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ARACHNIDES, From #g##v¾ a *spider,* and *t # o##, resemblance,* a class of invertebrated animals, formerly regarded as true insects, . and as such classed by Linnaeus in his order Aptera, under the generic names of *Phalangium, Aranea,Acarus,* and *Scorpio.* The Arachnides were first formed into a distinct class by #. Lamarck, whose arrangement of the Linnaean Aptera is admitted by Latreille to approach the most nearly to the natural order.

The third primary division in the system of Cuvier, that of the articulated animals *(animalia articulata),* contains four great classes, viz. Annelides, Crustacea,Arachnides, and Insecta. We have already stated our intention (see Animal Kingdom) to treat of the first of these classes under the title of Helminthology, of the last under Entomology, and of the two intermediate classes in the order of their alphabetical occurrence. We shall I therefore now proceed with the history and classification of Arachnides.

The naturalists who preceded Lamarck appear to have confounded this class either with the true Insecta, or with the crustaceous tribes, such as crabs and lobsters. It was in the course of his public lectures (in 1800) that the last-named, observer instituted for their reception a separate class, under the title which they now bear.

Cuvier, in one of his earliest works (*TableauElémentairede l'Hist. Nat.des Animaux,* 1798), continued, with his contemporaries, to class the Arachnides with insects, of which he regarded them as forming the third principal division, preceded only by the Crustacea and Myriapoda; thus far departing from and improving the old Linnaean system, by assigning them a higher place in his general arrangement, but not yet admitting them to the honour of a separate class.

Lamarck published the first edition of his *SystemedesAnimaux sans Vertèbres* in the year 1801, and he there explains the reasons which induced him to form the separation previously advocated in his lectures.

#. Latreille did not admit the *classic* separation of the Arachnides, either in his *Histoire Naturelle de Crustacés et des Insectes* (1802-5), or in his later work, the *Genera C##staceorumet Insectorum* (1806-7), but merely placed them at the head of the class of insects. In a subsequent volume, however *(Considérations Generales sur#Ordre Naturel des Crustacés,* &c. 1810), he practically admits the propriety of #. Lamarck's views; and in it we find the Arachnides forming a separate class, and constituted of the same materials as those used by his predecessor. In that portion of Baron Cuvier's *RegneAnimal* (vol. iii. 1817) of which #. Latreille is the author, we find the same arrangement followed, with this exception, that in the last-named work the My#iapoda and Chelopoda are removed from the Arachnides and placed at the head of the class Insecta—a modification likewise adhered to both in the *Familles Naturelles du Règne Animal* (1825), and in the recent edition of the *RègneAnimal* itself (1829), which contains the latest view of #. Latreille. By these, in as far as concerns our general principles of arrangement, 've shall be chiefly guided in the course of this article; but we conceive it due to #. Lamarck to present our readers, in the first place, with a short statement of his opinions.

He defines the Arachnides as follows: Oviparous animals, at all times provided with articulated legs,—not subject to metamorphoses, nor ever acquiring new kinds of organs. Respiration tracheal or branchial: stigmatiform openings for the entrance of the air. A rudimentary heart and circulation in the greater proportion of species. Copulationes plures per vitam in plurimis.

It is known that no vertebrated animal provided with feet has ever more than four; and that among such as are invertebrated, those which in a state of complete development are provided with feet, have never less than six. Amongst invertebrated animals, insects have essentially the smallest number of feet; for the various orders and families of that class, when arrived at their final development, have never more than six. They are hence called *hexapods* by some modern writers. It is otherwise, however, with the Crustacea and Arachnides, the greater proportion of which have more than six feet. Certain species, in their earliest state, have no more than that number; but their other feet appear as they advance in age. A few are hexapod, or six-footed, during the entire term of their existence; but in addition to those characters whieh determine the class to which they belong, various other relations connect them with their congeners, and show that they are not genuine insects.

Among those articulated animals which possess no system of circulation, insects alone undergo genuine metamorphoses; and none of the Arachnides are subject to such changes. Now, as all Arachnides are essentially distinct from the Crustacea, and as they differ from insects in the important characteristic just mentioned, it follows, according to #. Lamarck, that they constitute an assemblage of beings which ought not to be held in separation, however diversified they may be in various points of their organization.

The most remarkable circumstances in the structure of Arachnides are the following: That while many of these creatures are obviously provided with a circulating system, others present no vestige of that system; that the former breathe by means of branchial cells, while the latter respire through tracheae; and that certain tribes are provided with antennae, and others are entirely destitute of any such organs. These apparent non-conformities of structure result from this, that throughout the extended course of their class, the organization of the Arachnides undergoes rapid and remarkable changes; and if in the course of our observations we were to attend not only to the differences

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See the *Histoire Naturelle des Animaux tans Vertèbres, ' i* vols. 8vo· Paris, 1815—22.

"Animalia ovipara, pedibus articulatis in omni tempore instructa, ad metamorphoses non subjecta, nec nova partium genera acquirentia. Respiratio trachealis aut branchialis; orificiis pro aeris intromissione stigmatiformibus. Cor circulatioque in pluribus inchoatis. Copulationes," &c. *ut supra.*

of external or internal parts, but to the progress of nature in the order of her productions, we would sooner perceive the propriety of that succession or change of organization even among animals really allied to each other by the great majority of their relations; and it would not have been deemed necessary to remove to another class such of the Arachnides as were antennated, because it would have been then more clearly perceived how incompatible was such a change with the assignment of their natural and appropriate place in the system.

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The class of Arachnides, as established by Lamarck in his *Cours,* contained five or six small families, which, though each possessed of particular characters of distinction, it would have been difficult to separate from their common frame-work, without considerable inconvenience to whatever other class one or more of such families might have been removed. If, for example, the antennated Arachnides should be classed among insects, we then destroy the most simple and satisfactory definition which can be given of the last-named class, while we are forced to assign to the animals with which we unite them a position in the general series unsuitable to their real nature and attributes. If we transport the tracheal Arachnides to the class Insccta, in order to enable us to define the latter class by the exclusive character of respiring by tracheae, then insects can no longer be said to be uniformly distinguished by the possession of antennae, and the genus Phalangium, &c. would be separated from the class which contains the spiders. For these reasons Lamarck is of opinion that the division which contains his Arachnides, whether antennated or non-antennated, ought to be preserved in its integrity, if we wish to avoid the impropriety of associating with insects other forms of animal life which nature has distinguished by different characters.

A class may be constituted of natural materials, and contained within suitable limits, and nevertheless present among its various families animals of very different forms and construction. During every period of its existence, a butterfly presents an aspect very dissimilar to that of a scarabaeus, yet both belong to the true Insccta. When strong general affinities *{analogies d'ensemble)* prevail, those special diversities of structure which are occasionally observable are insufficient to authorize a separation of classes. The genera Aranea, Phalangium, and Galeodes, are very nearly related to each other, although the first respire by obvious branchial cells, while the others enjoy a tracheal respiration.

The non-antennated Arachnides arc in general provided with eight feet; and the Acarides and Pycnogonides conduct· naturally to the Phalangides, such as the genus phalangium and others. Now, if these Acarides belong essentially to the Arachnides, can the parasitical genera, such as Pediculus and Ricirtus, which lead towards them so evidently, be regarded as belonging to another class? The transition is so gradual and prepared, that the Acarides, provided for the most part with eight feet, like the other non-antennated Arachnides, yet present us with many genera (such as Astoma, Leptis, Caris) which have never more than six. Lamarck maintains the necessity of preserving the class Arachnides according to the limits which he has himself assigned to it, because its being so preserved relieves the class of insects from species with which that class has little or no connection. Without citing the impossibility of assigning a suitable position among insects to tribes like the Parasites, the Thysanoura, and the Myriapoda, the strongest objection to the reunion of these animals with insects is, that it will alter the general and truly natural characters assigned to the latter, viz. that of presenting, after exclusion from the egg, a particular state of *larva,* singularly varied according to the different orders in the forms and parts of the animal, and that of finally exhibiting an *imago* or perfect state very different from the larva, and distinguished by six articulated legs, two reticulated eyes, and a pair of antennae.

