllides. Latreille.

Elytra horizontal; wings longitudinally folded, often produced beyond
the elytra; tarsi three-jointed; hinder feet formed for jumping.

Stirps 1.—Antennæ not longer than the thorax; anterior feet com-
pressed, formed for digging; oviparous not exserted.

Genus 261. GRYLLOTALPA. Ray, Latr., Leach.

Antennæ setaceous, composed of a vast number of joints (beyond sixty): an-
terior tibiae and tarsi formed for digging; two first joints of the
tarsi very large, dentiform: hinder feet little formed for jumping.

Sp. 1. Gryl. vulgaris. Above fuscous, ferruginous yellowish beneath:
anterior tibiae quadridentate; wings twice the length of the elytra.

Gryllus Gryllotalpa. Linn. Acheta Gryllotalpa. Fabr. Gryllotalpa vul-
garis. Latr., Leach.

Inhabits Europe in gardens and cultivated places, especially the sides
of ponds and banks of streams: they burrow and work underground
like the mole, raising a ridge as they proceed, but seldom throw up
hillocks. They sometimes destroy whole beds of cabbages, young
legumes and flowers. At night they come abroad and make long
excursions. In fine weather, about the middle of April, and at the
close of day, they begin to utter a low, dull, jarring note, continued
for a long time without interruption. About the beginning of May
they lay their eggs, two hundred or more, below ground, the female being excessively solicitous to preserve them from cold and accidents. They are said to be attracted to gardens by horse-dung, and to be expelled by the dung of hogs. They are common in some parts of Hampshire and Wiltshire.

**Stirps 2.**—Feet not formed for digging: oviduct exserted: antenna longer than the thorax.

**Genus 262. ACIETA. Fabr., Leach. Gryllus. Linn., Geoff., Latr., Oliv., Lam.**


Inhabits the temperate parts of Europe; is not very common in Britain.

The house cricket belongs to this genus.

**Fam. II. GRYLLIDE. Leach.**

**Locustarish. Latreille.**


**Genus 263. CONOCEPHALUS. Thunb., Leach. Locusta. Geoff., De Gieer, Fabr., Oliv., Lam., Latr.**

Thorax deflexed, convex, truncated: head acuminated: hinder feet twice the length of the body: antenna as long as the body.


Inhabits Europe. In the autumn the perfect insect may be found in great plenty in the marshes near London.

**Fam. III. LOCUSTIDÆ. Leach.**

**Acrydi. Latreille.**

Elytra and wings oblique: hinder feet formed for jumping: tarsi with three joints: antenna filiform or ensiform: oviduct not exserted.

**Stirps 1.**—Hinder legs as long as the body: antenna filiform: scutellum short.

**Genus 264. LOCUSTA. Leach. Gryllus. Fabr., Panz., Linn.**

Antenna filiform, or terminated in a club: hinder legs not, or scarcely, longer than the body.

**Obs.**—We have many indigenous species of this genus.

Sp. 1. *Loc. migratoria.* Thorax somewhat carinated: mandibles blue. This species, though not a native of this country, has been occasionally taken in Britain; in the year 1748 it appeared in several
irregular flights in many parts of Europe, and visited England: but they perished in a very short time, before they did much harm.

"Of all the insects which are capable of adding to the calamities of the human race, locusts seem to possess the most formidable powers of destruction. Legions of these voracious animals of various species are produced in Africa, where the devastation they commit is almost incredible. The air is darkened by their numbers; they carry desolation with them wherever they pass, and in the short space of a few hours are said to change the most fertile provinces into a barren desert.

"Some of the species serve as food, and are eaten fresh as well as salted. In the latter state they are constantly exposed to sale in the Levant, but the quantity of nutritious matter is said to be very small."

**Stirps 2.**—Hinder legs longer than the body: antennae capitate: scutellum short.

**Genus 265. GOMPHOCERUS. Leach's MSS. Gomphoceros. Thumb.**

Hinder legs longer than the body: antennae capitate; club of the antennae spoon-shaped in both sexes: anterior tibia simple.


Gryllus rufus. Linné.

Inhabits England.

**Stirps 3.**—Wings covered by the scutellum.

**Genus 266. ACRYDIUM. Fabr., Geoff., De Geer, Oliv., Leach.**


Tetrix subulata. Latr.

Inhabits Europe. It is found on hot and sandy banks, and is subject to some variation in colour.

The species of Acrydium are but little understood. We seem to possess three very distinct indigenous species, all varying in size, sculpture, and colour.

**Order VI. DICTYOPTERA. Leach.**

**Order Hemiptera. Linné.**

**Class Uolonata. Fabr.**

**Order Orthoptera. Latr.**

*Characters of the Order.*

Elytra coriaceous, nervose, decussating each other: wings membranaceous, with a few longitudinal folds: maxillary palpi elongate: body depressed, oval, or somewhat orbicular: tarsi with five joints.
Genus 267. BLATTA. Linn., Fabr., &c.

Sp. 1.

"The genus Blatta may be defined (as it now stands), to be a general reservoir for all insects agreeing with the character of the Order. The foreign species are numerous, and but little known: much might be done towards elucidating this hitherto neglected part of entomology, and it is hoped some entomographer who has time will devote some share of his attention to the examination of the genera and species."

Order VII. HEMIPTERA.

Order HEMIPTERA. Linn., Lam., Cuv., Leach.

Class RHYNCHOTA. Fabr.

Order HEMIPTERA. Section I. Heteroptera. Latr.

Characters of the Order.

Rostrum attached to the anterior extremity of the head: elytra somewhat crustaceous or coriaceous, with the apex membranaceous, placed in an horizontal direction, one decussating the other: thorax with the first segment (which bears the feet) larger than the following one: haustellum with three setae: ocelli or little eyes two, one obsolete. (Metamorphosis semicomplete.)

Section I. TERRESTRIA. Latr., Leach.

The insects which compose this section are not only distinguished from the second section by their economy, but likewise by the structure of some essential organs: the antennæ of this division are exserted, and are very distinct.

Fam. I. PENTATOMIDÆ. Leach.

Corisæ. I. Latreille.

Antennæ composed of five joints: rostrum with four distinct joints, the three first of nearly an equal length: labrum very long, striated: tarsi with three distinct joints, the first elongate: head trigonate, immersed even to the eyes in the thorax.

Stirps 1.—Scutellum elongate, covering the elytra and the wings.

Genus 268. TETYRA. Fabr., Leach. SCUTELLERA. Latr. Cimex. Linn.

Scutellum longer than broad, not covering the sides of the abdomen: thorax very narrow in front: antennæ with the second joint longer than the third.


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Stirps 2.—Scutellum not covering the wings or elytra.

Genus 269. ÆLIA. Fabr., Leach.

Body ovate: thorax with the anterior margin much narrower than the hinder: head longer than broad: antennae with the second joint not longer than the third, their base covered by the lateral margins of the head.

Sp. 1. Æl. acuminata. Pale-yellowish, longitudinally lineated with fuscous, impressed-punctate; a fuscous band running down the middle of the back divided by a whitish line; last joint of the antennæ red.


Inhabits grassy places: is rare in Britain.


Body ovate: thorax with the anterior margin much narrower than the hinder: head with nearly equal diameters.

Sp. 1. Pent. bidens. Body griseous above; thorax with a lengthened spine on each side behind.


Inhabits Europe.

Sp. 2. Pent. prasinus. Green above; hinder angles of the thorax without spines.


Inhabits woods and ferns on heaths.


Body ovate, somewhat orbicular; anterior margin of the thorax narrower than the hinder: head nearly semicircular: antennae with the second joint longer than the third: tibiae spinnlose.

Sp. 1. Cyd. valleraceus. Brassy dark green; sides of the head and thorax with a longitudinal line, on the latter red; outer margin of the elytra a spot on each, and the apex of the elytra red; thighs (apex excepted) and the middle tibiae yellowish.

Inhabits woods and sandy situations.

Fam. II. Coriside. Leach.

Coriside II. Latreille.

Antenna composed of four joints: rostrum with four distinct joints, the first three of nearly an equal length: labrum very long, striated: tarsi with three distinct joints, the first elongate: head trigonate, immersed even to the eyes within the thorax.

Antennae inserted above a line drawn from the eyes to the base of the labrum; the last joint thick: thorax with the anterior narrower than the posterior margin: body ovate, the sides of the abdomen dilated: head trigonate; neck not apparent.

Sp. 1. Cor. marginatus. Red-fusceous, obscure; sides of the abdomen elevated, acute; antennae with their internal base unidentate, the first and last joints blackish, the middle ones red; thighs beneath with a canal, and a few little teeth.

Coreus marginatus. Fabr., Latr., Leach. Cimex marginatus. Linné. Inhabits Europe, and is common in Britain in hedges and on the dock.


Antennae inserted above a line drawn from the eyes to the base of the labrum; geniculated about the middle; the first joint very long, the last thick: body filiform: head somewhat conic: neck not apparent: scutellum minute, linear conic: feet elongate: thighs clavate.

Sp. 1. Ber. tipularius. Reddish-gray; antennae as long as the body, with the last joint fuscous; clypeus acuminated, and produced; thorax with three elevated lines, which are parallel and longitudinal; two of these are marginal, the other dorsal; elytra striate nervous, impressed-punctate, spotted with fuscous.


Antennae filiform, inserted beneath a line drawn from the eyes to the base of the labrum: body elongate ovate: head trigonate, neck not apparent.


Head trigonate, neck not apparent: antennae setaceous; the second joint at the apex thick, the two last when combined much shorter than the one before it.


Antennae setaceous, the second and following joints alike: head trigonate: neck not apparent.


*Head* ovoid, with a distinct neck; *antennae* slightly thicker towards their extremities.


Inhabits

**Fam. III. Cimicidae.** Leach.

**Cimicides I.** 1. Latreille.

*Rostrum* with two or three distinct joints; *labrum* very short, not projecting; *feet* simple; *eyes* not very large; *feet* formed for walking on the earth, with distinct nails.


*Body* not linear; *antennae* inserted above a line drawn from the eyes to the base of the rostrum; *rostrum* with the middle joint evidently longer than the others; *thorax* bilobate, abruptly elevated behind; *tibiae* alike, elongate, somewhat cylindrical.


*Reduvius personatus. Latr., Fabr., Leach.*

Inhabits Europe; is rare in Britain.


*Body* filiform; four posterior feet very long, filiform; anterior feet tarsiform, with very long coxae.


*Gerris vagabundus. Fabr.* *Ploiaria vagabunda. Leach.*

Inhabits


*Body* depressed; *rostrum* short, setaceous; *wings* none.


Inhabits Europe in houses, sucking the blood of man. The common bed-bug.


*Body* entirely depressed, reticulated; *feet* all simple; *antennae* terminated by an oval joint, the third joint very long.


*Tingis Cardui. Fabr., Panz., Latr.*

Inhabits thistles, and is very abundant.
Fam. IV. Hydrometide. Leach.

Cimicidae I. 2. Latreille.
Rostrum with two or three distinct joints: labrum very short; eyes moderate; feet very long, formed for walking on the water, with the nails very minute, inserted laterally into a fissure at the extremity of the last joint of the tarsi.

Antenneae setaceous, the third joint longer than the rest; anterior feet simple: head elongate-cylindric, apex thickened.
Aquarius paludum. Schellenberg.
Inhabit Europe in most places, and walks on the surface of the water.

Antenneae filiform, the first joint longest: anterior feet raptorious: rostrum two-jointed: head somewhat vertical.
Sp. 1. Vel. rivulorum. Black; sides of the thorax and margins of the abdomen red: thorax with two anterior punctures; each elytron with three and a spot of white; inferior sides of the abdomen punctured with black.
Inhabit running waters and springs.

Antenneae filiform, the first joint longest, the last cylindric: anterior feet raptorious: rostrum three-jointed: head porrected.
Sp. 1. Ger. paludum. Brown-olive, black above, cinereous, silky beneath: abdomen nearly equally broad: trunk as long as the head, carinated beneath, a series of impressed lines on each side: antennae and feet black: thorax with an elevated line extending to the middle of the back: lateral margins of the thorax and abdomen with the anus reddish.

Obs.—The species of this genus are certainly but little known; they are either subject to great variation, or are very numerous.

Fam. V. Acanthide. Leach.

Cimicides II. Latreille.
Labrum very prominent: eyes very large: feet formed for walking and jumping.

**Antenna** filiform: *rostrum* straight, long.

Acanthia maculata. Latr., Leach. 
Inhabits grassy banks.

Section II. **AQUATICA.** Leach.

Fam. HYDROCORISAE. Latreille.

**Antenna** very minute, not exserted, inserted beneath the eyes. All the insects of this section live in the water.

Fam. VI. **NEPADA.** Leach.

**Anterior tarsi** united with the tibiae: body depressed or linear.

**Stirps 1.** — *Anus* without setæ: *tarsi* of the four posterior feet distinctly biarticulate: *antenna* four-jointed.


*Four posterior feet* ciliated, formed for swimming: *antenna* inserted beneath the eyes: *body* ovate, much depressed.

Inhabits ponds.

**Stirps 2.** — *Anus* furnished with two setæ: *tarsi* of the four posterior feet one-jointed: *antenna* three-jointed.


*Rostrum* perpendicularly inflected: *body* oval: *anterior thighs* thick: four hinder feet not elongate-filiform.

Sp. 1. *Nepa cinerea.* Dark grayish-black. (Pl. 5. fig. 4.) 
Nepa cinerea. Linn., Fabr., Latr., Leach. 
Inhabits ditches: is very common.


*Rostrum* porrected: *body* linear: four hinder feet very long, filiform: thighs of anterior feet elongate.

Inhabits the ditches and ponds of Europe. It is very local in this country. It may occasionally be found near London in ponds on Epping Forest, Copenhagen Fields, and near Hammersmith.
Fam. VII. Notonectidae. Leach.