Arachnides, on the contrary, although in many instances antennated, and, like all other living beings, undergoing successive developments of parts from the period of their birth, yet offer not the condition of a larva distinct from that of the perfect state: they preserve, not of course the ' dimensions, but the form and proportions of the parts with which they were originally produced; and if a few of them acquire additional parts in the course of their development, these are not of a new kind, but merely supernumerary to such as previously existed; for example, a pair of feet, or another segment to the abdomen. But this kind of development is different from that called metamorphosis in insects. All of these acquire either a new form, or parts of structure of a different kind from those which they possessed when first produced from the egg; and their state of larva, manifestly distinct from that of the perfect insect, is never equivocal.

Thus the Arachnides of Lamarck, distinguished in a general point of view from true insects by the want of metamorphoses, yet breathing in air, are remarkable for the singular gradations which their organization presents us when we compare the different families with each other. In fact, these animals exhibit, in their totality, different groups, which offer among themselves such great dissimilarities of organization, as might almost furnish the materials of as many classes; but such a proceeding would injure the simplicity of systematic arrangement, and would be unsuitable, in as far as these great divisions might still be connected together by characters of general application, the same, in truth, as those by which the class of Arachnides is itself distinguished.

Although certain Arachnides possess organs adapted to a circulating system, they do not on that aceount belong to the crustaceous class. They are chiefly distinguished from that class by their respiratory organs, which, whether tracheal or branchial, are always placed in the interior of the body, whilst in the Crustacea they are external. In the former, also, the opening which admits the fluid to be respired is stigmatiform; but it is not so in the latter. .

Even the structure of the eyes affords an index to the Arachnides. All true insects have two eyes, with plane facettes, presenting the appearance of a very delicate network; but in the Arachnides the eyes are smooth, whether isolated, as among the greater number, or grouped as in spiders, and form a small mass, of which the surface is

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Animaux sans Vertèbres, tome v· p. 6.

granular or sub-granular, and not in facettes. Arachnides form a class superior to insects, because many of them are more highly organized, and all of them.are more nearly allied to the Crustacea than genuine insects. It does not follow from this that all the individuals of that class are superior to the most perfect insects, or that they have derived their existence, according to the French phraseology, by transition from these last-named creatures, or by an advance or progression in the scale of organization. For in the progress of animal life from the lower to the higher groups, the Arachnides appear to commence almost at the same epoch as the genuine insects, and present a dichotomous or double ramification, corresponding in its level with that which bears the entire class of insects. About that same point of the animal kingdom there seems in fact to be three distinct streams or courses of life, immediately succeeding the Epizoana, viz. that of the apterous insects (*Puleae),* which leads successively to all the other forms of insect life; that of the antennated parasitical Arachnides *{Pediculus* and *Ricinus),* which leads to the Acarides and other non-antennated Arachnides; and that of the wandering *{v#g#bund#)* antennated Arachnides (Thysanoura and Myriapoda),from which the crustaceous tribes may be said to spring.
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Thus, of those great divisions which appear to derive their origin almost from the same point in the scale, the first is formed of an enormous series of animated beings, characterized by the strongly contrasted aspects of larva and perfect insect; and the others are true Arachnides, and consequently present no such marked distinction between the conditions of the young and old. In the most perfect of the arachnidean class, such as spiders and scorpions, Cuvier has demonstrated a muscular and dorsal heart, subject to sensible systole and diastole; and on the abdomen he discovered several stigmatic openings (from two to eight), which lead to an equal number of particular purse-shaped cavities, each of which contained a great many small and very delicate laminae or plates. These isolated cavities, and the plates with which they are filled, arc without doubt the respiratory organs of these Arachnides. Cuvier regards them in the light of lungs; while Lamarek himself is inclined to view them rather as branchial cavities analogous to those observable in the leech and earth-worm—the property of branchia being, in the first place, the power of becoming habituated to the respiration of air (water being their usual medium), whilst the true lung respires air alone; and, in the second place (and this character applies of course *a fortiori* to lungs also), never to exist except in animals which are possessed of a circulating system.

Finally, from the dorsal heart already mentioned two large vessels derive their origin, and arc then ramified over the membrane of the respiratory cavities. Cuvier regards these vessels as pulmonary, the one acting as an artery, the other as a vein—and other vessels spring from the same dorsal trunk, and distribute themselves to various parts of the body. In these animals there is even a liver, composed of four pair of glandular clusters, which discharge their fluid at four different points of the intestine.

It is among the Arachnides that we find the first establishment of organs for the circulation of the animal fluids; and in the same class we perceive, as it were, the termination of tracheal respiration by ramified tracheae, with a view to the substitution of the branchial system, which, though in itself admitting of considerable variation, is always characterized by its more loeal restriction. jAmong the Arachnides also we find the commencement of the principal of the conglomerated glands.

The respiratory sacks, which Cuvier pointed out in the spiders and scorpions, were also detected by #. Latreille] m the genus Phryna, in such a manner as to connect, by that dominating feature in their structure, the Arachnides *pedipalpes* and the Arachnides *jilcuses* of that author. Although among the Phalangides the respiratory sacks have not yet become perceptible, yet the aeriferous tracheae have changed their character, and no longer consist of a double cord with a series of plexus, but are merely branched or ramified. The same order prevails among the Acarides, and results mainly from the reduced number and altered position of the stigmata. Among the animated Arachnides, in which the stigmata are more numerous, and in general lateral, the tracheal cords, like those of insccth, have as many plexus as stigmata; and such Arachnides, in fact, approach the most nearly to the class of insects. Thus tracheal respiration changes by degrees its nature and mode of action, as the stigmata undergo an alteration in regard to their number and position; and, becoming more and more reduced and restricted) it prepares the way, as it were, for branchial respiration, which only shows itself effectively along with the establishment of a circulating system. It results from these considerations that, in spite of the difference of organization observable in different families of Arachnides, ' these families are nevertheless related and united by natural affinities, which it is impossible to mistake, and would be improper to separate, and which . appear to place them at an almost equal distance from Insects and Crustacea. In their aspect, however, they in general resemble somewhat more nearly the latter class. For example, the cancerides or crabs represent in some respects, by their short bodies, and heads confounded with the thorax, the usual form of spiders; while the cray-fish and Thalassinae *(Cancer anomalus,* Leach) recall the figure of the scorpion. . , .

The greater proportion of Arachnides dwell on the land, a few inhabit the waters, and a certain number are parasitical on the bodies of other animals, of which they suck the juices. In general they are carnivorous, and live on blood, or at least on animal substances; a very limited number existing on vegetable matter. Many are furnished with mandibles, which perform the functions of a trunk or sucker; and others are provided with an isolated or separate trunk, frequently accompanied both by mandibles and palpi. They are for the most part solitary animals, of gloomy habits, and forbidding aspect; they court concealment, and avoid exposure to strong light.· The bite of

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Ibid. tome v. p. 10.

Analysedes Travauxdes Sciences de l'Jnsiit##t pendant #anne# 1810.

many species is dangerous, in consequence of a poisonous or irritating fluid frequently instilled into the wound. The offensive organ in the scorpionides is plaeed at the extremity of the abdomen.

The following is a tabular view of #. Lamarck's system of arrangement. .....

General Division ofArachnides.Order I.— *Antennated trachealArachnides.* Head furnished with two antcnnae. Respiration effected by means of double-corded plexiform tracheae.

Section I.— *CrustaceousArachnides.* Two composite eyes, of which the surface is granular or sub-granular. They are sometimes called wandering Arachnides, to distinguish them from such as are fixed or parasitical. They are frequently of a scaly structure, and provided . with mandibles fitted for incision and division. This section consists of two families, viz. *Thysanoura* and *Myriapoda.* The following are the. genera of *Thysa-nour#:* Smynthurus, Podura, Machilis, Lepisma. Those of *#tlyriapoda* are, Scutigera, Lithobiu#, Scolopendra, . Polyxenus, Julus, Glomeris.

Section II.— *AcarideousArachnides.* Two or four smooth eyes. These animals are parasitical, and provided either with a retractile sucker or with two mandibles hooked for the purpose of adhesion. Their bodies are never scaly. The genera are Pediculus and Ricinus.

Order II.— *Non-antennated trachealArachnides.* No an- tennae. Tracheae for respiration branched, but not ganglionized. Two or four smooth eyes.

Section I.—Body either without apparent division, the head, thorax, and abdomen, being united in one mass, or composed of two divisions. This section is composed of two families, viz. *Acarides* and *Phalangides.* The former contains the following genera: Astoma, Leptus, Caris, Ixodes, Argas, Uropoda, Smaris, Bdella, Acarus, Cheyletus, Gamasus, Oribata, Erythraeus, Trombidium, Hydrachna, #lais, Limnochares. The

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g#ncrá of *Piuxlangides* are these—Trogulus, Siro, Phalangium.

Section IL—Body divided into three or four distinct segments. This section is likewise composed of two families, *Pycnogonides* and *Pseudo-scorpiones.* Of the first family the genera are, Nymphum, Phoxichilus, Pycnogonum; of the second, Galeodes, Chelifer.

Order HI.— *Non-anten#ated branchialArachnides.* No antennae. Branchial cells or pouches for respiration. From six to eight smooth eyes.

Section I.— *Pedipalpi* or *Scorpionidoe.* Palpi very large, in the form of projecting arms, terminated by claws or pincers. Abdomen distinctly ringed, and not furnished with a spinning apparatus. Genera—Scorpio, Thelyphonus, Phrynus.

Section II.— *Araneides* or *SpinningArachnides.* Palpi simple, in the form of small feet; those of the male bearing the sexual organs. Mandibles terminated by a movable crotchet. Abdomen without rings, and furnished at its termination with a web-making apparatus, consisting of from four to six spinners. Genera— Aranea, divided into numerous tribes or sub-genera; Atypus, Mygale, Avicularia.

In his *ConsiderationsGenerales,* #. Latreille founds the orders of the class Arachnides on two principal points as the first basis. These animals are either masticators or suckers. The jaws of the former are simple, and fitted for cutting and triturating the substances on which they feed; those of the latter, when they exist at all, serve only to seize their prey, and are terminated by a movable piece, either solitary and hooked, like a claw or crotchet, or accompanied by a fixed projection like a small finger. In the latter case the mandibles have the appearance of a pair of pincers. The Arachnides of this division compress with their pincers the small animals on which they prey, and so force the alimentary juices to pass by degrees into the oesophagus. The body of their prey having undergone this operation, is thrown aside. In spiders the claw of the mandible seems to execute an additional function. It distils a poisonous liquid, analogous in its nature to that which exudes from the mouth of the scolopendra, and the tail or sting of the scorpion. Moreover, all the masticating Arachnides are furnished with antennae, while the suctorial tribes, with the exception of two genera, Ricinus and Pulex, are unprovided with these organs. Thus the primary divisid·s of this class by Latreille nearly correspond to Lamarck's two orders, the *Ante#nistes* and *Palpistes.*

#. Latreille then subdivides the masticating Arachnides into three orders— *Tetracera, Myriapoda,* and *Thysanoura.* The last alone present a thorax distinct from the abdomen, and have no more than six feet. In the two first-named orders the organs of movement amount at least to the number of fourteen, disposed along the sides of the body, each segment of which, with the exception at most of the last three, carry one or two pair. The Tetracera (genus *Oniscus of* Linnaeus) are distinguished by four antennae; there are only two in the Myriapoda. The Tetracera have besides several jaws, and are furnished with plates or foliaceous appendages on the inferior surface of the posterior extremity of their bodies. The number of their feet is invariably fourteen. They are related in several particulars to the Crustacea. De Geer observed, that in Assellus and Idotea there is a kind of membranous cavity, frequently filled with air, beneath the plates of the tail; and similar parts are observable in the true crustaceous Squillae of Fabricius. In Oniscus the air penetrates the body by openings, which are covered by the first folds of the tail. The other Tetracera probably receive it i# a similar manner: at all events they are not provided with distinct external stigmata, like the Arachnides of the sue-ceeding orders. We still find in this first division species which inhabit the sea; but as soon as we enter the crder Acera (scorpions, spiders, &c.) we find none occurring i# that element.

The structure of suctorial Arachnides is reducible to three principal forms or combinations of organs; 1tf, Those possessed of antennae, and of which the head is distinct from the thorax— *Parasita;2d,* Those which are unprovided with antennae, each segment of the body furnished with a pair of legs, and the head distinct— *Pycnogonides* · 3<7, Those which are unprovided with antennae, but of which the head and thorax are confounded as it were in a single segment, which alone is provided with feet— *#cem,* This last-mentioned order, according to Latreille, would

form the first, if the organs of the mouth alone were considered, as these are more complicated than in any other suctorial Arachnides. The Acera have two palpigerous maxillae, and frequently a lip, with two strong mandibles. The generality of the Pycnogonides have also mandibles, which have been taken for palpi, and true palpi, which have been erroneously regarded as antennae; but their mouth consists of a tunnel or syphon of a single piece, lt is still more simple in the Parasites, being nothing more than a very short projection, containing a small sucker, or a cavity of which the sides are dilatable, and accompanied by two crotchets.

In regard to the *families of* the Arachnides, the Tetracera offer two principal groups. Some dwell in salt or fresh water, are usually fixed upon other animals, of which they suck the blood, and have, with the exception of the genus Bobyra, four very obvious and distinct antennae. They constitute the first family, that of *Asellota.* Others are more terrestrial than aquatic. They wander from place to place, love obscure and sombre situations, and live upon putrid substances; their two intermediate antennae are but slightly developed. They form the second family, called *Oìiiscides.* According to Latreille, the structure of the mouth in Scolopendra is so different from that of Julus, that it is difficult to conceive the motive which influenced Fabricius to unite these Arachnides into a single order, that of *Mitosata.* In Julus, the maxillae and the lip are soldered together, forming one transverse plate, without distinct palpi, or their place supplied by tubercles. The Scolopendrae have their maxillae separated, four projecting palpi, and the labia in the form of hooks, subservient to the same uses as the mandibles of spiders. These considerations, and the figure of the antennae, have required the establishment of two families, which compose Latreille s order Myriapoda, viz. *Chilognatha* and *Syngnatha.* Proceeding upon the same principles, he divides the order Thysanoura likewise into two families, the *Lepisrnenae* and the *Podurellae.* The next orders, Parasita and Pycnogonides, contain few genera, and do not admit of subdivision into families. The last order, Acera, is composed of eight families, viz. Scorpionides, Pedipalpi, Aranides, Phalangita> Acaridiae, Riciniae, Hydrachnellae, and Microphthira.

Before commencing our systematic exposition of t class, we shall lay before our readers the sentiments of Mr Kirby. “I must next say something on the orders of the Arachnida. Every one at first sight sees that *sp· ders* and *scorpions* are separated by characters so strongly marked, that they look rather like animals belonging ^{t0} different classes, than to the same. These form the t"° primary orders of the *Arachnida,* and they appear to be connected by two secondary or osculant ones,—on the one side by *Galeodes,* and on the other by *Thely#ho#us* and *Phrynus.* This class, although there is an appearance of

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eight legs, is, strictly speaking, of a *Hexapod* type; for the anterior pair, ordinarily regarded as legs, and performing their function, are really the analogues of the maxillary palpi of perfect insects. This will be evident to you if you examine any species of *Galcodes.* These animals, if we look at them cursorily, we snould regard as decapods; but when we trace the two anterior pairs of apparent legs to their insertion, we find that both proceed from the *head,* which in that genus is distinct from the trunk; while the three last pairs, which alone are furnished with claws, are planted, as legs usually are, in the latter part. The first pair represent the ordinary palpi of *Aracl#nida,* are analogous to the labial ones of hexapods, and, as likewise in Phrynus and Thelyphonus, are more robust than what are usually taken for the first pair of legs; but they differ in being considerably longer, and, instead of terminating in a *chela,* are furnished with a retractile sucker. The second pair are more slender and shorter than the first. They correspond precisely with what are deemed the first pair of legs of *Octopods* and *Arachnida,* and are clearly analogous to the maxillary palpi of insects. Whether the base of the first 'pair of these palpi is in any respect analogous to the labium of insects (as that of the second seems to be to their maxillae), I am not prepared to assert; it will therefore be most advisable to namt these palpi *anterior posterior",* but as they evidently proceed from the head in Galeodes, and in that genus are clearly analogous to those of the Phrynidea (which in their turn as clearly represent those of the Aranidea), it follows, that in all they are organs of the part representing the head, and therefore not in a *primary* sense *legs,* although in a *secondary,* as #. Savigny has proved, they may be so called.” '

The following are the secondary groups of the class Arachnides, according to Mr Kirby’s exposition, in the work last quoted.