"Linne and all his predecessors comprehended the species under the generic appellation Notonecta. The accurate Geoffroy was the first who separated Notonecta into two genera, which have been adopted by most succeeding writers, excepting Linne, who in his last edition of the Systema Naturae has merely given the synonyms of that author, without taking the least notice of the important characters which induced him to separate them."

De Geer confounded the animals of this tribe with Nepa and Naucoris, whilst Latreille and Olivier placed them in a division of their family Hydrocorisae. In the Edinburgh Encyclopaedia Dr. Leach separated them from the Hydrocorisae, and placed them in a particular tribe, named in that work Notonectides, and in the twelfth volume of the Transactions of the Linnean Society he has given an excellent paper, in which are described at large the whole of the British species hitherto discovered, which consist of four very natural genera.

Stirps 1.—Body cylindrical oval, or nearly square: tarsi with two articulations. (Scutellum large.)

"All the insects of this family swim on their back, moving by means of their long hinder legs, which resemble ears; whence they have been aptly named boat-flies."

Genus 289. NOTONECTA of authors.

Body oval and cylindrical: antenna with the third articulation slenderer than the second: anterior tarsi with the first articulation long: clavus of the hinder feet very minute.

Besides the above characters, the following will be useful, in order to enable the young entomologist to distinguish this genus from Plea, from which it was first separated by that close examiner of nature Dr. Leach.

The thorax is hexagonal; the anterior part is much attenuated, and the hinder margin is straight: the head is narrower than the broadest part of the thorax: the eyes are oblong, and converge a little behind: the hinder legs are much ciliated, and the clavus are so minute as to be discovered with great difficulty: the tips of the elytra are notched.

Sp. 1. Not. furcata. Elytra black, with two grayish spots at the base, and two larger ones at the posterior part.

Notonecta furcata. Fabr., Oliv., Leach.

Var. β. Elytra with ferrugineous spots.

Inhabits ponds and ditches in England and Scotland.


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.


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.


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.


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. Cicadidae. Leach.**

**Cicadariæ I. Latreille.**

*Antenna* 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.
MODERN SYSTEM.

Fam. II. CEREOPIDE. Leach.

CICADARIAE II. Latreille.

Antennae three-jointed: ocelli two; tarsi with three joints.

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


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.


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. coleopteratus
Inhabits hedges.


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

Flata nervosa. Fabr.
Inhabits hedges.

STIRPS 2.—Antennae 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.

Antennae 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 tibiae white; elytra semihyaline: apex with a fuscous band; nerves spotted with fuscous.

Inhabits France and England in grassy places.

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


Antennae 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. Cerocops sanguinolenta. Fabr., Leach.

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


Membracis. Oliv., Lamarck, Schrank.

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


Inhabitats the oak and various trees in woods.

Genus 300. MEMBRACIS. Latr., Fabr., Leach. Cicada. Linn.

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


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

Inhabitats woods and hedges.

Stirps 4.—Antenna 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 antenna produced into an angle.


Inhabitats England and other parts of Europe.


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


Inhabitats moist places.

Fam. III. PSYLIDÆ. Latreille, Leach.

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


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


Inhabit the alder.

Antenna 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.

Aphidit. Latreille.

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

Stirps 1.—Antenna eight-jointed: rostrum minute and horizontal with indistinct joints: head elongate-quadratc.

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

Elytra and wings horizontal and linear.

Sp. 1. Thr. Physapus. Black, hairy: antennæ, tibiae, and tarsi pale: middle of the tibiae 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.—Antenna seven-jointed: elytra larger than the wings: rostrum subperpendicular, with three very distinct joints: head transverse.

Genus 306. APHIIS. Linn., Fabr., Latr., Oliv., Lam., Leach.

Antenna 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: antenna 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.


Aphis lanigera of authors,

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

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

Inhabits hedges and woods.

Fam. V. Coccideæ. Leach.

Galinsecta. Latreille.

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


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


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: coxae 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.

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 Pulces 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., Lea.; 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 Phalena (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. Papilionidae. Leach.

Papilionides. Latreille.

Hinder tibia 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.

*Antenna*, 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 elyptes; 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 tentaculate, 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*)


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.


*Antenna* 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.


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

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.


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

*Antenne* elongate, with an abrupt, obconic, compressed head: *palpi* slender, somewhat cylindrical; 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."

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

Inhabits Europe; the larva on the cabbage.

Sp. 3. *Pont. Rape* (small cabbage butterfly).
Inhabits gardens.

Inhabits gardens and woods.

Inhabits path-ways in woods.

Sp. 6. *Pont. Daphlidice* (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 1815.
Wings somewhat oval."


**Genus 315. MELIT.EA. Fabr., Leach. ARGYNNI.S. Latr. Pa-pilio. Linn., Haworth.**

*Antennae* 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. 3. *Mel. Cinxia* (Glaunville). Inhabits Europe; very rare in Britain.


**Genus 316. ARGYNNI.S. Fabr., Latr., Leach.**

*Antennae* 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.


Antennae 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. Alalanta (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.

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."

Inhabits nettles.

Sp. 5. Van. polychloros (large tortoise-shell).
Inhabits Europe: the larva on the elm.

Inhabits Europe: the larva feeds on nettles.

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

Antennas 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 aerial 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 aerial 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, whereby 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."
Antennae 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.
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.

Antennae 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 orbicular-triangulate, with the external margin excavated to receive the abdomen; the middle cell closed behind, from which part the nerves 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 bimucronate suspended by the tail. Leach's Zool. Misc. vol. i. p. 27.
Inhabits woods and fields.
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.
Inhabits fields and the borders of woods.
Papilio Jurtina. Haworth, Linn.
Inhabits fields and lanes.
Inhabits fields and the borders of woods.
Sp. 8. *Hipp. ægeria* (speckled wood, or wood Argus). Inhabits the borders of woods and fields.


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

Genus 321. THECLA. *Fabr., Leech. POLYOMMATUS. Latr.*

*Feet in both sexes all alike: nails scarcely produced beyond the pulvilli, which are large: antennæ gradually clubbed; the club elongate, cylindrical oval: hinder wings tailed.*

*Antenna gradually clavated.*


**Antenna abruptly clavated.**


Genus 322. LYCÆNA. *Fabr., Leech. 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 Hypothœ. *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. Virgaureae (scarce copper). Inhabits Europe: very local in Britain. It is found in some parts of Huntingdonshire.


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


Inhabits heaths, commons, and lanes.

Inhabits fields and marshes.

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.

Inhabits meadows.

Inhabits Europe: in Britain it is very local. It is found near Sherborne in Dorset in great abundance.

Fam. II. Hesperide. Leach.

Hesperides. Latreille.

Hinder tibiae with two pair of heels or spurs, one pair at the middle, the other at the usual place: antenna 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.


Palpi with the third joint cylindric or cylindric-conic.

* Antenna ending in an abrupt very acute hook.


Inhabits the borders of woods.

** Antenna with their points arcuate.

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

Inhabits dry banks.

*** Antenna with straight points.

Sp. 5. Hes. Linca (small skipper).
Inhabits the skirts of woods.
Inhabits meadows: very rare in Britain, excepting in some parts of Bedfordshire, where it is common.

Section II. *CREPUSTRARIA*. Latreille.

Wings horizontal in repose: *antenna* 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. *SPHINGIDE*. Leach.

**SPHINGIDES. Latreille.**

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

**Stirps 1. Anus not tufted.**

**Genus 324. SMERINTHUS. Latr., Leach. Laothoë. Fabr.,**


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

Inhabits Europe. The larva on the willow and poplar.

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. Lin., Fabr., Latr., Hazworth, Leach. Spectrum. Scopoli.**

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

**Obs.—This genus has lately been divided into the following genera:**


Inhabits Europe: is very rare in Britain.

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.

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.

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

Inhabits Europe: it has been taken near London, and in Ravelstonwood near Edinburgh.

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.

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

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: antennae prismatic, thicker towards their middle; (of the males ciliated): wings opaque.

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: antennae prismatic, thicker towards their middle (of the males ciliated): wings transparent.

Inhabits open places in woods.

Inhabits the borders of woods.

Fam. IV. **ZYGÆNIDÆ.** Leach.

**ZYGÆNIDES.** Latreille.

*Palpi* long, separate, covered with long scales or porrected hair.
CLASS V. INSECTA


Antenna fusiform: abdomen with the anus bearded.

Sp. 1. *Æg.* opiformis (bee hornet sphinx).

Inhabits Europe: is rare in Britain.

Sp. 2. *Æg.* crbroniformis (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. *ZYGENA* of authors. *SPHINX.* Linn.

Antenna abruptly flexuous-clavate: palpi cylindric-conic.


Inhabits fields.


Antenna 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: antennae setaceous, gradually narrowing towards their extremities.

Fam. V. *BOMBYCIDÆ.* Leach.

*BOMBYCITES.* Latreille.

Antennae with a single series of cilia (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: larvae naked: pupa with its segments laterally denticulated.


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


Antennae 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.
MODERN SYSTEM.

Phalaena (Bombyx) Cossus. Linné.

Inhabits Europe. The larva feeds on the internal parts of the willow, ash, and oak. The celebrated Lyonneth 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.


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.

Wings horizontal: antenna subcylindric: of the male doubly pectinated: hinder wings simple.

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

"As Antenna 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: antenna setaceous.


Palpi very hairy, three-jointed: last joint minute linear and almost naked: tongue obsolete: antenna filiform.

**Genus 337. GASTROPACHIA.** Och., Germ., Leach's MSS.
*Palpi* porrected, three-jointed, hairy, subcylindric, with obtuse points: *tongue* obsolete: *antenna* filiform.

"**Antennae 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: *antenna* filiform.
Sp. 1. *Od. potatoria*. (Pl. 12. fig. 3.)

**Genus 339. LASIOCAMPATA.** Schrank, Leach, Germar.
*Palpi* compressed, porrected, very hairy, two-jointed; the second joint elongate obtuse: *tongue* obsolete: *antenna* filiform.

**Genus 340. ERIOGASTER.** Germar, Leach's MSS.
*Palpi* very short and very hairy, subglobose: *tongue* obsolete: *antenna* filiform.

**Genus 341. ENDROMIS.** Och., Germ., Leach's MSS. **DIMORPHA.** Hiib.
*Palpi* compressed, recurved, very hairy; second joint obtuse: *tongue* very obsolete: *antenna* filiform.

Obs.—*Bombyx rubra*, &c. forms the **Genus PENTHOPLERA.** Germ.

**Genus 342. STAUROPUS.** Germ., Leach's MSS. **HARPYIA.** Och.
*Palpi* reflexed, compressed, hairy and biarticulated; last joint minute: *tongue* obsolete: *antenna* filiform (of the male naked at their extremities).

**Genus 343. NOTODONTA.** Och., Germar, Leach's MSS. **PILIODONTIS.** Hiib.
*Palpi* short, very hairy, two-jointed; first joint very short, second compressed and truncate: *tongue* short: *antenna* filiform.

**Genus 344. PYGAERA.** Och., Germar, Leach's MSS. **MELALOPHIA.** Hiib.
*Palpi* very hairy, two-jointed; first joint incurved, second reversed obtuse: *tongue* abbreviated, but spiral: *antenna* setaceous.

Obs.—*Bombyx curtula*, 2. *reclusa*, form the genus **Clostera** of Hoffmannsegg.
Stirps 4. Wings deflexed: *larva* with its hinder legs converted into a furcate tail.

Genus 345. CERURA. Schrank, Leach, German. ANDRIA. Hübner. Palpi cylindrical, hairy obtuse, with their joints confluent: *tongue* spiral but abbreviated: *antennae* filiform pectinated.


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. Arctiade. Leach.

Noctuo-Bombycites. Latr.

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


Palpi with long scales: *antennae* of the males (at least) with a double series of pectinations: *tongue* often short, composed of two separate filaments.

* *Antennae* ciliated.


**Antennae** pectinated.


Palpi with short not porrect scales: *antennae* simple or slightly ciliated: *tongue* long, the two filaments conjoined.


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

Fam. VII. Tineidae. Leach.

Tineites. Latreille.

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

Stirps 1.—*Antennae* distant from each other: *eyes* separate, divided by a frontlet: *tongue* elongate: *palpi* not longer than the head.
Genus 349. LITHOSIA. Fabr., Latr., Leach.

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


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


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


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. Limmella. 2. Flavella. 3. Roeselle, and their congers belong.

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


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


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


Inhabits houses.

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

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


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. Noctua. Leach.

Noctuæites. 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.


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.


**Caterpillars with membranaceous feet of conformable size.

1. Wings horizontal.


2. Wings deflexed.


B. Caterpillar with fourteen feet.


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.


CLASS V. INSECTA.


Genus Tetthea. Och.


Genus Hadena. Schrank, Och.

Genus Miselia. Hüb., Sch.


Genus Apamea. Och.

Genus Mamestria. Och.

Genus Thyatira. Och.

Genus Mythimna. Och.
Sp. 1. Noc. turca (double line).

Genus Caradrina. Och.


Genus Nonagria. Och.
Genus **Gortyna**. Och.

Genus **Xanthia**. Hüb., Och.

Genus **Cosmia**. Hüb., Och.

Genus **Cerastis**. Och. *Gletsch.* Hüb.

Genus **Xylena**. Hüb., Och.


Genus **Acrostola**. Och.

Genus **Anarta**. Och.


Genus **Brephia**. Hüb. *Brephos.* Och.

Genus **Euclidia**. Hüb., Och.

**Fam. IX. Phalænidae.** Leach.

**Phalænites.** Latreille.

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

**Stirps I.—Larce with twelve feet.**

Haworth, Hübner.*

*Antenna* setaceous of the male pectinated.
CLASS V. INSECTA.