1. Aranidea. —M $^{\#}$ Leay. *(Aranea,* L., *Araneidae,* Lat.) The Aranidea or spiders seem resolvable into two sub-orders—the’ *Sedentarios* and the *Wanderers;* thus forming, perhaps, what Mr M ^{4} Leay would denominate the normal groups of a circle of *Arachnida.*Def.—*Mandibles* armed with a perforated claw. *Head* and *trunk* coalite. *Palpi* pediform, anterior pair without claws. *Abdomen* without segments or elongated tail. *Spiracles* two. *Anus* furnished with an apparatus for spinning.

2. Scorpionidea. —M $^{\#}$ Leay. *(Scorpio,* L. Latr.)

Def.—*Mandibles* chelate. *Head* and *trunk* coalite. *Anterior palpi* chelate. *Posterior palpi* pediform. *Pectens* two. *Abdomen* divided into segments, and terminating in a jointed tail, armed at the end with a sting. *Spiracles* four pair.

3. Galeodea.Def.—*Head* distinct. *Eyes* two. *Mandibles* chelate, with dentated chelae. *Palpi* pediform, the anterior pair thickest, with a retractile sucker. *Trunk* consisting of two principal segments, with a minute supplementary posterior one. *Spiracles* two, placed in the trunk. *Pseudo-pectens* two. *Abdomen* divided into segments. *Anus* unarmed, and without a spinning apparatus. ’!

Leon Dufour, *Six N#uv. #rach. &c. Ann. Gen.des Sciences #hysiq.* iv. iii. 17, t. lxix. f. 7. b.

Mém. sur les Anim. sans Vertèbres.

Introduc. to Entom. vol. iv. p. 386. (1826.)

4. Phrynidea.Def.—*Mandibles* ungu#culate. *Anterior palpi* chelate or ungu#culate, very robust. *Posterior palpi* pediform, very long and slender. *Abdomen* divided into segments. *Spiracles* two pairs. *Anus* terminating in a mucro, and sometimes in a filiform jointed tail, without a sting at the end.

In the *RegneAnimal* (2d edition, 1829), Latreille includes in the class Arachnides only those species which correspond to the *Arachnidespalpistes* of #. Lamarck. By this arrangement he is of opinion they may be classed and defined in a more simple and rigorous manner. According to his most matured views, then, the Arachnides, like the Crustacea, are destitute of wings, and are not subject to metamorphoses, but only to simple changes. Their sexual organs are removed from the posterior extremity of their bodies, and situated, with the exception of certain males, at the base of the abdomen. ’ They bear a resemblance to insects in as far as the surface of their bodies present openings or transverse clefts named *stigmata,* for t#e entrance of air, but in smaller number than in insects (eight at most, "generally two), and placed only at the inferior part of the abdomen. Their respiration is farther carried on either by aerial branchia, performing the office of lungs, inclosed in the cells of which the openings just mentioned are the entrance, or by means of radiated tracheae. The organs of vision consist of small simple eyes, variously grouped when numerous. The head, usually distinct from the thorax, presents, as analogous to the antennae of insects, two articulated appendages, in the form of small talons .of two or more pieces, which have been improperly compared to the mandibles of insects, though moving in a different direction. They, however, cooperate in the action of the jaws, and are represented in those Arachnides of which t#e mouth is formed like a syphon or sucker by two pointed plates or lancets. A sort of lip *(labium,* Fab.), or rather tongue, formed by a pectoral prolongation; two maxillae, formed by the radical part of the first article of two small feet or palpi, or by a lobe or appendage of that article; a beak-shaped projection, named sternal tongue *(langue sternale)* #y #. Savigny, produced by the re-union of a very small chaperon, terminated by a minute triangular lip, and of a longitudinal inferior keel, usually hairy : —these, and the parts called mandibles, compose, under certain modifications, the general structure of the mouth in the class Arachnides. The pharynx is placed in advance of a sternal projection, which has been regarded as a lip; but when w¢f consider its position behind the pharynx, and the absence of palpi, it is probably rather analogous to a tongue *(languette).* The feet, like those of insects, are generally terminated by two crotchets, sometimes by three, and are all attached to the thorax, which is almost always formed of a single articulation, for the most part intimately united to the abdomen. The abdomen in the greater proportion of species is soft, or but slightly protected. »

When considered in relation to their nervous system, the Arachnides are obviously distinguished both from the Crustacea and Insects; for, with the exception of the scorpions, the ganglia or swellings of the nervous cords never exceed three in number.;

The greater proportion of Arachnides feed on living insects, the bodies of which they seize or adhere to, and

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suck their juices. Others are parasitical on the bodies of vertebrated animals. A few, such as certain mites, feed on cheese, and on flour and other vegetable productions. In some of the species two of the feet are not developed till the animals have changed their skin; and in general it is not till after their fourth or fifth moult, or casting of their exuv#ae, that the Arachnides attain to their completed state.

The following tabular view exhibits the classification and relative position of the orders and genera of this extensive class.

CLASS ARACHNIDES.

Order I.— Pulmonariae.Family I.— Araneides.Sect. I.— *Tetrapneumones*-

Genus 1. Mygale.
2. Cteniza.
3. Atypus.
4. Erodion.
5. Dysdera.
6. Filistata.

Sect. II.— *Pipneumones.*

A.—Sedentariae.

Tribe 1.— *Tubitelce·*

Genus 7. Clotho.
8. Drassus.
9. Segestria.
10. Clubiona.
11. Aranea.

Ibid. p. 388.

Chelicères or *Antenne-pinces* of the French writers.

According to Latreille, these do not differ from feet properly so called, except in the tarsi, composed of only a single joint, and usually terminated by a small crotchet; they almost entirely resemble the ordinary feet of the Crustacea.

Latreille has observed, in conformity with the experience of Jurine *fils,* that the *#rguh#s* of Müller does not acquire the faculty of generating till after the completion of the sixth moult. Caterpillars generally change their skins four times before they assume the form of the chrysalis, which, with the final transformation to the perfect state, causes the number of moults to amount also to six·

12. Argyroneta.
Tribe 2.— *Incequiteloe.*
Genus 13. Scytodes.
14. Theridion.
15. Episinus.
16. Pholcus.
Tribe 3.— *Orbiteloe.*
Genus 17. Linyphia.
18. Uloborus.
19. Tetragnatha-
20. Epeira.
Tribe 4.— *Laterigradoe-*
Genus 21. Micrommata.
22. Senelops.
23. Philodromus.
24. Thomîsus.
B.—Erraticae.
Tribe 5.— *Citigradoe.*
Genus 25. Oxyopus.
26. C tenus.
27. Dolomedes.
28. Lycosa.
29. Myrmecia.
Tribe 6.— *Saltigradxc.*
Genus 30. Tessarops. »
31. Palpimanus.
32. Eresus.
33. Salticus.
Family II.— Pedipalpi.*Tribe* 1.— *Tarentulae.*
Genus 34. Phrynus.
35. Thelyphonus.
Tribe 2.— *Scorpionides.*
Genus 36. Buthus.
37. Scorpio.
Order II.— Traciieariae.Family I.— Pseudo-Scorpiones.
Genus 38. Galeodes.
39. Chelifer.
Family II.— Pycnogonides.
Genus 40. Pycnogonum.
4L Phoxichilus.
42. Nymphon.
43. Ammothea.
Family HI.— Holetra.*Tribe* 1.— *Phalangiia.*
Genus 44. Phalangium.
45. Gonoleptes.
46. Siro.
47. Macrocheles.
48. Trogulus.
Tribe 2.— *Ac#rides.*
Genus 49. Trombidium.
50. Erythraeus.
51. Gamasus.
52. Cheyletus.
53. Oribata.
54. Uropoda.
55. Acarus.
56. Bdella.
57. Smaridia.
58. Ixodes.
59. Argas.
60. Eylais.
61. Hydrachna.
62. Limnochares.
63. Car#s.

64. Leptus.
65. Aclysia.
66. #stoma.
67. Öcypete.

We shall now proceed to the first subdivision of the class into two great orders.

Order I.— ArachnidesPulmonariae.

Characterized by the possession of pulmonary sacks, a heart with distinct vessels, and from six to eight simple eyes. The sacks contain aerial branchia, which perform the office of lungs, and are named pneumo-branchiaby Latreille. They are placed under the abdomen, and are indicated externally by *stigmata* or small transverse openings, of which there are sometimes four on each side, sometimes only four in all, or two on each side. The eyes vary m number from six to eight, whereas in the subsequent order (*Trachearíae)* there are never more than four. The respiratory organ is formed of small plates. The heart is a

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large vessel, which stretches along the back, and gives off 'branches forwards and on either side. The feet are constantly eight in number. The head is always confounded with the thorax, and presents two pincers *(mandibulae* of authors, *chelicères* or *antenne-pinces* of Latreille) terminated by two finger-like projections, of which one is movable, or by a single hook or claw, always movable. The mouth is composed of a lip *(labium)*; of two palpi, which sometimes assume the shape of arms or talons; of two or four maxillae, formed, when there is only a pair, by the radical article of the palpi, and when there are four, by that same article and the corresponding portion of the first pair of feet; and of a languette of one or two pieces. If we were to assume as a basis the progressive diminution in the number of the pulmonary sacks and stigmata, then the scorpions which have eight, while the other Arachnides have only four or two, would form the leading genus of the class, and the family of *Pedipalpi* would take precedence of the *Araneides* or spinners; but these last-named Arachnides are to a certain extent isolated, by reason of the sexual organs of the male, by the hook of their frontal talons, by their pediculated abdomens, and the peculiarities of their spinning apparatus, as well as by their natural habits; and the scorpions also appear to form a more natural transition from the pulmonary Arachnides to the family of the pseudo-scorpions, the first of the second order.

Of all the Arachnides the *Pulmonariae* exhibit the greatest analogies to the crustaceous class, especially to the genus Limulus and others of the paecilopodous order. The pneumo-branchia and their stigmatiform openings may frequently be detected externally by yellowish-white markings, disposed in two longitudinal series. The first two are placed immediately beneath the sexual organs, at least in the females, at a small distance from the origin of the abdomen, and on its second segment, when that part is annular or divided into segments. Thus the second segment in these Arachnides corresponds in its characters to the first segment of the female Limulus. We may also perceive in them the indications of conglomerated glands, and even in certain species traces are observable of chili-ferous vessels.

The claw of the mandibles in spiders, and the terminal joint of the tail #n scorpions, form a species of dart, perforated by one or two openings, which give issue to a poi-I sonous liquid secreted by special glands. This poison is mortal to such small creatures as form the natural prey of the Arachnides, and is even productive of dangerous consequences to man and the larger animals. Its mode of action on animals unprovided with a circulating system is not clearly understood, but the phenomena attending it might reasonably be adduced in support of that theory which advocates the agency of poison from the bite of venomous reptiles as being carried on as much through the medium of the nervous as the circulating fluid. The almost instantaneous death of animals from the bite of certain snakes has been regarded as a proof that the vascular system was not alone concerned; and the same sudden effect produced upon those classes in which, as far as we can perceive, no vascular system exists, demonstrates some other mode of action.

Notwithstanding the researches of Cuvier, Marcel de Serres, Leon Dufour, Treviranus, and other observers, our knowledge of the internal organization of several genera of Arachnides is extremely deficient. Hence it is difficult to trace the boundaries of the orders in a manner at once natural and precise. At the same time it has been remarked, that the accurate observation of the eyes and other external organs furnish characters which coincide with the distinctions deduced from internal structure, as far as the latter has been ascertained.

Family I.— Araneides.

This extensive family corresponds to the genus Aranea of Linnaeus, and contains all those species commonly called spiders—the *Arachnidesfileuses* of Latreille. The characters are, two or four branchial pouches; from six to eight simple eyes; last article of the mandibles *(clielicères)* in the form of a corneous claw, perforated at the extremity for the emission of poison, and folded upon the preceding joint; abdomen usually soft, without divisions, its extremity furnished with from four to six small teat-like appendages, pierced with numerous holes for the

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The genus *Tess#r#ps* of #. Rafinesque is described as having only four eyes; but #. Latreille is of opinion that the lateral p a#r had been overlooked.

According to #. Marcel de Serres *(Mémoire sutle Vaisseau Dorsal des Insectes),* the blood in the araneides and scorpions proceeds, first to the respiratory organs, and from thence by special vessels to the various parts of the body. Latreille, however, seems to think, from the relations which exist between these creatures and the crustaceous tribes, that such circulation may be effected in th# contrary direction. See the *RègneAnimal,* tome iii. p. 212; and a memoir by Treviranus *On the Internal Organization of Arachnides*. 1 vol. 4to, Nuremberg, 1812.

passage of the silk or spinning materials; feet palpi, without pincers at the extremity, but terminated in the female by small hooks, and in the male by the generative organs. The maxillae are neyer more than two in number. The languette consists of a single piece, always external, and placed between the maxillae; its form more or less square, sometimes triangular or semicircular. The thorax, usually impressed with a form resembling the letter Y, indicating the space occupied by the head, is composed of a single article. The legs, of which the forms are analogous, though the dimensions differ considerably, are composed of seven joints, of which the first two form the haunch, the third the thigh, the fourth and fifth the leg, and the remaining two the tarsi; the last is terminated by a couple of hooks, which are usually toothed or pectinated, and in many species there is an additional tooth of smaller size, but not pectinated. The intestinal canal is straight: there is first a stomach composed of several sacks; and towards the middle of the abdomen a second dilatation occurs. According to Marcel de Serres the heart is situated in the abdomen, and stretches throughout its whole length; there is a considerable swelling towards its superior extremity, after which it assumes and retains the cylindrical form. It is very muscular, and its pulsations are strong and frequent. The pulmonary pouches, usually two in number, are always situated on the lower surface of the abdomen, near its origin, and are covered by a coriaceous skin, generally of a red colour; the stigmatiform opening proper to each pouch is placed towards its base, on the inner side. These pouches are formed of a white membrane, strong but flexible, which presents on its interior, transverse, projecting, parallel, nearly semicircular folds or plates, which constitute the respiratory organ. The liver is proper to the abdomen, of which it occupies the chief portion. It is composed of an infinity of minute glands fixed to the intestinal canal, and filled with a peculiar liquid, thick, and of a brown colour. The interior of the abdomen also contains the silk vessels, four in number, long, cylindrical, folded, yellow. They open into a common canal, situated at the origin of the spinners.

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The nervous system consists, 1*st*, of a cerebriform ganglion, placed towards the base of the thorax, quadrangular in some, in others rounded—from it proceed whitish nervous threads to the mouth, eyes, and feet; 2*dly*, of two nervous cords, derived from the above ganglion, which occupy the median line of the body, and of ganglia which distribute nervous filaments to the different organs, and principally to the alimentary canal and the silk vessels. #. Dufour did not ascertain the number and disposition of these latter ganglia. According to Treviranus they do not exceed two.

The dorsal and abdominal region of many spiders exhibit several small depressed points, which are produced by the attachment of the filiform muscles which traverse the liver. These are likewise observable in the scorpions.[1]

The silk vessels with which both sexes of many species fabricate those webs so remarkable at times for their symmetrical form and exquisite delicacy of structure, vary in shape and position according to the habits of the species. The formation by these creatures of skilfully wrought nets for the capture of their prey, is a fact of such every-day occurrence and observation, that we cease to regard it in its proper light, as one of the most admirable and surprising instincts of animal life. According to Reaumur, the silk undergoes its first elaboration in two small reservoirs, shaped like a drop of glass placed obliquely, one on each side, at the base of six other reservoirs in the form of intestines, which lie side by side, and folded six or seven times. The latter derive their origin from a little below the commencement of the abdomen, and proceed to the nipples by a slender thread. It is in the last-named vessels that the silk acquires that greater consistence and those other qualities which render it fit for use. A certain degree of dryness or evaporation seems necessary for the proper formation of the threads; but when the atmosphere is in a favourable condition the requisite change appears to take place almost instantaneously.

Various opinions have been entertained regarding the origin of those white, flaky, filamentous, silky substances which are frequently found floating in the atmosphere during the mornings of spring and autumn. They are called *fils de la vierge* by the French, and Lamarck still maintains the opinion that they are meteoric productions. The results of chemical analysis, as well as of ordinary observation, render it little less than certain that they are produced by small spiders of the genera *Epeira* and *Thomisus.* The innumerable threads which the sun-beams occasionally bring to view over the entire surface of ploughed fields are also formed by spiders of the genus Lycosa. Latreille is of opinion that many of these creatures, before they are sufficiently provided with spinning materials to form webs, content themselves by ejecting simple longitudinal thrêads. They are merely apprentices to the weaving art.