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Stirps 2.—*Larva* with ten feet.


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


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

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

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

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

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


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

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

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

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


*Wings* triangular, nearly horizontal; anterior margin of the upper *wings* straight; *palpi* two, recurved, compressed, often very large; *antennae* ciliated.  
Sp. 1. *Her. proboscidalis* (the snout), &c.
SISTERS 4.—*Caterpillars* with fourteen feet, anal ones wanting: the first pair of membranaceous ones distinct.

**Genus 363. PLATYPETERX.** Laspeyeres, Latr., Leach. PHALENA. Fabr.

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


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


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


Bombyx compressus. Fabr.

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


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


**Genus 366. SIMAẾTHIS.** 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 squamous: inferior wings not completely covered by the upper ones."

Sp. 1. *Sim. dentana*.

Tortrix dentana. Hübner.


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


Pyralis palliolatis. Hübner, Latr.

Fam. X. Pyralidæ. Leach.

CRAMBITES. Latreille.

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

SISTERS 1.—*Superior wings* forming with the body a nearly horizontal, depressed triangle.
Class. Insecta.


*Tongue distinct, conspicuous: palpi exserted.*


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


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


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


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


*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.*


Fam. XI. Alucitæ. Leach.

Pterophorites. Latreille.

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


*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.

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: antenna inserted between the eyes, often very long, composed of an infinity of joints: fect 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 fect; 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. PHRYGANEZA. 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. Leptoceridae. Leach.

Antenna much longer than the whole body.

Genus 376. LEPTOCERUS. Leach.

Antenna simple, not denticulated.


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.
Antennae with the inner edge denticulated.
Inhabits Ireland and England.

Fam. II. Phryganideæ. Leach.
Antennaæ as long as the body.

Genus 378. PHRYGANEÆ. 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.
Antennaæ 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. Libellulideæ. Leach.

Libellulineæ. Latreille.

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

Steps 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.

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


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


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.


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 Loch Katrine.

Genus 333. GOMPHUS. Leach. Libellula. Linn., Don.

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


Libellula vulgarissima. Linn. Libellula forcipata. Don.

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


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


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 335. ANAX. Leach.

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

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

Inhabits marshes.

Genus 337. LESTES. Leach.
Wings membranaceous with an oblong-quadrate parallelopiped stigma: abdomen of the male armed with a forceps-like appendage.

Inhabits marshy places.

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.

Inhabits the banks of rivers.

Fam. II. Ephemeridae. Leach.

Ephemeriorae. 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.

Wings four.

Inhabits near water.

Genus 390. CLOEON. Leach.
Wings two.

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.

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

Fam. III. PANORPIDÆ. Leach.

PANORPADÆ. 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 cylindrical-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. cilia magnified.)
Inhabits hedges, and is very abundant in this country.

Fam. IV. HEMEROBIADÆ. Leach.

HEMEROBIINI. Latreille.

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

Stirps 1.—Ocelli or little eyes not distinct.

Genus 393. CHRYSPOLA. Leach. HEMEROBIUS of authors.

Antenna (at least as long as the body) with cylindrical joints longer than broad.
Inhabits woods, and is a common species.

Genus 394. HEMEROBIUS. Leach, &c.

Antenna as long or shorter than the body, with moniliform joints.
Inhabits ——: is rare near London.

Stirps 2.—Ocelli three, distinct.

Genus 395. OSMYLUS. Latr., Leach. HEMEROBIUS. Fabr.

Villers, Roemer, Don.

Antenna 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.

RHAPIDINÆ. 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.


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.

PSOQUELLE. 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.


Inhabits woods.

STIRPS 2.—Tarsi three-jointed.

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

Wings none.


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 PIZATA. Fabricius.

Characters of the Order.

Wings nervured (the areoles 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.

Tani. I. Tenthredinidae. Leach.

Tenthredinidae. Latreille.

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

Larve 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.—Antennae short and clavated; with the third joint very long; superior wings with two marginal and three submarginal cells.


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. europae. Head and thorax black: abdomen blueish-black; the apex only yellow or ferruginous; antennae and tarsi yellow: femora and tibiae blueish-black: wings brownish at the apex.

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


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; tibiae and tarsi yellowish; wings with the apex brownish.

Inhabits woods near London, but is rare.

Genus 402. CLAVELLARTA. 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 antenna, tibia, 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. ZARFIA. Leach.

Eyes of the male joining at the posterior part.

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

Tenthredo fasciata. Linn., 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. Antennae black: wings from the middle to the apex with light brown spots: feet light red; thighs black and shining.


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. lata. Back of the abdomen pale yellow, the first segment wholly black: wings at the base blackish.


Inhabits England and Germany. It has once occurred near Bristol.
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STIRPS 2.—Antenna 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: antenna of the male ciliated: tibia, the four hinder ones furnished with a spine situated near the middle on the inner side.
Larva with fourteen spurious feet.
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. Jarine, Leach.
Upper wings without the branch to the marginal cells: antenna of the male divided and ciliated: the whole of the tibia simple.
Inhabits France, Germany, and Italy. In England it is very rare.

STIRPS 3.—Antenna 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: antenna with nine joints.
Inhabits

Genus 409. ATLALIA. Leach.
Upper wings with two marginal and four submarginal cells: antenna with ten joints.

Genus 410. SELANDRIA. Leach. Tenthredo, Fam. I. Klug.
Upper wings with two marginal and four submarginal cells: antenna with nine joints.
CLASS V. INSECTA.

**Genus 411. FENUSA. Leach. Tenthredo, Fam. II. †. Klug.**
Upper wings with two marginal and three submarginal cells: antennae composed of nine joints.

Sp. 1 Fen. pumila.


**Stirps 4.**—Antennae 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; antennae with the third joint longer than the fourth.

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

**Genus 413. TENTHIREDO. Leach. Tenthredines Allanti. Klug.**
Upper wings with four submarginal cells; antennae with the third joint of the same length with the fourth.


**Genus 414. DOSYTHEUS. Leach. Tenthredines Doleri. Klug.**
Upper wings with three submarginal cells; antennae with the first joint short, the third longer than the fourth.


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


**Genus 416. EMPHYTUS. Leach. Tenthredines Emphyti. Klug.**
Upper wings with three submarginal cells; antennae with the first and second joints equal; third and fourth equal.


**Stirps 5.**—Superior wings with but one marginal cell; body short; of the males narrower towards the apex; antennae 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. CR.ESUS. Leach.**
Upper wings with four submarginal cells; antennae in both sexes longer than the body (especially in the females) with very short ciliae; posterior tarsi with the first joint elongated and compressed.
Sp. 1. _Cras. septentrionalis_.
Inhabits woods.

Genus 413. _NEMATUS._ _Leach_.
_Superior wings_ with four submarginal cells: _antenneae_ simple, nine-jointed; longer than the body in the males, the last articulation generally increasing, or internally a little produced: _tarsi_ simple.


Genus 419. _CLADIUS._ _Leach_.
_Upper wings_ with three submarginal cells: _antennes_ of the same length as the body or scarcely longer; of the males with very long cilia; 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. _Cia. difformis._
Inhabits England, but is rare; it has occurred at Coombe Wood in Surry, and near Bristol.

Sib. 6. — _Intercne_ with many articulations: _body_ rather depressed: _wings_ with two marginal and four submarginal cells.

Genus 420. _TARPA._ _Fabr., Klug, Leach._ _Megalodontes._ _Latr._ _Spinula._ _Diprion._ _Schrank._
_Tibia_, 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 fascia; and a puncture on each side; anus with a white band: _antennae_ brown; the first two joints black; _feet_ yellow; base of the coxa of the four anterior feet black.

_Tarpa Fabricii._ _Leach._
Length of the body 7 lines; expansion of the wings 12 ½ 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: _antennae_ with the second and last joint black, the others brown; _feet_ reddish brown; _tibia_ yellow; thighs of the four anterior legs black at their base.

Length of the body 5—5½ 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.


Larva with no spurious feet. 

Lyda. Klug. 

Sp. 1. Lyda Betulæ. 2. Lyda crythrocephala, &c.


Antennae pennated in the males; serrated in the females: superior wings with one marginal and three submarginal cells: mandibles tridentate. 


Inhabits Europe: is very rare in Britain.

Fam. II. Xiphydriade. Leach. 

Abdomen sessile: ovipuct 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. 

Larva with scaly feet, or at least not membranaceous. 


Mandibles exserted, longer than wide: neck long: ovipuct exserted: antennae inserted in the front between the eyes, gradually thicker externally. 


Inhabits flowers in fields and hedges.


Mandibles exserted, longer than wide: neck long: ovipuct exserted: antennae setaceous, inserted above the clypeus. 


Inhabits willow grounds.

Fam. III. Uroceride. Leach. 

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


Mandibles with their internal edge not dentated: maxillary palpi long and pendulous: antennae filiform, compressed, inserted under the anterior margin of the clypeus: superior wings with one marginal cell,
and two submarginal, the last incomplete: ovipositor capillary, hidden in a longitudinal groove.

Sp. 4. Orys. coronatus.
Inhabits sandy places: taken by Dr. Leach in Darent wood in July.

Mandibles dentated on their internal edge: maxillary palpi very small; labial palpi terminated by a very thick, hairy joint: antenna 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: ovipositor exserted, composed of three parts, the outer ones valviform.
Sp. 1. Uro. Gigas. (Pt. 3., fig. 3.)
Inhabits Europe: is rare in Britain.

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

Fam. IV. Evanidae. Leach.
Evaniales. Latreille.

History wings with very distinct nervures: antennae with 13 or 14 joints.

Abdomen very small, much compressed, triangular or ovoid; abruptly pedunculated and inserted behind the metathorax.
Found near Bristol and Swansea, but is very rare.

Neck elongate: hinder tibia clavate: abdomen a lengthened club.
Inhabits woods and hedges.

Fam. V. Ichneumonidae. Leach.
Ichneumonides. Latreille.

Abdomen attached to the thorax by a part of its transverse diameter: inferior wings with very distinct nervures: antennae 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; ovipositor 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: ovipositor 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: ovipositor 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.

   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, Leach.

A. Abdomen almost inarticulate, with but three distinct segments.


B. 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; ovipositor filiform; palpi very short; antennae filiform, straight, from 13 to 16 joints.

Genus 432. DIPLOLEPIS. Geoff., Oliv., Panz., Illiger, Leach.

A. Abdomen with the inferior part compressed, triangular-ovoid; antennae filiform, joints cylindric.

B. Abdomen with its inferior part compressed, triangular-ovoid; antennae moniliform, thicker towards their extremities.

Fam. VII. CYNIPSIDAE. 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: antennae broken, clavate, or gradually thicker externally, from six to twelve-jointed: hinder feet formed for leaping.

Stirps 1.—Hinder tibia arcuated.


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. claviges. (Pl. 3. fig. 6.)
Inhabits Europe. Is found on aquatic plants in Battersea fields in the month of June.

Stirps 2.—Hinder tibia straight.


Antennae with cylindric joints: abdomen compressed; oviduct exserted.

Inhabits?

Fam. VIII. CHRYSIDIDÆ. Leach.

CHRYSIDIDÆ. 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.


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.


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


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. CHRYYSIS of authors. VESP. 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. 3. fig. 7.)

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


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


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.

LARVAE omnivorous.

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

Fam. IX. FORMICACE. Leach.

FORMICARIA. Latreille.

Abdomen with a peduncle abruptly formed, with a scale on two knots:
antennae 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 economy of these animals.

Genus 440. FORMICA of authors. LASIUS. Fabr.

Pediole of the abdomen formed of one simple scale: sting not punctiform. Poisonous glands: antennae inserted in the first joint not receiving the second.

Sp. 1. For. herculanea. Latr., Leach.

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

Fam. X. MUTILLADÆ. Leach.


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


Inhabits sandy places.

Genus 442. MYRMOSA. Latr., Jurine, Panz., Leach. MUTILLA.

Rossi. HYLEUS. Fabr.

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


Myrmos melanocephala. Latr., Leach.

Inhabits

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

Fam. XI. SCOLIADÆ. Leach.

Genus 443. SCOLETE. Latreille.

Thorax with the first segment transverse-quadrato, or forming an arc: feet short, or moderately long; the hinder ones thick, spinulose, or
strongly ciliated: *antennae* 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. TIPHIHA.** Fabr., Panz., Illig., Jurine, Spinola, Leach.

*SPHEN.* Scopolii, Christus. *BETHYLUS.* Panzer.

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


Inhabits flowers, and sandy situations.

**Fam. XII. SAPYGIDE.** Leach.

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

**Genus 441. SAPIYGA.** Latr., Jurine, Klug, Illig., Spinola, Leach.


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


*Sapgyga sexpunctata.* Leach. *Hellus sexpunctatus.* Fabr.

Inhabits palings.

**Fam. XIII. POMPILIDE.** Leach.

**POMPILI.** Latreille.

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

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

**Genus 445. POMPIILUS.** Latr., Leach.

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

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


*Pomphilus annulatus.* Latr., Fabr., Leach.

Inhabits


*Maxillary palpi* pendulous, longer than the labial ones; the three last
joints equally long, the last joint thicker, conic-obo
tae (in both sexes) thick, rigid, with the middle ar
culated, not convoluted.
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 recur
rent nervures.
Aporus unicolor. Spinola, Latr., Leach.

Inhabits__________

Fam. XIV. Sphecidae. 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 denticu-
culated.

Genus 448. AMOPHILA. Kirby, Latr., Leach. Sphex. Linn.,
De Geer, Panz., Lamarek, Cuv., Jurine, Illig., Spinola. Peps-
Antenna inserted about the middle of the face: maxille and labrum
much longer than the head, bent in the middle: palpi very slender,
with cylindrical joints.
Sphex sabulosa. Linné. Amopli. sabulosa Kirby, ñc.

Inhabits sandy places.

Fabr., Spinola.
Antenna inserted about the middle of the face: maxille and labrum
scarcely longer than the head, and bent towards their extremities:
malillary palpi with all the joints elongate and obconic.

Inhabits sandy places.

Genus 450. DOLICHURUS. Latr., Leach. Pison. Jurine. Pom-
pilus, Spinola.
Antenna inserted at the mouth (at the base of the clypeus?): maxillary
palpi setaceous, longer than the labial ones.
Sp. 1. Dol. uter.
Inhabits

Fam. XV. LARRADA. Leach.

LARRATE. 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: antennae inserted near the mouth, the first joint obvoid 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.

* Antennae thicker externally: eyes separate.


Antennae 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.

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

Inhabits posts and sandy places.

** Antennae filiform: eyes meeting behind.


DIMORPHA. Jurine, Panz., Illig.

Antennae inserted towards the mouth at the base of the elypeus.

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

* Superior wings with three submarginal cells.


Antennae filiform: superior wings with the third submarginal cell narrow, almost lunate: mandibles without a tooth-like process on their internal edge.
*Larra ichneumoniformis.* Panz., Fabr., Latr., Leach.
Inhabits ————

*Antenna* filiform: *superior wings* with the third submarginal cell narrow; almost lunate: *mandibles* with a strong tooth on their internal edge.
Inhabits ————

*Superior wings with two submarginal cells.*

*Antenna* (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.*

*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.
Inhabits ————

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

*Antenna* thicker towards their extremities, longer than the head; convoluted, the second joint much shorter than the third: *mandibles* without teeth at their extremities; *tibiae* spinose: *tarsi* with large pulvilli.
*Vespa uniglumis.* Linn. *Oxybelus uniglumis.* Fabr., Latr., Leach.
Inhabits ————.
Fam. XVI. Crabronidae. 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; antennae 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.


Antennae with the first joint long and cylindric; superior wings with one complete sub-marginal cell.

Inhabits sand-banks.

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

Antennae with the first joint obconic; superior wings with two complete submarginal cells, and two discoidal cells.

Stigmus ater. Jurine, Latr., Leach.
Inhabits sand-banks.

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


Superior wings with the submarginal cell not narrower towards the apex; antennae with the first joint longest, thickest.

Inhabits sand-banks.

Stirps 2.—Superior wings with three complete submarginal cells.

* Antennae inserted at the mouth, filiform; Clypeus not trilobate.


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

Inhabits sand-banks.
Antennae thicker towards their extremities, inserted about the middle of the face: clypeus trilobate.


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.


Philanthus quadricinctus. Fabr., Panz. Cerceris quadricinctus. Leach. Inhabits?

Fam. XVII. Vespidae. 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.


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 maxilæ: maxilæ with the terminal lobe short, short-lance-shaped.


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. 3, fig. 6.)

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 obtrigonomus.

Fam. XVIII. **Andrenidae**. Leach.

**Andrenetæ.** Latreille.

Larvæ pollinivorous.

**Lip** with the apex subcordate or subhastate, on each side with one articule; 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.


Hinder feet pollinigerous: **superior wings** with three submarginal cells: antenna 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.


Inhabits ———.

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

a. Lip when at rest deflexed.

* Superior wings with two submarginal cells.


Marilla 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 tibiae.

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.**


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

Sp. 1. And. nigro-aenea.

Melitta nigro-aenea. 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 tibia with a thick scopo 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 scopo or brush of their hinder tibia, 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.


Maxilla 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 maxilla, but also by having a longer tongue with very minute auricles, and the tops of the valves cultriiform.

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.


Labrum trigonate, of the male entire, of the female generally emarginate: antenne 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 Rcaumur, they excavate to the depth of nine or ten inches, and deposit their eggs in a mass of pollen mixed with honey.

Inhabits Europe.

** Lip with the intermediate division incurved, longer than the lateral ones, and twice as long or more than the head.


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.

Apis 4-cincta. Linné.
Inhabits the vicinity of London, but is rare.

Fam. XIX. APIDE. 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 I.—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.


Mandibles not dentated: antennae straight in both sexes, and subequal: superior wings with two submarginal cells; ocelli disposed in a triangle.


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.)


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.


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*.
Inhabits various flowers in hedges.
The female is *Apis maxillosa* of *Linné* and *Kirby*; *Hyaleus maxillosus* of *Fabricius*.

**Labial palpi with the third joint inserted obliquely on the internal side of the second, near to the apex.**

*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*.
Inhabits

*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.

Inhabits

*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*.
Inhabits Europe in gardens.

*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.
Inhabits Europe. This species selects the hollows of large stones for the purpose of nidificating.


*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."

Inhabits Europe. Builds its cells with the leaves of roses and of the *Mercurialis annua.*

Genus 480. **CAELIOXYS.** *Latr., Leach. Apis. Linné, Villers, Kirby (** c. 1 a).*

*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.

*Apis conica. Kirby.* *Caelioxys 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 pollinigrous.

* Lip with the lateral divisions shorter than the palpi. Body simply pubescent.


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.


Superior wings with three complete submarginal cells: maxillary palpi one-jointed.


** Lateral divisions of the lip almost as long as the palpi. Body very villose in parts. Scutellum spinose. Superior wings with three submarginal cells.


Maxillary palpi six-jointed, with five very distinct.

The insects of this genus are supposed to be parasitical.

Stirps 2.—Lip with the apex generally hirsute, not inflected.

A. Hinder feet of the females, with their tibiae 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.

Maxillary palpi distinctly six-jointed: superior wings with two submarginal cells complete.
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. 3, fig. 9.)
Inhabits sandy banks.

Mandibles unidentate within: maxillary palpi five-jointed.
Inhabits flowers on sandy heaths.

B. Hinder feet with the tibiae and the first joint of the tarsi shortly hairy.

* Hinder tibia terminated by two spurs or heels: superior wings with three submarginal cells in all, complete, the last neither linear nor oblique.

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.

Inhabits Europe.

**Hinder tibiae 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.*

*Apis mellifica* of authors.
Inhabits Europe.

Order XIV. RHIPPIPTERA. *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 Angliae* 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 *Linnaean 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 maxillae; the maxillae 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 Aputa Anglia*, gives the following account of *Styllops Melitta*: "Upon this insect (*Melitta nigro-aenea*) 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-aenea*, 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, Sorcerby'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.

**Family I. Tipulidae. Leach.**

**Tipulæ. Latreille.**

*Antenna* with many joints, filiform or setaceous, longer than the head.

**Stirps 1.—Ocelli** none: *antenna* 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: *antenna* very hairy: *eyes* large: *rostrum* very short, terminated by two lips: *two anterior legs* at a distance from the others.

Genus 490. CORETHIRA. Meig., Illig., Latr., Leach.  
*Antenna* 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.

Inhabits marshy places.

Genus 491. TANYPUS. Meig., Illig., Latr., Leach.  
*Antenna* fourteen-jointed, very plumose, moniliform, their extremities filiform; of the male, almost entirely moniliform, their last joint larger and ovoid in the female.

Inhabits marshy places.

Genus 492. CHIRONOMUS. Meig., Latr., Illig., Fabr., Leach.  
*Antenna* twelve-jointed, very plumose, moniliform, with filiform extremities in the male, seven-jointed, the last joint elongate, cylindric in the female.

Inhabits marshy places.

**Stirps 3.—Ocelli** none: *antenna* 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. *Antenna* with fifteen or sixteen joints, of a globular form, covered with bundles of hairs.
Inhabits moist places.

Genus 494. CECIDOMYIA. Latr., Illig., Meig., Leach. OLIGOTROPHUS. Latr.
Wings incumbent: antennæ moniliform, hairy.


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.
Inhabits moist places and meadows.

Genus 496. PEDICIA. Latr., Leach. LIMONIA. Meig.
Antennæ sub-setaceous, simple; the two first joints larger, elongate; the three following turbinated, the three next globular, and the seven last slender, cylindric.
Tipula rivosa. Linné, Donovan.
Inhabits moist places.

Genus 497. TIPULA of authors.
Antennæ sub-setaceous, 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.
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. *Stre. Chameleou.* (Pl. 12, fig. 4.) Inhabits marshy places.

**Genus 300. ODONTOMYIA.** Meig., Illig., Latr., Leach. *Antenna* a little longer than the head; the last joint cylindric-conic, with six rings: thorax bispinose.


**Genus 301. CLITELLARIA.** Meig., Illig., Leach. *Epiphiium.* Latr. *Antenna* 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.


**Genus 302. NEMOTELUS of authors.** *Antenna* half the length of the head, the third joint fusiform, four-ringed: proboscis sheathed beneath a rostelliform process on which the antennae are inserted.


**B. Antenna terminated by a style or seta.**

**Strips 3.**—*Scutellum* spined.

**Genus 303. OXYCERA.** Meig., Illig., Latr., Leach. *Antenna* with their first and second joints forming a subfusiform club, the third styliiform.


**Strips 4.**—*Scutellum* without spines.

**Genus 304. YAPPO.** Latr., Fabr., Leach. *Pachygaster.* Meig. *Antenna* with their two first joints transverse; the second with the third joints forming a sub-hemispheric head.


**Genus 305. SARGUS of authors.** *Antenna* terminated by a seta longer than the antennae, their second joint elongate: abdomen generally oblong.

CLASS V. INSECTA.

Fam. III. Tabanideæ. 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.
Inhabits meadows.

Stirps 2.—Wings divaricating: scutellum without spines: antennæ considerably longer than the head.

Genus 507. HEMATOPOTA. 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.
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.
Tabanus caecutiens. Linné.
Inhabits woods, commons, and lanes.

a. Proboscis (when at rest) entirely or partially prominent.
   * Proboscis terminated by two large lips.

Fam. IV. RHAGIONIDEÆ. Leach.

Rhagionideæ. Latreille.


Antennæ moniliform, the third joint not ringed, but terminated by a setæ: palpi porrect.
Inhabits the trunks of trees.
Genus 510. AThERIX. Meig., Latr., Leach.

Antennae moniliform; the third joint not ringed, but terminated by a seta: palpI erect.

Inhabits borders of woods.

Fam. V. DOLYCHOPODÆ. Leach.

DOLYCHOPODES. Latreille.

Palpi prominent, lamelliform: wings incumbent: antennae 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.

Inhabits moist places in woods and commons.

Fam. VI. MYDASIDÆ. Leach.

MYDASHI. 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: antennae 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., Lutr., 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. Erav. Scopoli.

Antennæ with their first joint longer than the second; the last elongate-conic, terminated by a very distinct style.

Sp. 1. Asi. crabroniforinis. Fabr., Leach. (Pl. 9. fig. 9.)
Inhabits commons and heaths.

Genus 515. DASYPOGON. Meig., Illig., Lutr., Leach, Fabr.

Antennæ with their two first joints nearly equal; the last sub-cylindric, terminated by a minute, articuliform, conic style.
Inhabits sandy commons.

Stirps 2.—Tarsi terminated by two claws and two pulvilli: antenna much longer than the head, inserted in a common footstalk.

Genus 516. DIOCTRIA. Meig., Illig., Latr., Fabr., Leach.
Inhabits the borders of woods.

Stirps 3.—Tarsi terminated by three claws; pulvilli wanting.

Genus 517. GONYPES. Latr., Leach. LEPTOCASTER. Meig.
Abdomen very long, slender, thicker towards its extremity.
Inhabits — — —

Fam. VIII. EMPIDÆ. Leach.

EMPIDES. Latreille.


Genus 518. EMPIS of authors.
Antenna three-jointed, the last joint terminated by a seta; palpi erect.
Inhabits — — —

Fam. IX. ANTHRACIDÆ. Leach.

ANTHRACII. Latreille.

Body short: wings divaricating: antennae 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 pectic.
Inhabits borders of woods on dry banks.

Fam. X. BOMBYLIDÆ. Leach.

BOMBYLIARIA. Latreille.

Body short: wings divaricating: antennae contiguous, three-jointed: head lower than the thorax.

Genus 520. BOMBYLIUS of authors.
Proboscis longer than the head, pointed: palpi distinct: antennae 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.
MODERN SYSTEM.

Fam. XI. ACRODERIDE. Leach.

INFLATA. Latreille.

Body short as if inflated: wings divaricating; antenna three- or two-jointed.

b. Proboscis (when at rest) retractile within the cavity of the mouth.

Genus 521. ACROCERA. Meig., Latr., Leach.

Proboscis obscure; antenna inserted on the vertex; two-jointed, the last joint terminated by a seta.

There is a British species of this genus.


Proboscis obscure; antenna inserted anteriorly over the cavity of the mouth; two-jointed, the last joint terminated by a seta.


Inhabits Germany and England.

Fam. XII. SYRPHIDE. Leach.

Syrphide. Latreille.

B. Haustellum with two setae.

Stirps 1.—Head anteriorly conic-produced; antenna 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.

Antenna with their setae plumose, inserted at the dorsal juncture of the second and third joints; the last joint of the antenna suborbicular.


Inhabits marshes, especially the bogs of Dartmoor, and the north of England, Scotland, and Ireland.


Antenna with their last joint elongate; seta plumose, inserted at the dorsal juncture of the second and third joint.


Inhabits woods in June and July.

Genus 526. ERISTALIS. Latr., Fabr., Leach. HELIOPHILUS. Meig., Illig.

Antenna 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.


Inhabits flowers in marshes.

**Genus 527. HELOPHILUS. Leach.**

**Elophilus. Meig., Illig., Latr.**

Antennae 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.


Inhabits hedges, and is very common.

**Genus 528. SYRPHUS of authors.**

Antennae separate at their base; their last joint suborbiculate; *seta* inserted beyond the dorsal juncture of the second and third joints; abdomen elongate-subquadrate, gradually somewhat narrower towards its extremity.