The habits of spiders vary greatly. Some rest in the centre of their webs, the outstretched cordage of which warns them of the temporary entanglement of their prey, on which they instantly rush, and devour after the infliction of a mortal wound. Others seek the protection of a leaf or other natural harbour, and only appear in the more open parts

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Some naturalists are of opinion that the two small spinners placed in the centre of the four exterior ones yield no silk.

"L'organe reproducteur du male est formé de deux verges qui s'ouvrent à l'extrémité des palpes, et communiquent chacune avec un testicule en forme de poire, qu'on observe dans le thorax. On voit souvent à coté des verges deux crochets, servant au male à saisír la femelle. L'organe reproducteur de ces derniers individus est placé dans l'abdomen. Il est composé de deux valves, situées vers le milieu de sa partie inférieure, et près de son origine; à leurs deux ouvertures correspondent les oviductus, dont les membranes, en se développant, forment les ovaires. Ces organes ne sont point composés de canaux cylindriques, et ne consistent qu'en une membrane générale, enveloppant tous les oeufs, et se divisant seulement vers sa base en deux parties qui se prolongent et constituent les ovíductus. On découvre vers la base des valves un organe particulier, analogue à l'oviscapre des femelles des insectes, coriace, ayant la figure d un cuilleron, plus large vers son origine qu'à l'extrémité, ou il est assez allongé, et jouissant d'une certaine mobilité u parait fournir la matière soyeuse qui recouvre les oeufs ou leurs cocons." *(Dict. Class, d'Hist. Nat.* tome i. p. 509.)

of their premises when lured by an expected capture. Many spin comfortable tunnels, or horizontal watchtowers, as they maybe called, in which they repose till the vibration of their nets calls them into active service. An extensive tribe of erratic species (the *vagabunda)* spin no webs at all, but trust to strength, activity and cunning, for their daily, or, it may be, monthly fare· for spiders, though voracious in times of abundance, are capable of frequent and long-continued abstinence. The webless species are often endowed with the faculty 0 f leaping, and after insidiously approaching their prey by the most wary and almost imperceptible footsteps, they spring upon it at once, and inflict the fatal wound. Several kinds hunt down their insect food by speed of foot· and a few are nocturnal, and surprise their defenceless and unsuspecting victims during the darkness of the night. According to Mr Sheppard, a large species, which occurs among the fcn ditches of Norfolk, actually constructs a sort of raft of weeds, or floating island, on which it allows itself to bc wafted about, and from which it seizes upon drowning insects; and another (*Lyccsa#irat#ca* of Walckenaer) gives chase to its prey over the surface of the water.

Unwet they bathe their oily forms, and dwell
With feet repulsive on the dimpling well.

The passion of love, so powerful in its influence over the most savage beasts, rules with a feeble and transitory sway over the subjects of our present inquiry. The male spider approaches the female with the greatest circumspection, fearful lest the sexual feeling should not have banished that thirst for blood which under ordinary circumstances induces them to prey as readily on each other as on winged insects. It therefore not unfrequently happens, that if a small male approaches a large female, whose feelings unfortunately do not coincide with his own, instead of being caressed he is eaten. According to Audebert, the female of the domestic spider is capable of producing successive generations without any renewal of intercourse with the male. He also states that he kept the same individuals in life for five or six years.

All female spiders, including even the erratic and webless species, are provided with reservoirs of silky matter, which, if not used in spinning, are at all events employed in forming a protecting covering for the eggs. The most casual observer of nature must have frequently remarked the care with which the anxious mother carries about and watches over her unhatched offspring; and the delicate colour of the silken bag which contains the eggs, and the fine contrast which in some cases it presents to the body of the parent, cannot have escaped observation. The truth is, that spiders, though frequently of a repulsive aspect, are as often distinguished not only by great beauty of colour, but by extreme elegance of form and delicacy of structure. #Ve are prejudiced against the race in general, because all those that dwell within doors are of a dark and lurid hue, and from their haunts and habits have become objects of aversion and disgust. Thomson has well described,

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Where gloomily retired,
The villain spider lives, cunning and fierce,
Mixture abhorred! amid a mangled heap
Of carcases, in eager watch he sits,
O'er-loöking all his waving snares around.
Near the dire cell the #readless wanderer oft
Passes, as oft the ruffian shows his front;
The prey at length ensnared, he dreadful darts
With rapid glide along the leaning line;
And fixing in the wretch his cruel fangs,
Strikes backward grimly pleased; the flut#ring wing,
And shriller sound, declare extreme distress,
And ask the helping hospitable hand.

But many of those which live in fields, woods, and gardens, are worthy of being admired for their beauty, no less than for their singular instincts and remarkable modes of life.

The external appearance varies considerably in the same species, according to the age of the individual. The younger they are, the less varied is their colouring. The number and colour of the eggs differ according to the species. There is seldom more than a single laying of eggs in each year. In some species the eggs are free or unattached in the cocoons which contain them, in others they are fixed by agglutination. In the course of the summer season they are usually hatched in from fifteen to thirty days, according to the temperature. The eggs of such as deposit in autumn (as *Epeiradiadema,* a fine species, which occurs in gardens, near the outskirts of woods, and in moors and furzes) are, however, seldom hatched till the commencement of the ensuing spring.

Some species of spider appear to possess the power of reproducing lost or mutilated parts, after the manner of the Crustacea. It is somewhere remarked, that in proportion to the simplicity of organic structure in an animal, its body is more capable of repairing by reproduction such portions as have been destroyed or deteriorated. This would induce the belief that frogs and lizards are lower in the scale than insects, and that the latter, which do not possess the reproductive power, are more highly organized than spiders and other Arachnides. This, however, is not the case; and we may therefore infer that the principle itself is erroneous, or at least incapable of general application. The ascertainment of the fact, that spiders were capable of effecting this repair of parts, is due to the ingenious

observations of MM. Vincent Amo-roux and Amédée Lepelletier. It was also, however, observed by Sir Joseph Banks in this country, and communicated by him to Dr Leach, by whom the circumstance was recorded in the Supplement to the sixth or preceding edition of this work.

As Sir Joseph was writing one evening in his study, a web-spinning spider, above the medium size, passed over some papers on the table, holding a fly in its mouth. Surprised to see a spider of this description walking about with its prey, and struck with something peculiar in its gait, he caught and placed it under a glass for examination, when he perceived, that instead of eight legs, it had only three. This mutilation accounted sufficiently for its inability to spin a web; but the singular circumstance of its having changed its natural habits, and having become a hunting instead of a spinning spider, and his desire to ascertain whether its limbs would be reproduced, induced Sir Joseph to prolong its captivity. On the following morning the creature destroyed two flies by sucking out their juices, leaving the bodies 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 sometimes swallowed the flies.

Soon after its confinement it attempted to form a web on the side of the vessel, but performed the operation very slowly and awkwardly, owing to the want of the proper number of legs. However, in the course of about a fortnight it had completed a small web, upon which it generally sat, and no doubt regarded with complacency. A month after being caught it shed its skin, leaving the slough on the web. After this change five new legs began to appear, which for a short period were of little or no use to it in walking. These new members, however, extended themselves considerably in the course of three days, and became about half as long as the old ones. The web was now increased, and the spider continued immovably sitting 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 cast its skin, leaving the slough hanging in the web, opposite to a hollow cell it had woven so as to prevent itself from being completely seen. The legs were now larger than before the change of the skin, and they continued to increase for several days, but did not attain the size of the old legs. It was then put into a small bowl as a more commodious and convenient residence, where it spun a larger and more perfect web. We are not acquainted with the result of any further observations on the subject.