Inhabits flowers.

**Genus 529. DOROS. Meig., Illig., Leach.**

Antennae separate at their base; their last joint suborbiculate; *seta* inserted beyond the dorsal juncture of the second and third joints; abdomen subovate-trigonai; the length double the breadth.


*Milesia conopsea. Fabr.*

Inhabits fields, but is very rare.

**Stirps 2.**—*Head* not anteriorly conic-produced; *antennae* much longer than the head, placed on a common elevation; *oval cavity* on the nasal prominence; *wings* deflexed.

**Genus 530. CHRYSOTOXUM. Meig., Latr., Leach.**

Antennae subcylindric, their last joint having a *seta* at its base.


*Musca arcurata. Linn.*

Inhabits flowers.

**Genus 531. CERIA. Fabr., Latr., Illig., Meig., Leach.**

Antennae 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; *antennae* inserted separately, very much longer than the head; *wings* deflexed.

**Genus 532. APHRITIS. Latr., Leach.**

Microdon. Meig.

Antennae with their third joint conic, elongate, its base bearing a *seta.*
Inhabits heaths.

**Stirps 4.**—Head not anteriorly produced; *nasal* part straight, not prominent; *antenna* inserted separately, very much longer than the head; *wings* deflexed.

Genus 533. **MILESTA.** Latr., Leach.
Hinder thighs (of the males at least) large, very thick, elongate-ovato, denticulated beneath; *antenna* with their last joint much compressed; *abdomen* trigonate.

Inhabits borders of woods.

Fam. XIII. **Conopsidæ.** Leach.

**Conopsarid.** Latreille.
*Proboscis* prominent, nearly cylindric or conic, without any remarkable dilatation; *antenna* 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; *antenna* very much longer than the head; apex fusiform.

Inhabits hedges and flowers.

Genus 535. **ZODION.** Latr., Leach.
*Proboscis* porrect; *ocelli* three; *antenna* shorter than the head; apex subovoid.

Inhabits umbelliferous plants. Taken by Dr. Leach in Darent Wood in July.

Genus 536. **MYOPA of authors.** Stomoxoides. Schäffer.
*Proboscis* very long, filiform, geniculated beneath twice.

Inhabits hedges and gardens.

Genus 537. **BUCENTES.** Latr., Leach.
*Proboscis* geniculated twice.

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.
CLASS V. INSECTA.

MusciDEs. Latreille.

Proboscis retractile, terminated by a very remarkable dilatation.

Stirps 1.—Antenna 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.
Antenna shorter than the head: head hemispheric.
Inhabits wine-vaults.

Stirps 2.—Antenna 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.

Thorax cylindric: proboscis entirely retractile.
Inhabits thistles.

Stirps 3.—Antenna inserted near the upper part of the head, setigerous: palpi internal: halteres visible: anterior legs simple: head not often subglobose: hinder legs not longer than the rest: wings deflexed: eyes sessile: vertex broad.

Genus 541. CALOBATA. Meig., Illig., Latr., Fabr., Leach.
Antenna very much shorter than the head, the third joint longer than the second: body long, filiform: legs long, filiform.
Inhabits France and England.

Antenna very much longer than the head, inserted on an elevation; the second joint very long, cylindric.
Inhabits marshes.

Genus 543. LOXOCERA. Meig., Illig., Latr., Fabr., Leach.
Antenna very much longer than the head; last joint linear: abdomen narrow, linear.
Inhabits flowers in marshes.

Antenna shorter than the head: head round, sub-globose: vertex horizontal: body very much elongated.
Inhabits cow-dung.

Genus 545. ANTHOMYIA. Meig., Illig., Latr., Leach.
Antennae shorter than the head: head hemispheric, transverse: vertex inclined: body not much lengthened.
Inhabits woods.

STIRPS 4.—Antennae 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.
Antennae two-jointed, the last joint subulated at its extremity: anterior legs simple.
Inhabits meadows.

Antennae three-jointed: anterior legs simple.
Inhabits houses near woods.

Anterior legs raptorial: antennae terminated by a bearded seta.
Once taken in Devon by Dr. Leach.

STIRPS 5.—Antennae frontal, very short: palpi internal: halteres entirely or partly concealed: wings divaricating.

Antennae distant, sub-parallel, last joint subquadrate, with a biarticulate seta: (body short: abdomen depressed, semicircular: wings large.)
Sp. 1. Phas. variibilis. Leach.
Musca hemiptera. Linne.

STIRPS 6.—Antennae frontal, as long as the face: palpi internal, or partly concealed: wings divaricating.

Genus 550. MUSCA of authors.
Antennae with the third joint very much longer than the others: abdomen moderately long, subacuminate.
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. ERIOTRYX. Meig.

Antenna with their last joint longer than the others: abdomen distinctly annulated, rounded.
Inhabits woods.

Genus 552. GYMNOSOMA. Meig., Leach.

Antenna with their last joint longer than the others: abdomen semi-circular, subarticulate.

Genus 553. ECHINOMYIA. Dow., Latr., Leach. TACHINA. Meig., Fabr.

Antenna with their second joint longer than the others: abdomen sub-globose, and very bristly.
Inhabits woods.

Genus 554. TACHINA. Leach.

Antenna with their second joint longer than the others: abdomen ovate, rather bristly.
Inhabits the skirts and pathways in woods.

Fam. XV. ÖSTRIIDÆ. Leach.

MUSCIDES, I. Latreille. ASTOMATA. Duméril.

The larvae of all the insects of this family reside in the frontal sinuses under the skin, or in the stomachs of graminivorous mammalia. Their curious economy 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. ÖSTROS 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 acuminately: eyes distant; of the male closer than those of the female.

* Thorax roughish, with elevated points.

The larvae of the species of this division of the genus inhabit the frontal sinuses.
Sp. 1. Ösirus 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 sheep-folds.
** Thorax with square shining naked spots.

The larvæ of this section reside beneath the skin of herbivorous mammals.

Sp. 2. *Estrus 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. *Estrus 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 larva of the Gasterophili, as their name imports, inhabit the stomach of herbivorous quadrupeds, and are called Bots; the perfect insect, Botflies."


*Estrus Bovis. Linne. (Estrus Equi. Clark.)*

The larva 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:

**Strips 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. Linne. 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-
Mr. Bentley informs me, from observations he made in the summer of 1818, while in Hampshire, that the *Hippobosca* 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.


*Hippobosca avicularia.* Linné.

Inhabits the black grouse and tit-pippit.

**Genus 559. CRATERINA. Olfers.**

*Stenepteryx.* Leach.

*Ocelli* three, situated in foveolæ.


*Hippobosca Hirundinis.* Linné.

Inhabits the nests and bodies of the house-swanlow.

**Genus 560. OXYPTERUM. Kirby, Leach.**

*Ocelli* none.


Inhabits England.

**Stirps 3.—Wings none:** *thorax* anteriorly notched for the reception of the head.

**Genus 561. MELOPHAGUS. Latr., Leach, Olfers.**

*Melophila.* Nitsch.

*Ocelli* none.


*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.* Herms., 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: *tibiae* 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 Arachnida, in a division by itself. Its mode of propagation is unknown. Hermann considered the sexual as specific differences.


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 coxae, one-jointed thighs, two-jointed tibiae and tarsi, the latter part furnished with claws.

Order PODOSOMATA.

Body four-jointed, and formed as it were of the junction of the coxae: 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 Arachnoida by Dr. Leach, in Brevster'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. PYCNOGONIDE. Leach.

Mandibles none.

Genus 1. PYCNOGONUM of authors.

Legs rather strong: coxae with subequal joints: tibiae 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, ungualiform, attached to the first joint of the body at the base of the rostrum.


Genus 2. PHOXICHLUS. Latr., Leach.

Legs very slender: coxae with the middle joint longest, subclavate: tibiae 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. Nymphonideæ. Leach.

Mandibles two, biarticulate, didactyle.


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: coxae with the middle joint longest: tibiae 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.


"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, 203. tab. 2. fig. 10), 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."


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.

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 c, 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. 1.)—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 pupae 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 hexagonal 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 enclosed 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 stupefies 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 Larval 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 larvae,) in the form represented in pl. 11. fig. 3, with the sides and front covered with gauze. a 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 larve 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 antennae, 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.
METHOD OF COLLECTING INSECTS.

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 LAXES.—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
METHOD OF COLLECTING INSECTS.

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."

Heathes 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 buxarius, Noturus monoceros, Lixus subcivosiris, &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 Ranunculci or butter-cups are in blossom, many Musca 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 keep 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 Dipterae, Notonectidae, &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 Carabidae, Elateridae, &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 Staphilinidae. 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 Silphidae, Staphilinidae, &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
SEASONS FOR COLLECTING INSECTS.

dig at the roots of trees for the pupae 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 pupae 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 pupae 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 larva, 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 _Morning_, 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 _Bombbyx 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 _uninpregnated_ females. One of which is no sooner perceived, than they become so much enamoured of their fair and chaste relation, as abso-
lately 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 Tineae 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."

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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.;—Confervae 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.

**Arachnoida 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.
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 larvae 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 ineffectual, 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 transfx 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 under the 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 antennae 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 *Libellulae* 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.

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**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 forever.
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, economy, &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 1518. 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 Borrell, 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 supericies 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 supericies 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.

<table>
<thead>
<tr>
<th>Focal Distance of the Lens or Microscope in 100ths of an Inch</th>
<th>Number of Times that the Diameter of an Object is magnified</th>
<th>Number of Times that the Superficies of an Object is magnified</th>
<th>Number of Times that the Cube of an Object is magnified</th>
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<tbody>
<tr>
<td>½ or 50</td>
<td>16</td>
<td>256</td>
<td>4,096</td>
</tr>
<tr>
<td>⅞ or 40</td>
<td>20</td>
<td>400</td>
<td>8,000</td>
</tr>
<tr>
<td>⅞ or 30</td>
<td>26</td>
<td>676</td>
<td>17,576</td>
</tr>
<tr>
<td>⅞ or 20</td>
<td>40</td>
<td>1,600</td>
<td>64,000</td>
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<tr>
<td>15</td>
<td>53</td>
<td>2,806</td>
<td>143,857</td>
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<tr>
<td>14</td>
<td>57</td>
<td>3,249</td>
<td>185,193</td>
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<tr>
<td>13</td>
<td>61</td>
<td>3,721</td>
<td>226,981</td>
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<tr>
<td>12</td>
<td>66</td>
<td>4,356</td>
<td>287,196</td>
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<tr>
<td>11</td>
<td>72</td>
<td>5,184</td>
<td>373,248</td>
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<tr>
<td>⅞ or 10</td>
<td>80</td>
<td>6,400</td>
<td>512,000</td>
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<tr>
<td>9</td>
<td>83</td>
<td>7,744</td>
<td>631,472</td>
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<tr>
<td>8</td>
<td>100</td>
<td>10,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>7</td>
<td>114</td>
<td>12,996</td>
<td>1,481,544</td>
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<tr>
<td>6</td>
<td>133</td>
<td>17,029</td>
<td>2,352,637</td>
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<td>⅞ or 5</td>
<td>160</td>
<td>23,600</td>
<td>4,096,000</td>
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<tr>
<td>5</td>
<td>200</td>
<td>40,000</td>
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</tr>
<tr>
<td>4</td>
<td>266</td>
<td>70,756</td>
<td>13,821,096</td>
</tr>
<tr>
<td>3</td>
<td>400</td>
<td>160,000</td>
<td>64,000,000</td>
</tr>
<tr>
<td>⅞ or 2</td>
<td>800</td>
<td>640,000</td>
<td>512,000,000</td>
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</table>
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 Libellulae 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 t alc, 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, antenna, &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 punctuation of their stems and leaves, and a similar ornament conspicuously distinguishes numerous insects, which also imitate with multiforum variety, as may particularly be seen in the caterpillars of many species of the butterfly tribe (Papilionidae), 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 antenna, 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 meandering 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, fessess—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 scissors 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 scissors 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 *Chrysalids*; 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 *Tenthredinids*: 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 opaque 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 sub-class of the Crustacea, p. 78 to 82.

Arachnoida.—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 Obisiun) 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.

Acaris.—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.

Animalcule.—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 animalculae 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 animalculae 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 opaque 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.—*Accom.*

**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. c.)
Æquale, when it is of the same breadth with the thorax.
Barbatum, with tufts of hair at the sides or extremity.
Falcatus, 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.
Acuminata, terminating in a subulated apex.
Angulata, the posterior margin having prominent angles.
Angularis ant., 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.)
Bicuudate, the hinder wings having two projecting processes.

Caudate, in which one or more projections in the hinder wings are extended into processes.

Concoloro, of the same colour both on the upper and under surfaces.

Concerentes, which when at rest have the anterior margin in part contiguous to the inner or posterior margin, whether erect or incumbent.

Convoluta, wrapping round the body, the upper surface forming a convexity.

Costa, the margin between the base and the apex.

Crenate, the margin notched, but in such a way that the incisures are pointed to neither extremity.

Cruciata, incumbent, but the inner margins lying over each other.

Cruciate complicate, folded together crosswise.

Deflexa, incumbent, but not horizontally, the outer edges declining towards the sides.

Dentato-crosea, hollowed, with denticulations between the hollows.

Denticulata, with minute distinct teeth.

Denudata, a certain part destitute of scales, but opaque.

Digitata, divided nearly to the base like fingers.

Discus, the space between the base, the apex, the margin, and the suture.

Divaricata, incumbent, but diverging behind.

Elongata, the posterior margin longer than the interior.

Erecta, when at rest, standing up so as to approach each other.

Erosa, with minute obtuse hollows and unequal laciniae.

Excavata, having no projecting processes.