Various attempts have been made at different periods to fabricate gloves and stockings from the silk of the spider. Nearly a century ago, Bon of Languedoc succeeded in making a pair of each of these articles from this frail material: they were nearly as strong as those of common silk, and of a fine gray colour. Reaumur was appointed by the Royal Academy to report on the advantages which might result from the regular prosecution of a manufactory from spider-silk; but his opinion was, that the natural fierceness and voracity of spiders rendered them entirely unfit to be bred and brought up together. From 4000 to 5000 were distributed in cells, each containing from 50 to 200 individuals; but in a short time only a few were left alive. He also stated, that the web of the spider was not equal to that of the silk-worm, either in strength or lustre. The cocoons of the latter weigh from three to four grains, so that 2304 worms produce a pound of silk. But the bags of a spider, when cleaned of filth and dust, do not weigh above the third part of a grain, so that the work of twelve spiders does not exceed that of a single silk-worm, and to form a pound of silk 27,648 spiders would be required; and as it is the females alone that spin the bags, if they are kept in pairs for the purpose of breeding, 55,296 individuals would be necessary to the formation of every pound. Even this calculation applies only to good spiders of the domestic' breed, for those found in gardens scarcely yield the twelfth part of silk of the house species; therefore 280 would not produce more than a single silk-worm, and 663,555 would' scarcely yield a pound of silk.

Sir George Staunton, in his *Embassy to China,* states that spiders' webs are met with in the forests of Java of so strong a texture as to require to be cut through with a knife; and in the *Philosophical Transactions* (1668) we are informed that the spiders of Bermudas suspend their webs between trees seven or eight fathoms distant, and that they are so strong as to entangle birds as large as thrushes. "The web of a house-spider," observe Messrs Kirby and Spence, "will, with occasional repairs, serve for a considerable period; but the nets of the geometric spiders are in favourable weather renewed, either wholly, or at least their concentric circles, every twenty-four hours,

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even when not apparently injured. This difference in the operations of the two species depends upon a very remarkable peculiarity in the conformation of their snares. The threads of the house-spider's web are all of the same kind of silk, and flies are caught in them from their claws becoming entangled in the fine meshes which form the texture. On the other hand, the net of the garden spider is composed of two distinct kinds of silk; that of the radii not adhesive, that of the circles extremely viscid. The cause of this difference, which, when it is considered that both sorts of silk proceed from the same instrument, is truly wonderful, may be readily perceived. If you examine a newly formed net with a microscope, you will find that the threads composing the outline and the radii are simple, those of the circles closely studded with minute dew-like globules, which from the elasticity of the thread are easily separable from each other. That these are in fact globules of viscid gum, is proved by their adhering to the finger, and retaining dust thrown upon the net, while the unadhesive radii and exterior threads remain unsoiled. It is these gummed threads alone which retain the insects that fly into the net; and as they lose their viscid properties by the action of the air, it is necessary that they should be frequently renewed·"

Dr Lister was of opinion that spiders possessed the power of again withdrawing their webs within their bodies,—a fact which, with Degeer, we may reasonably doubt, when we consider the immediate atmospheric change which takes place in the nature of the thread after it is once protruded. In fact, when a spider asce#ds on the same cord by

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Memoirs of the Academy, 1710.

Introduction to Entomology, vol. i. p. 414.

which it had previously dropped from a height, a small ball or rounded web will be found adhering to it, composed of the coil which it has collected in its re-ascent. The extreme tenuity of the component or elementary threads of the spider's web has been well explained by Leeuwenhoeck. He states that the threads of the minutest spiders, some of which are not equal in bulk to a grain of sand, are so fine that four millions of them would not exceed the thickness of a human hair. Now we know that each spinner, of which there are four, is pierced by about a thousand holes, consequently that every compound or ordinary thread is composed of 4000 still finer. Thus a spider's thread, of the thickness of a human hair, may in some instances be composed of not fewer than *sixteen thousand millions* of single threads!

The bite of an ordinary spider occasions almost instant death to most insects. The great species of South America attack vertebrated animals, such as humming-birds and young pigeons, and their bite is often attended with dangerous consequences even to the human race. Spiders are themselves preyed upon by birds; and a winged insect of the genus *Sphex* pierces them with its sting, carries them off, and buries them dead or alive in holes where its eggs are deposited, the larvae produced from which afterwards feed upon the dead body of the spider. Most species perish about the commencement of winter, although many others are known to exist for several years. According to Sparmann, they form an artiele of food to the Bosjiesmen of Southern Africa; and Labillardiere relates, that the inhabitants of New Caledonia eat with avidity great quantities of a spider nearly an inch long *(A. edulis),* which they roast over the fire.

The ascent of spiders into the air, and the extension of their webs from tree to tree across an open space, or even over a running stream, have frequently excited the attention of naturalists. Dr Lister relates, that attending minutely to a spider at work weaving its net, he observed it suddenly desist, and, turning its nipples to the wind dart out a thread with the violence of a water jet. This thread, taken up by the wind, was carried to some fathoms' length, still issuing from the body of the animal. Some time after the spider leapt into the air, and the thread mounted her up swiftly. He afterwards made the same observation on about 30 other species of spiders, and found the air filled with young and old sailing on their threads, and probably seizing insects in their passage, as he found legs and wings, and other manifest signs of slaughter, on these threads, as well as on the webs below. These observations were corroborated by Dr Hulse, who made the like discovery about the same time. It is D r Lister's opinion that this darting of threads was known to Aristotle and Pliny (vide *Hist. A#zim.* lib. ix. cap. 89; and *Elm.* lib. x. cap. 74), but he believes their sailing was first observed by himself. On these sailing spiders he further observes, that they will often dart, not a single thread alone, but a whole sheaf at once, consisting of many filaments, all of one length, but divided from each other, and distinct; and the longer they become, the more they spread, and appear like the numerous rays of a blazing star. He observed, too, that some species seemed to use their legs as oars, sometimes closing, and again spreading them out, as occasion might require. When the air is still it is highly probable they can direct their course, and perhaps mount or descend at pleasure. In rowing, he observed they always take their flight backwards. These threads mount to an almost incredible height, and may always be observed in a fine clear day in autumn, when there is little or no wind. In a letter to Mr Ray, he further states, that "I one day observing the air full of webs, forthwith mounted to the top of the highest steeple on the minster (at York), and could there discern them exceedingly high above me."

If a spider is placed on the top of a pole surrounded by water, it nevertheless effects its escape by means of a silken line, which is ere long found to extend from the pole to some other object on the outside of the pool. It is evident that the spider possesses the power of permitting the material of which its threads are composed to escape at pleasure; but whether this is accomplished by a projectile force, by electrical agency, or by the mechanical action of the external currents of the atmosphere, is still a subject of dispute. The beautiful regularity with which the radiated parts of the web are usually disposed favours the idea expressed by a French writer, that the animal possesses the power of shooting out its threadsand directing them at pleasure towards a determined point; whilst the observations of Messrs Rennie and Blackwall indicate the necessity of a current of air as a moving force. It appears, from the experiments of the latter gentleman, that when spiders are placed upon an insulated twig surrounded by water, and exposed to a current of air, however slight, either naturally or artificially produced, they directly turn the thorax towards the quarter from whence it came, and elevating the abdomen, they emit from their spinners a small portion of glutinous matter, which is instantly carried out in a line, consisting of four finer ones, with a velocity equal or nearly so to that of the air. They next carefully ascertain whether their lines have become firmly attached to any object, by pulling at them with their anterior pair of legs; if the result satisfies them, they gl ue the nearer end to the twig, and then march across. "Such was invariably the result when spiders were placed where

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the air was liable to be sensibly agitated: I resolved therefore to put a bell glass over them, and in this situation they remained 17 days, evidently unable to produce a single line by which they could quit the branch they occupied, without encountering the water at its base; though, on the removal of the glass, they regained their liberty with as much celerity as in the instances already re-corded." *(Linn. Trans,* vol. xv.) Mr Blackwall affirms with confidence, that in motionless air, spiders have not the power of darting their threads even through the space of half an inch. Mr Murray, Mr Bowman, Mr Mark Watt, and others, maintain a contrary opinion.

Lastly, Mr Virey thinks it more probable that spiders actually fly (by vibrating their feet) through the air, than that they are acted upon either by electrical influences or the agitation of the air. He does not assert that they have wings.

Voyageàla Recherche de la Perouse;Introduction to Entomology, vol. i. p. 302.

The bodies of spiders decompose so rapidly after death, that both their forms and colours are speedily altered and effaced. It is therefore with great difficulty that they are preserved as subjects of examination in museums. Hence, perhaps, our comparative ignorance both of their structure and habits.

Sect. I.— Tetrapneumones.

Two spiracles and two pulmonary sacks or pneumobranchia on each side.