Extensa, not lying upon one another.

Falcata, the posterior margin obtusely hollowed.

Fusistrata, with one or more transparent spots.

Fissa, digitated, divided into linear portions with straight margins.

Gymnoptera, membranaceous and transparent without scales.

Horizontales, which when at rest are parallel to the horizon.

Hydrina, quite transparent.

Incumbentes, which when the insect is at rest cover the back of the abdomen horizontally.

Incurvata, the anterior margin bent like an arch.

Integerrima, with a margin linear and not in any wise cut.

Integra, undivided without indentations.

Irregulara, marked with exceedingly minute points.

Lanceolata, oblong attenuated at both extremities.

Maculata, marked with spots.

Margo exterior, anticus, crassior ala, the margin between the base and the apex.
Margo posterior, the margin between the apex and the angulus posticus.
Margo interio or tenius, the margin between the base and the angulus posticus.
Nebulose, marked with many scattered, abrupt lines, of various forms.
Nervosae, with nerves large for the size of the wing.
Nitidissimae, with scales exceedingly smooth and resplendent.
Ocellate, with one or more ocelli, or eye-like markings.
Pagina superior, the upper surface of the wings.
Pagina inferior, the under surface.
Potentes, horizontal, extended when at rest, not uniting or incumbent.
Pudicae, nearly horizontal, little inclined, and not incumbent.
Planae, extended horizontally, which cannot be folded up.
Plicate, wings which when at rest are folded up, but expanded in flight.
Punctatae, marked with very small dots.
Radiatae, with nerves diverging like rays from a common centre.
Repandae, with a waving but plain margin.
Reticulatae, with nerves disposed like net-work.
Reverse, deflected, the margin of the secondary wings projecting from under the primary.
Rotundatae, the posterior margin rounded and devoid of angles.
Sidicaudatae, the process in the posterior wings, hardly longer than a serrature.
Sulcose, somewhat indented, but irregularly.
Tesselatae, marked with black spots so disposed as to resemble a chequered pavement.
Truncatae, with the posterior angle straight.
Tomatae, with elevated membranes among the veins.
Variigata, of different colours.
Undulatae, marked with continuous and nearly parallel waving lines.
Unguiculatae, 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.

ANTENNE (or Horns) For the supposed use of these organs see p. 24.

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.

Aculeata, armed with small sharp points.

Aculeato-serrata, set with thick prickles turned towards the apex.
Aculeato-uncinata, set with hook-shaped prickles.
Acuminato-setaceae, terminated with a stiff sharp-pointed hair.
Amphi-opthalmica, wholly or in part surrounded by the eyes.
Approximatae, close together at their base.
Aristatae, furnished with a compressed lateral knob, having attached to it a short beard or bristle.
Articulatae, with distinct joints or articulations.
Barbatae, with tufts of hair at the articulations.
Breves, shorter than the body.
Capitatae, clavated, ending in a knob.
Catopthalmica, when placed behind the eyes.
Ciliatae, fringed with parallel setæ, inserted along the side of the antennae through their whole length.
Clavatae, club-shaped, terminating in a knob; growing gradually thicker towards the apex.
Coadunatae, connected at the base.
Dentatae, set with remote spreading points in one direction.
Distinctatae, not united at their base.
Elongatae, when longer than the head.
Exarticulatae, with no distinct articulations.
Filatae, simple, without a lateral hair or thread.
Filiformes, of the same thickness through their whole length.
Hyperophthalmica, placed above the eyes.
Hypophthalmica, placed under the eyes.
Lamellatae, pectinated, but with scales instead of bristles.
Longae, longer than the body.
Mediocres, of the same length with the body.
Moniliformes, with distinct subglobular joints or bead-like articulations.
Mucronatae, terminating in a sharp projecting point.
Nuda, not garnished with hairs or bristles.
Nuttantes, at the points bent downwards.
Pectinatae, comb-shaped, or sending out from both sides parallel bristles the whole length.
Perfoliatae, the club being horizontally divided, the pieces connected in the middle.
Perfoliato-imbricatae, consisting of small concave pieces, imbricated and connected in the middle.
Plumosa, like a plume of feathers.
Prorrectae, stretched straight forward.
Prismaticae, linear, with more than two flat sides.
Pro-opthalmica, placed before the eyes.
Ramosae, with many lateral branches.
Remotae, distant from each other.
Rigidae, not flexible.
AN EXPLANATION OF

Securiformes, shaped somewhat like an axe.
Serrate, toothed like a saw, the incisures turned towards the extremities.
Setaceae, growing gradually more attenuated from the base to the point.
Seticornes, in the shape of a bristle.
Simplurres, not branched.
Spinose, set with large subulated spines.
Spiriformes, rolled into a spiral form.
Subulate, linear at the base, growing more slender and pointed at the apex.
Truncate, the club terminated abruptly by a transverse line.
Verticillate, with hairs arranged in whorls at the joints.
Uncinate, elevated and mucronated, the point reflexed so as nearly to form a right angle.

Aptera, insects without wings; many of the Coleoptera are destitute of wings, and in most of such species the elytra are close, not separable: the females of several species of the Lepidoptera are also destitute of wings; as are also some of the Hymenoptera.

AREOLE, Wing-cells. In Hymenoptera these are essential in the generic character; as in Tenthraxidide, &c.

Marginales, those cells situated on the upper part of the wing near the apex. (See pl. 10. fig. 10. a. a.)
Submarginales are beneath the above. (Pl. 10. fig. 10. b. b.)

Artus, the various instruments of motion, viz. the wings, the feet, &c. (See p. 33.)

ATOMUS, a very minute dot or point.

Body. See Corpus.

CAPUT. The Head.

Angulatum, the margin cornered.
Attenuatum, lengthened, blunt at the base, growing narrower at the apex.
Attenuatum postice, blunt at the apex, narrower at the base.
Basis, the part connected to the thorax.
Caudiculatum, with one or more deep hollow lines.
Clypeatum, covered above with a leaf-like spreading substance.
Conicum, cylindrical, growing smaller at the apex.
Cornutum, some part ending in a horn.
Depressum, pressed downwards as it were, or thinner than broad.
Emarginatum, terminating in a notch.
Exsertum, distinctly separated from the thorax.
Gibbum, convex both above and below.
Inflexum, not on the same plane with the thorax, bending inward.
Integrum, undivided, without any furrow.
Linatum, roundish, divided at the base by a hollow, the hinder angles acute.
Marginatum, with a free elevated margin.
Mutilum, not furnished with horns, spines, or tubercles.
Nutans, fixed transversely at right angles with the thorax.
Porrectum, prominent and elongated.
Prolongatum tubo, the apex running out into a tube.
Prominens, on the same plane with the thorax, but narrower.
Retractile, capable of being drawn at pleasure within the thorax, and concealed there.
Retractum, placed within the thorax, and not to be distinguished from it.
Rugosum, wrinkled, marked with waved and elevated lines either longitudinally or transversely.
Tuberculatum, rough with rigid prominent warts or tubercles.
CAUDA, the Tail, a part affixed to the extremity of the abdomen. (See p. 33).
Aristata, terminating in a bristle or slender thread.
Biscta, having two slender attenuated setae.
Foliacea, spreading out like a membrane.
Rostrata, standing out like a beak.
Setosa, elongated, slender, gradually attenuated.
Triquetra, having three plane sides.
Triseta, having three slender attenuated setae, as in Ephemerid.
Chela, the extreme part of the foot, with a moveable lateral toe like the claw of a crab.
Chrysalis, (the pupa of those Papilionidae that are often of a golden colour) synonymous with Pupa.
Cicatrina, an elevated and somewhat rigid spot.
Cingula, coloured bands or belts surrounding the abdomen.
Clypeus, a horny horizontal part of the head covering the mouth.
(See p. 30.)
Coleoptria, both elytra.
COLOR.—The colour of insects varies greatly, and it frequently occurs that the species cannot be determined by this alone. Many circumstances will tend to alter the colour; as a change of food, the age, &c. and such casualties should be allowed for. In studying the species and arranging varieties, the extreme of both light and dark specimens should always be retained.
Æruginosus, light blueish green, like verdigrise.
Albus, dull white.
Albidus, dirty dull white.
Afer, the purest and deepest black.
Atro-purpureus, very dark red, almost approaching to black.
Atro-virens, dark green, bordering on dark blue.
Aureus, gold-yellow, without any foreign mixture.
EXPLANATION OF

• Aurantiacus, orange, or a mixture of yellow and red.
• Azureus, azure blue, nearly the same with Caruleus, but bright like ultramarine.
• Badiaus, chestnut or liver-brown bordering on dark red.
• Brunneus, the darkest pure brown.
• Casius, pale blue, verging towards gray.
• Caruleus, sky-blue.
• Cauus, hoary, with more white than gray.
• Carnus, flesh-colour, something between white and red.
• Cinerus, ash-colour, blackish gray.
• Coccineus, cinnabar-colour, with a slight tinge of blue.
• Crocus, saffron-colour, dark orange.
• Cypreus, dark blue like Prussian blue.
• Ferrugineus, brown, verging towards yellow.
• Flavo-circens, green, verging upon yellow.
• Fuscesc, brown, running into gray.
• Griseus, lively light gray.
• Glaucus, green, bordering upon gray.
• Hepaticus, liver-brown.
• Lacteus, shining white.
• Lateritia, brick-colour, like Miniatus, but duller, and verging towards yellow.
• Lilacinus, lilac, like Violaceus, but duller, and verging more towards red.
• Lividus, dark gray running into violet.
• Luteus, yellow.
• Miniatus, high red, like red-lead.
• Niger, black, with a tinge of gray.
• Ochraceus, yellow, with a small tinge of brown.
• Pallidus, of a pale cadaverous hue.
• Pallide-flavus, pale or bluish-yellow.
• Prusius, grass-green without any tinge of blue.
• Puniceus, fine bright red like carmine.
• Roseus, rose-colour, a pale blood-red.
• Sanguineus, pure red, but duller than Puniceus.
• Sulphureus, bright yellow.
• Testaceus, a dark red, or brick-colour.
• Violaceus, violet-colour, a mixture of blue and red.
• Vitellinus, yellow, with a slight tinge of red.

CORPUS, the Body (and see also ABDOMEN). This part is frequently considered in the generic characters, and designated as under.

Compressum, flattened at the sides.
Depressum, depressed, thinner than broad.
Glabrum, of a smooth shining surface.
THE TERMS USED IN ENTOMOLOGY.

Hemisphericum, convex above, flat below, like the section of a globe.
Lineare, oblong, equal in breadth throughout.
Marginatum, with a free elevated margin.
Membranaceum, nearly of the consistence of a leaf.
Nitidum, the surface smooth and shining.
Nudum, not covered with either wool, hair, or bristles.
Oblongum, the transverse diameter much less than the longitudinal.
Obovatum, inversely ovate, the narrow end downwards.
Obtusum, blunt, rounded at the apex.
Obliquatum, the transverse diameter equal to the longitudinal.
Ovale, egg-shaped, the outline at both extremities equal.
Ovatum, the longitudinal diameter exceeding the transverse, and the latter broader at the base than at the apex.
Pilosum, set with distinct long hairs.
Platrum, the under part flat.
Pubescent, covered with soft hair.
Retusum, terminating in an obtuse hollow.
Rotundatum, the outline nearly circular, without corners.
Rugosum, wrinkled, marked with waved and elevated lines, either longitudinally or transversely.
Scabrum, rough, with hard raised points.
Sericeum, covered with soft shining hairs.
Tomentosum, covered with a soft down or wool.
Crustaceus, somewhat hard, elastic, resisting the impression of the finger.

DECLARATUM INSECTUM, the insect arrived at its perfect state.

DISCES, of the wing, elytra, &c. the middle between the base, the apex, the margin, and the suture (Pl. 10. fig. 5. a.)

ELYTRA, two crustaceous or coriaceous wings, expanded in flight, when at rest covering the abdomen, and inclosing the membranaceous wings. (See p. 37.) The elytra are subject to great variety in Colour, Markings, Sculpture, &c. and are distinguished by many terms in common with Abdomen, Abc, Thorax, &c. They are called Abbreviata, when shorter than the abdomen.

Aculeata, armed with small sharp points.
Annulata, narrower than the back.
Apex, the part at the extremity of the abdomen. (Pl. 10. fig. 5. d.)
Attenuata, attenuated, blunt at the base, growing narrower at the apex.
Basis, the part next the thorax. (Pl. 10. fig. 5. e.)
Caudinata, with deep hollow lines.
Carinata, forming a ridge at the suture.
Coadunata, undivided, joined together at the suture.
Convexa, the surface elevated like the section of a sphere.
Coriacea, of a substance like leather.
Deflexa, the edges declining towards the sides.
Dentata, the margin or apex set with sharp pointed processes.
Denticulata, with minute distinct teeth.
Dimidiata, covering but half of the back.
Emarginata, terminating in a notch.
Fasciata, transverse, at the apex emarginate.
Fuscistrata, with one or more transparent spots.
Flexilla, capable of being bent, not crustaceous.
Hirta, thickly covered with short hairs.
Hispida, set with short rigid bristles.
Immarginata, without a margin or distinct rim.
Immobilia, that cannot be moved, and consequently are useless for flight.
Inequilata, the surface not flat, but with irregular elevations and depressions.
Integra, completely covering the back.
Linearia, oblong, equal in breadth throughout.
Lincata, marked with depressed lines.
Linneto-punctata, dotted, the dots or punctures disposed in lines.
Marginata, with a free elevated margin.
Margin, the outer rim next the belly, from the base to the apex.
Marginata, rough, with rigid spines.
Mutilata, which do not completely cover the back, whether with respect to length or breadth.
Pilosa, set with distinct hairs.
Porcata, with elevated longitudinal lines or ridges.
Premorsa, the apex terminating obtusely, with unequal incisures.
Pubescentia, covered with soft hair.
Punctata, marked with very small excavated dots or punctures.
Rigida, not flexible.
Rotundata, the apex without angles.
Rugosa, wrinkled, marked with waved and elevated lines, either longitudinally or transversely.
Scabra, rough with hard raised points.
Secinea, covered with soft shining hairs.
Sinuata, a hollow, a deep furrow as if scooped out.
Spinosa, the margins set with subulated rigid spines.
Striata, slightly channelled with parallel lines.
Submarginala, the margin having a distinct rim, but neither free nor elevated.
Subrotunda, the outline nearly circular.
Subulata, linear at the base, growing more slender, and pointed at the apex.
Stylata, with one or more deep hollow furrows.
Sutura, the part where the elytra meet and form a line in the middle of the back from the base to the apex.

Tomentosa, covered with soft down or wool.

Truncata, abbreviated, the apex terminating in an abrupt line.

Tuberculata, rough, with rigid prominent warts or tubercles.

Villosa, covered with soft hair.

Eruca, the old word for Larva.

Escutellatus, having no scutellum.

FASCIA, a broad transverse line or band.

Abbreviata, not extending throughout the wing.

Communis, extended over both upper and under wings.

Dimidiata, running only half the length of the wing.

Hyalina, quite transparent.

Interrupta, broken, but continued either above or below.

Sesquicerta, occupying the fourth part of the wing.

Terminalis, near the apex and posterior margin.

Undata, with waving obtuse sinuses.

Fasciculus, a bundle or tuft of hair as on the back of many caterpillars.

FEMUR, the thigh, that part of the limb nearest the body. (Pl. 10.

fig. 6. b.—fig. 7. c.)

Arcuatum, bent, like a circular arch.

Basis, the part next the body.

Dentatum, the margin having one or more indentations.

Hispidum, set with short rigid bristles.

Incrassatum, growing thicker in the middle.

Muticum, without spine or tooth.

Saltatorium, thick, formed for leaping.

Spinosum, set with large subulatcd spines.

(Femora) simplicia, equal, and without any remarkable difference in thickness.

Fenestra, a clear transparent spot.

HABITAT, the habitation, the places where insects are usually found.

Abietis, fir-groves.

Absinthetis, places where wormwood abounds.

Agris, artificial grass-fields, clover, &c.

Alnetis, places abounding in alder.

Animalibus putridis, dead animals in woods, sides of rivers, &c.

Aquis, water.

Aquis fluentibus, running streams.

Aquis stagnantibus, ponds and standing waters.

Arundinetis, reedy fens.

Betaletis, birch-trees, or woods.

Boleto, boletaria and fungi.

Cardueticis, places overgrown with thistles.

Chelidonicis, where celandine grows.
Compascuis, grassy commons.
Corylis, nut-trees.
Crepaculis, chalky places.
Domibus, houses or out-houses in the shade.
Dunetis, bushy places or thickets.
Ericetis, heaths or heathy commons.
Floribus, the blossoms of flowers.
Fossis, ditches full of aquatic plants.
Fungis, funguses in all their states.
Graminosis, grassy banks, &c.
Hortis, gardens, the resort of many rare and interesting insects, which if extensive, will afford full employ at all hours of the day and seasons of the year.
Lapidibus, stones.  Sub lapides, under stones.
Lappaculis, places where burdock abounds.
Lichenosis, trees and pales abounding in lichens.
Ligno putrido, decayed trees and wood.
Lucis, thick woods.
Nemoribus, shady groves.
Paludibus, marshy grounds.
Parietinosis, shady sides of old walls.
Pascuis, pastures.
Peridmnetis, skirts of woods.
Pinetis, where pines are plentiful.
Populetis, among poplars.
Pratis, meadows.
Quercetis, among oaks.
Ripis, banks of gross weeds.
Sabulosis, sandy places.
Salicetis, amongst willows.
Segetibus, grassy borders, &c. of corn fields.
Sepibus, hedges.
Sepimentis, lanes between hedges, mostly moist.
Septis, old shady pales and rails.
Sicifoliiis, withered leaves on oaks, &c.
Spartiosis, broom fields.
Stagnis, ponds wherein water-plants grow.
Stercore, the dung of animals, especially of horses and cattle.
Sylvis, woods, open only in their paths.
Sylvaticosis, considerable open parts in woods.
Tiliaraeis, among limes.
Truncis, shady trunks of trees.
Viminosis, ozier-holts.
Ulicetis, commons abounding in furze.
Ulliginosis, bogs, fens, and moist places.
THE TERMS USED IN ENTOMOLOGY.

*Ulmos*, amongst elms.

*Umbelliferis*, on umbelliferous plants in hedges and wood sides.

HALTERES (see p. 37), poisers, in the Order of *Diptera*; two globular bodies placed on slender stalks behind the wings, and seated on the thorax; sometimes they are an arched membranaceous scale.

HAMULI. These are very minute hooks or crotchets, discoverable under, a good magnifier, on the inferior wings of many Hymenopterous insects, by means of which they are kept steady in flying.

— *Kirby*.

HASTATA, a javelin-shaped mark that is triangular; the base and sides hollowed, the posterior angles spreading horizontally.

HAUSTELLUM, a sort of trunk at the mouth of insects, principally of the *Diptera*, consisting of setae, which are either inclosed in a bivalve sheath or without one.

HEAD. See Caput.

HEXELYTRA, wings either wholly or in part formed of a substance intermediate between leather and membrane.

HEXAPODA insecta, having six feet, as in all genuine insects.

HYALINA, wings, elytra, &c. quite transparent.

IMAGO, the perfect insect after having gone through the states of Larva and Pupa.

IMBRICATUS, set with scales, lying over each other like the tiles of a house.

INSTALLA, a stria of equal breadth throughout.

LABRUM. (See p. 23.)

LARVA, caterpillar, grub or maggot; the insect as it comes from the egg, slow, sterile, and voracious.

Caudata, with a tail or horn, as in most of the *Sphingida*.

Gregaria, those larvæ that live in society, many of them inclosed in a web.

Nuda, naked, not hairy.

Polyphaga, that will eat a variety of plants.

Subentanea, small caterpillars that feed within the substance of the leaf.

LINEA, a line, the twelfth part of an inch.

LINGUA, the Tongue. (See p. 29.)

Replicatilis, the point capable of being turned back.

Spiralis, capable of being rolled up like the spring of a watch between the palpi. (Pl. 10. fig. 9.)

LITURA, a spot of a deeper colour in one part than another.

LUNULA, a spot shaped like a new moon.

MACULA, a spot, larger than punctum, of an indeterminate figure, and of a different colour from the ground. (Pl. 10. fig. 8. h.)
An explanation of

Ancyrdaris, round, the middle of the same colour with the rest of the wing.

Deltoides, nearly triangular.

Flexuosa, irregularly waving.

MANDIBULÆ, the mandibles. (See p. 28. Pl. 10. fig. 1. d.)

Manus, a foot shaped like the claw of a crab.

MARGINATUS, thorax, elytra, &c. with a free elevated margin.

MAXILLÆ, organs at the mouth, generally semicircular, pointed at the ends, moving transversely, that is, horizontally, not perpendicularly as in the human species, for the purpose of holding and comminuting the food. (See also p. 28. Pl. 10. fig. 2. a.—b. c. maxillary palpi.)

Dentata, the margins set with sharp pointed processes.

Forcapa, like a pair of pincers.

Furcata, forked, divided into two parts at the ends.

Lamellata, thick in the middle, and smaller towards the base and the apex.

Prominentes, placed straight before the head, and on the same plane.

MENTUM, the chin. This part is most observable in the Lucanus Cer-

vus.

METAMORPHOSIS.—The transformation of an insect from the larva to the pupa, and previous to its last or perfect state. The meta-
morphosis of insects is defined as follows.

Coarctata, of an oblong cylindrical shape with no part of the body vis-
ible; as in the Order Omaloptera.

Incompleta, with motionless feet and wings; as in Coleoptera, Lep-
doptera, &c.

Semicompleta, when the pupa moves, eats, and has wing-cases; as in Dermoptera, Orthoptera, Diptoptera, Hymiptera, &c.

OCELLI (or Stemnata), little shining eyes generally placed together on the crown of the head, for the purpose of seeing objects at a distance and above the insect.

Dioptra, with a transparent pupil divided transversely by a small line.

Sesquialter or Sesquiocellus, a large ocellus inclosing a smaller one.

OCULI, the eyes (see p. 21). All insects have at least two eyes: the Arachnioida have six or eight, arranged for the most part on the vertex or summit of the head. They are subject to considerable variety in situation and shape, and are distinguished as under.

Approximati, when placed close together.

Bini, two eyes, one placed on each side of the head.

Colorati, of a different colour from that of the head.

Compositi, furnished with many and often numerous lenses, for the purpose of seeing near objects and those at a distance.

Concolores, of the same colour with the head and body.
THE TERMS USED IN ENTOMOLOGY.

Contiguous, touching one another.

Fasciati, marked with stripes of a different colour: this may be observed in several of the Dipterous insects, particularly those of the Tabanidae; but the colours fade when the insect is dead.

Fenestrati, the pupil glassy and transparent.

Hemisphericci, convex, like the section of a globe.

Immobiles, so fixed in the head as to be incapable of motion.

Infiri, placed on the under side of the head.

Interrupti, broken, but continued either above or below, as in the Gyrinidae.

Laterales, placed at each side of the head.

Lunati, resembling a crescent or new moon.

Mobiles, so situated as to be moveable.

Oblicrnerati, the pupil scarcely distinguishable.

Cetoni, eight distinct eyes, as in many of the Arachnaïda.

Ovales, egg-shaped, the outline at both extremities equal.

Pedunculati, elevated on a stalk or peduncle.

Plani, the surface on the same plane with the head.

Prominuli, standing far out from the head.

Quaterni, with four eyes.

Remoti, distant from each other.

Reniformes, kidney-shaped, nearly round, hollowed on one side.

Semi, with six distinct eyes.

Simplices, furnished with only one lens.

Variegati, of different colours.

Verticales, placed on the crown of the head.

OS, the mouth and its parts. (See p. 27.)

Inferum, when placed on the under side of the head.

Maxillosum, with large maxillae.

Pectorale, situated in the breast, in a tube or rostrum.

Terminale, the apex of the head.

Pagina superior, the upper surface of the wing.

—— inferior, the under surface.

Palatum, the interior part of the transverse lip.

PALPI, organs placed at the mouth, often articulated, and generally shorter than the antenna, and are either two, four, or six. (Pl. 10. fig. 1. c. g. labial palpi. f. f. maxillary palpi.)

Clavati, club-shaped, terminating in a knob; growing gradually thicker towards the apex.

Elongati, longer than common, or longer than the mouth.

Evarticulati, with no distinct articulations.

Ersecti, projecting, not lying hid.

Filiformes, of the same thickness throughout.

Incurvi, turning straight upwards at the ends, over the head.

Pediformes, with a geniculated articulation like a foot.
Porrecti, stretched straight forwards.
Recti, straight, without flexure.
Recurvati, turned back.
Securiformes, shaped somewhat like an axe.
Setacei, growing gradually more attenuated from the base to the apex.
Simplices, not articulated.
Subulati, linear at the base, growing more slender and pointed at the apex.
Patella, orbicular, elevated, moveable bodies on which the base of the femora rests, as in the Ichneumonidae.
Pectines, in the genus Scorpio, two bodies situated between the abdomen and the breast, dentated on one side, but the number of teeth varies.
Pectus, the Breast, the under part of the thorax to which the feet are attached.
PEDES, the Limbs.—This term is applied by Linne to the whole limb, including the femur, tibia, tarsi, and unguis. The formation of the legs will generally determine the habits of insects, and are called Cursorii, when formed for running.
Mutici, without claws or spines.
Natatorii, compressed, doubly ciliated and two-edged, formed for swimming.
Saltatorii, with thick thighs, formed for leaping.
Serrati, dentated or toothed like a saw.
Spinosi, set with large subulated spines.
Petiolatum, having a slender elongated tube connecting the abdomen to the thorax: this is observable in many of the Hymenopterous insects.
Plantae, the under part of the tarsi.
Hemisphericae, concave and nearly circular: this kind of tarsus is peculiar to the aquatic Coleoptera. (Pl. 3. fig. 13. a.)
PROBOSCIS, a hollow tube at the mouth, often fleshy, and enlarging at the point.
Inflexa, tending towards the breast.
Plicatilis, pliable, so that it can be folded up.
Porrecta, stretched straight forward.
Recurrata, turning backwards.
PUPA, Aurilia, Chrysalis, Nymphe, the animal changed from a larva, often motionless, destitute of mouth, &c. See Metamorphosis.
Folliculata, inclosed in a case made of hair or silk, or of leaves, wool, earth, &c. conglutinated together.
Nuda, not inclosed in a case, not folliculated.
Obiecta, wrapped up in a crustaceous covering, the thorax and abdomen obvious.
Punctata, Elytra, &c. sprinkled with hollow dots or punctures.
THE TERMS USED IN ENTOMOLOGY.

Punctum, a small dot of a different colour from the rest of the wing.
- Callosum, an elevated and somewhat rigid point.
- Geminum, two spots near each other but separated.
- Ramosum, divided into distant parts.
- Ocellare, an orbicular spot of a different colour in the middle.
- Sesquialterum, formed of two spots that are distinct but contiguous.
- Reniformis, kidney-shaped, nearly round, hollowed on one side.
- Rivulus, a stripe running irregularly over the wing, and of a different colour from it.

ROSTRUM, the mouth lengthened out into a snout or tapering beak; this part is subject to great variations, and in the Curculionida, &c. is essential in the generic character.
- Acutum, the apex forming an acute angle.
- Apex, the point.
- Arcuatum, bent like a circular arch.
- Basis, the part next the head.
- Bivalve, consisting of two concave valves, united so as to form a tube.
- Breve, shorter than the head.
- Canaliculatum, with a deep hollow groove in the middle.
- Conicum, cylindrical, growing smaller at the apex.
- Cylindricum, linear and round.
- Geniculatum, bent, and making an angle at the flexure.
- Inflexum, not projecting, but bent towards the breast.
- Longius, longer than the head and thorax.
- Longum, longer than the head.
- Longissimum, longer than the body.
- Multivalve, forming a tube by means of many valves uniting.
- Nutans, transversely fixed to the head.
- Porrectum, prominent and elongated.
- Rectum, produced but not bent.
- Scutellum, slender, flexible, and gradually tapering towards the apex.
- Tubulosum, perforated like a tube; entire.
- Rugosus, with waved and elevated lines, either longitudinally or transversely.

SALTATORIUM, such insects that have their legs with thick thighs strong and formed for leaping.

SCUTELLUM.—This part is separated from the thorax by a transverse line, and lies between the wings or wing-cases; its form is generally triangular.

SETA, a fine hair or bristle.

SEXES OF INSECTS, are distinguished in Entomological works, by ♂ (Mars) for male, and ♀ (Venus) female.

SINUS, a hollow, an excavation as if scooped out.
AN EXPLANATION OF

SPIRACULA, the respiratory organs, situated on the sides of the abdomen.

SQUAMULA, a Scale; an erect membrane placed between the thorax and abdomen.

STEMMATA, the Ocelli or little eyes placed on the summit of the head: these are frequently considered in the character of a genus.

Sternum, the ridge running under the breast; this part is very conspicuous in the Dytiscide.

STIGMA, a spot or mark generally on the upper wing.

STRIA, a longitudinal line, and often punctured, generally extending from the base to the apex of the elytra.

Obsoleta, indistinct, as if obliterated.

STRICA, a narrow transverse line.

SULCUS, a deep hollow furrow.

SUTURA, the part where the elytra meet and form the line in the middle of the back, from the base to the apex.

TARSUS, the Foot. The form and number of the joints vary according to the insect's mode of life: in several species of the Coleoptera the anterior tarsi of the male are frequently broader than those of the female, and consequently serve as a sexual distinction. The number of joints in the tarsi serves as sections of the Order Coleoptera.

TERGUM, the upper part or back of the abdomen.

Tessellata, spotted or marked with another colour chequerwise.

THORAX, the part intermediate to the head and body. (See p. 31.) This part is subject to the greatest variety in shape, sculpture, &c.

Many of the terms used to distinguish the elytra in Coleoptera are also applicable to the thorax.

Aculeatus, furnished with sharp spines.

Aequalis, when of the same breadth with the elytra.

Angulatus, the posterior margin having prominent angles.

Canaliculatus, with a deep longitudinal groove in the middle.

Carinatus, the middle part of the disc raised into a straight longitudinal ridge.

Convexus, when the surface is elevated like the section of a sphere.

Cordatus, heart-shaped, the base notched, without angles.

Crenatus, the margin notched, but in such a way that the incisures are pointed to neither extremity.

Cristatus, the carinated ridge arched, dentated, and compressed.

Cucullatus, the carinated ridge hollowed before into a kind of hood.

Discus, the middle of the thorax, the line from b to c (fig. 4. pl. 10).

Gibbus, the disc elevated but not spherical.

Immarginatus, without clypeus or distinct rim.

Inequalis, the surface not flat, but with irregular elevations and depressions.
**Integer, Integerimus**, with the margin linear and not in anywise cut.

**Lineatus**, marked longitudinally with coloured lines.

**Lobatus**, divided into distinct parts.

**Marginatus**, with a free elevated margin.

**Margo**, the part surrounding discus.

**Muticus**, not furnished with horns, spines, or tubercles.

**NUidius**, the surface smooth and shining.

**Lineatus**, marked longitudinally with coloured lines.

**Lobatiis**, divided into distinct parts.

**Marginafus**, with a free elevated margin.

**Margo**, the part surrounding the discus.

**Muticus**, not furnished with horns, spines, or tubercles.

**NUidius**, the surface smooth and shining.

**Obcordutus**, heart-shaped, with the apex towards the abdomen.

**Oblongus**, the transverse diameter much less than the longitudinal.

**Obovatus**, inversely ovate.

**Obtusiis**, blunt, or rounded at the apex.

**Orbiculutus**, the transverse diameter equal to the longitudinal.

**Ovalis**, egg-shaped, the outline at both extremities equal.

**Ovatus**, the longitudinal diameter exceeding the transverse, and the latter broader at the base than at the apex.

**Planus**, the surface on the same plane with the head.

**Punctatua**, with hollow dots or punctures.

**Retusus**, terminating in an obtuse hollow.

**Rotundatus**, the outline nearly circular, without corners.

**Rugosus**, wrinkled, marked with waved and elevated lines, either longitudinally or transversely.

**Serratus**, the margin toothed like a saw.

**Spinosus**, the margins furnished with rigid spines.

**Squarrosus**, divided into elevated laciniae.

**Striatus**, slightly channelled with parallel lines.

**Submarginalis**, the margin having a distinct rim, but neither free nor elevated.

**Subrostratus**, the outline nearly circular.

**Sulcatus**, with one or more deep hollow furrows.

**Tectiniscus**, nearly cylindrical.

**Tetragonus**, with four corners.

**Transversus**, linear, but transverse.

**Tuberculatus**, rough with rigid prominent warts or tubercles.

**Villosus**, covered with soft down or hair.

**Tibia**, a part of the leg between the femora and tarsi.

**Trochanters**, spines fixed to the legs to assist them in running; these are common to most of the Carabidae.

**Vagina**, a bivalve sheath at the mouth of many Hymenopterous and Dipterous insects sometimes articulated. Mr. Kirby uses it in Hymenoptera to include every part of the office of which is to cover, defend, or support the tongue. **Vagina** is sometimes used for that part which contains the sting of insects.

**Valvulata**, small concave membranes enclosing the proboscis.

**Venae, Veins**; the vessels diffused throughout the wings; the veinung...
of the wings may always be considered with great advantage in the generic characters of insects, especially such as have them transparent.

Venter, the under part of the abdomen.

Vertex, the crown or summit of the head.

Villosus, covered with soft hair.

Vitta, a stria with a waved or furrowed margin.

Interrupta, not extending in a continued line but continued either above or below.

Repanda, with waving acute sinuses.

Undata, with waving obtuse sinuses.

Ungues, the Claws, subulated hook-shaped spines at the apex of the tarsi.
THE
ENTOMOLOGIST'S CALENDAR,
EXHIBITING THE TIME OF APPEARANCE AND HABITATON OF NEAR THREE THOUSAND SPECIES OF BRITISH INSECTS.

In forming the following Calendar, I have been anxious to render it as extensive as possible, and at the same time to introduce as many species of insects as my own knowledge of the subject, and the few works that have hitherto been published relative to British Entomology, could make it. In the times of appearance, and the situation where found, of a great number of species, I have been greatly assisted by my kind and much respected friend J. F. Stephens, Esq. F. L. S. whose rich cabinet has always been open to me, and who also has furnished me with much valuable information, derived from his own observations. In many species I have been unable to give a reference to a description, several of them being new to Britain, and hitherto undescribed; but thought it best to introduce them, as they are certainly valuable acquisitions to a cabinet.

As many of the Linnean genera have not yet been sufficiently investigated, and the species requiring a minute examination, such genera and species are distinguished by Italics. Of these the most extensive are the Lepidoptera, the genera of which are the least known in any department of Entomology. Of the Hemiptera, Neuroptera, Hymenoptera, and Diptera, but little is yet known of the species, consequently a very small number is introduced: however, they may be obtained in the course of collecting. I may be censured by the scientific Entomologist for introducing the English names of the Lepidoptera, but my object has been to render this a useful work; and many collectors are acquainted with them by no other name; yet it is to be hoped that these will hereafter be discontinued, as the scientific name is as easily retained in the memory (if a person uses himself to it) as the absurd English ones in present use.

The species marked by the asterisk (*) I am rather doubtful if found in the month in which they are placed in the calendar; but such is the time of the plants on which they feed being in blossom, which is certainly a good guide to the Entomologist.

The obelisk (+) to the plant in the habitation denotes that such insects are generally found in the larva state, and should be sought for accordingly, the insect being rare or difficult to procure in the perfect state.

⊙ This mark, placed in other times of appearance, denotes that they may be found in such situations throughout the year.

As many of the Lepidoptera last but a few days in the perfect state, I have distinguished the time of the month in which such species appear by the following: b. beginning; m. middle; e. end:—also, l. larva; p. pupa.
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- **Podura viridis**
- **Silpha opaca**
- **Staphylinus Morio**
- **Onialium planum**
- **Byrrhus semistriatus**
- **Platysoma pictipes**
- **Parnus sericeus**
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- **The clouded Brown tortricca**
- **The clouded Lead**
- **Salicis**
- **The rosy Day-moth**

* *Drassus melanogaster*

* *Clubiona lapidicola*

* *Aranea domestica*

* *Argyroneta aquatica*

* *Forficula polyptica*

* *Cicindela campestris*

* *Carabus violaceus*

* *atenulatus*

* *membralis*
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### JUNE

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Note: The entries are from "The Entomologist's Calendar" and list various species of moth larvae along with their associated habitats and other references.
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The Swallow-tail.


| Daphline c. Dover (Mr. Stephens) |
| The green-chequered White |

Meliata Silene b. Woods and waste ground 8, Page 237. The small Pearl-bordered Fritillary.

Argyminis Lathonia b. Open parts in woods, &c. 5, — The Queen of Spain Fritillary.

| Aglaia b. |
| The dark-green Fritillary. |
| Adipe b. |
| The high-brown Fritillary. |
| Paphia b. Borders of woods |
| The silver-washed Fritillary. |


| Cardui l. M. Spear thistle |
| The painted Lady. |
| Cardui e. Meadows |
| The painted Lady. |
| Antiopa l. m. Birch and sallow |
| The White-bordered. |
| Polychloros m. Near elms |
| The large Tortoiseshell. |

The Peacock.

| The Peacock. |
| The Peacock. polychloros m. Near elms |

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- Geophilus carpophagus Garden fruit
- Phalangium Opilio Walls and rocks
- Agelela labyrinthica Fields
- Epeira Diadema Gardens
- Ocyptera rubra Insects
- Bembidium flavipes Roots of grass, sandy places
- Zabrus gibbus Corn-fields
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| 476        | *Stelis phaeoptera*                        |                       |                    |                          |
| 478        | *Osma spinulosa*                           | Sandy and chalky places |              |                          |
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| 496        | *Pedicia rivosa*                           | Marshes               |                    |                          |
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| 555        | *Estrus Bovis*                             | Cattle on commons     |                    | Stewart ii. 267.         |
| 556        | *Gasterophilus Equi*                       | Horses on commons     |                    | Clark 44.                |
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Note: The table contains a list of species found in August, along with their common and scientific names, the places where they are found, and references to specific pages in the text for further information.
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| 12         | Carabus morbillosus | Under bark and wood of willows |                             | 1,2, Page 145.         |
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Published by T. Boys, 7, Ludgate Hill.
Published by T. Boys, 7, Ludgate Hill.
Published by T. Boys, 7, Ludgate Hill.
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I have taken the liberty of introducing the above four figures from Mr. Kirby's excellent Monograph, as they will be useful to the young Entomologist, and at the same time show the valuable instruction which may be gained from this justly celebrated work.

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Fig. 2. Callidium bajulum with the elytra extended and the wings displayed; in all specimens set in this way the pin must be passed through the middle of the back and near the thorax: the wings are kept extended by braces.

The above methods are also applicable for the Orders Dermaptera, Orthoptera, Dictyoptera, Hemiptera and Neuroptera.

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In order to facilitate the study of Natural History, especially those departments most suitable for young persons, it is my intention to form several small collections of Insects, Shells, &c. Each Collection will have an accompanying catalogue of the generic and specific names, with reference to authors by whom the species are described. Single specimens may also be obtained to illustrate genera, as well as to assist those who may be forming collections. Also every kind of apparatus used by the Botanist, Conchologist, Entomologist, or Mineralogist; such as collecting and other boxes, nets, forceps, setting-boards, pins, pocket microscopes or hand magnifiers, cabinets, trays for minerals, shells, &c. either corked or plain. Dissections of insects to illustrate their generic characters, or as most interesting objects for the microscope.

Mr. Sowerby intends also to re-open his very valuable and extensive Museum, for the use of his friends and for the benefit of students and lovers of natural history. The many rare and interesting specimens which this collection contains are highly deserving the honour which it has received from many of the most distinguished personages. The abilities and industry of its possessor are sufficiently known through the medium of his voluminous scientific and useful works. This gentleman has also been induced to offer for sale his duplicate specimens, which consist of subjects in every department of Natural History. These of themselves would form no mean Museum. However, he intends to dispose of them in small parcels to give the student an insight into the science, or in single specimens for the accommodation of those who may already possess collections, and to whom such species may be desiderata.

Those ladies and gentlemen who reside in the country may have collections, or any of the apparatus sent them, through the medium of their booksellers, by an application to Mr. Boys the publisher, to the Author, or to Mr. Sowerby, No. 2, Mead Place, Lambeth.
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**Notes:**
- The document contains a table of index entries, likely from a scientific classification or dictionary, with numerous taxa listed along with their classifications and references. The entries range from insects to various other groups, with specific scientific names and sometimes classifications. The text is dense, typical of a natural history or biodiversity index, where each entry is likely cross-referenced with other entries and would be used for looking up specific taxa in a larger work.
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