This section is characterized by the position of the eyes, which are always placed at the anterior extremity of the thorax, and usually close to each other. The mandibles *(cl#eliceres* of Latreille) and feet are robustly formed. The greater proportion of species have only four spinners. They fabricate silken tubes, in which they dwell, and these are placed sometimes in subterranean tunnels, sometimes under stones, and sometimes beneath the bark or among the leaves of trees.

The first division of the section corresponds to the *#hxr#pl#oses* of Walckenaer, and contains the three following genera, viz. Mygale, Atypus, and Erodion. These are distinguished from the others by having four spinners and eight eyes, and by the hooks of their mandibles being bent underneath instead of inwards.

GenusMygale, Walckenaer.—Palpi inserted at the superior extremity of the maxillae, in such a manner that they appear to be composed of six articles, of which the first, straight and elongated, with the inner angle ot its upper portion projecting, performs the function of a jaw. The languette is small and nearly square. The last joint of the palpi in the male is button-shaped, and bears at its extremity the reproductive organs; and the two anterior legs in that sex are provided with two strong spines or spurs at their inferior extremity.

This genus, as established by Walckenaer, is composed of the bird-catching spiders *(A. a#icularia,* Linn.), and the *Araignéesmineuses* of Olivier. It contains several species of great size and singular habits. The foreign kinds arc as yet imperfectly characterized. The habits of a large species found in Martinique, where it is called *Matoutou,* have been well described by Moreau de Jonnés. It spins no web, but lies concealed in holes and crevices of the volcanic tufa, from which, however, it makes frequent excursions in search of prey, which consists not only of insects, but of humming-birds and other species of the fea-t#ered race. It hunts chicfly during the night. It is possessed of great muscular strength, and unwillingly W# S a„ ◦bj ect ◦f w hich it may have become possessed.

hen induced to seize upon any hard and polished substance, it leaves traces of a poisonous liquid, which, had the substance been of a yielding nature, it would have injected into the wound. This liquid is lactescent, or of a milky aspect, and very abundant in proportion to the size of the animal. The female carries her eggs in a cocoon of white silk, of a very close texture, which she holds by means of her palpi, beneath the thorax. When attacked, she drops her eggs to defend herself, and secures them again when the combat has ceased. The young, when first produced, are entirely white; and the earliest change which they experience is the appearance of a black spot in the centre of the dorsal surface of the abdomen. From eighteen hundred to two thousand young have been observed to proceed from a single silk bag; but of these it is probable that an immense proportion perish in infancy, by the depredations both of birds and insects.

Several species of this genus inhabit Europe, and their characters and eco#omy are detailed by Olivier, Latreille, the Abbé Sauvage, and other writers. Our restricted limits prevent our describing more than a few, which we shall select as well from the indigenous as exotic.

f Superior extremity of the mandibles unprovided with a scries of transverse spines or corneous points. Tarsi furnished with a thick hairy brush, which conceals the crotchets. .

Sp. A#icularia.—AraneaA#ic#d#ri#, Linn. The birdcatching spider, Shaw. (See Plate L.)—Body nearly two inches long, very hairy, especially in the young. Thorax depressed, large, oval, truncated posteriorly. General colour black; the extremities of the palpi, the feet, and inferior hairs of the mouth, reddish. Hooks of the mandibles strong, conical, and very black. This species is said to dwell in the clefts of trees, and in hollows among rocks and stones. According to Madame Merian, it surprises small birds on their nests, and sucks their blood with avidity. It forms a tube-shaped cell, narrow at its posterior extremity, composed of a fine white semi-transparent tissue, resembling muslin. The cocoon of this species is like a large walnut in size and form. Its native countries are Cayenne and Surinam. Other nearly allied species also occur in those parts of South America, as well as in Africa and the East Indies. Their bite is dangerous, although the accounts given by Piso and other authors is no doubt exaggerated. To this section may be referred the *#.blondi* (see Plate L.), *cancerides,fasciata, atra,* and *brunnea* of Latreille.

-1·-1· Superior extremity of the first piccc of the mandibles provided with corneous points like the teeth of a rake. The tarsi are not so covered with hair as to conceal the crotchets.

The species of this section inhabit dry and mountainous places, where they form tunnels or subterranean galleries, sometimes two feet in depth. At the entrance they construct a door, moving upon a hinge, and formed of silk and clay, undistinguishable from the surrounding soil. There is what we may not improRerly call a mat of silk fastened to the inner surface of the door, on which the animal frequently reposes, probably for the sake of guarding the entrance, and being at hand to secure its passing prey. A fine silk tube, which is the proper dwelling, clothes the interior of the gallery. #. Dufour is of opinion that the females alone excavate the tunnels.

Sp. Coementaria.—Araignéemineuse, Dorthes. In *Linn. Trans,* ii. (See Plate L.)—The female of this species is about eight lines in length, of a reddish brown colour, somewhat pale on the edges of the thorax. The mandibles are blackish, and are each furnished near the articulation of the crotchet with five points, of which the innermost is the shortest. The abdomen is mouse-coloured, with darker spots. The first article of all the tarsi is

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furnished with small spines, the erotchets of the last have a spire at their base, and a double range of pointed teeth. The spinners are but slightly projecting. The *#.carminans* of #. Latreille (2d edit, of the *Nouv. Diet, #Hist. Nat.)* is

supposed to be the male of this species. He differs in the greater length of his legs; in the erotchets of the tarsi, of whieh the teeth are more numerous; in the want of the spines, and the greater shortness of the spinners. His two anterior feet are terminated beneath by a strong spine.

This speeies inhabits Spain, the southern parts of Franee, and other shores of the Mediterranean. Its habits are presumed to be noeturnal, as it is never seen abroad or at work during the day. It forms its tunnel in strong earth, free from stones, and on a sloping surface to avoid moisture. It resists the opening of its door with its utmost strength, and continues struggling in the entrance till the light has fairly entered, after whieh it retreats into the earth. The door is beautifully formed, and suspended on a hinge from above, so that it always shuts elose of its own accord. It preys upon beetles and other large and strong insects. When its door is cut off or unhinged, it forms another in its place, which, according to Rossi, differs from the first in not being movable. The Italian author does not mention by what means its entrance and exit are then accomplished; but Latreille has suggested that the experiment may have been tried just before the commencement of winter, and that the second operculum was closed with a view to exelude the rigours of that inclement season.

In the following genera of this division the palpi are inserted upon an inferior dilatation of the external side of the maxillae, 'and consist of only five articles. The languette, at first very small, as in the genus Atypus, afterwards becomes elongated and advaneed between the jaws. The last joint of the palpi in both sexes is lengthened and antennated towards the extremity. The males are not provided with a strong spur at the extremity of the two anterior legs.

GenusAtypus, Latreille. Oletera, Walckenaer.— Languette very small, and almost covered by the external portion of the base of the maxillae. Eyes contiguous, and grouped upon a tuberele.

Sp. Sulzeri, Latreille. *Aranea Picea,* Sulzer. (See Plate L.)—General colour blackish. Length of the body eight lines. Thorax nearly square, depressed posteriorly, enlarged and broadly truncated in front. The mandibles are strong, and their elaw is furnished near the base with a tooth-like projection. The last article of the palpi in the male is pointed at the extremity.

This is the only speeies of the genus known in Europe. It was first described by Sulzer as a Swiss speeies *(Geschichte derInsectem* Plate L. fig. 2). It has sinee been observed by several Freneh entomologists at Sevres, near Paris, and was discovered in this country by Dr Leaeh, near Exeter. Its habits are eurious and interesting. It constructs for its dwelling a silky seabbard, intermingled with moss, eight or ten inches long. Its direction is at first horizontal over the surface of the ground, and then perpendicular beneath the surface. The eggs are deposited at the bottom, enveloped in a white web. 1 he animal itself is slow in its movements. It is most frequently met with in the month of July. It appears to have been described and figured by Roemer as the *subterranean spider.*

An American spceies, the *Atypusruf#pes* of #. Milbert, of whieh the body is entirely black, and the feet rufous oecurs in the neighbourhood of Philadelphia.

Genus Erodion, Latreille. Missulena, #Valekenaer.- This genus differs from the preeeding in its straight, elongated languette, whieh projects between the jaws. Its eyes are spread over the front of the thorax.

Sp.Occatorius, Latreille, Walekenaer. (Plate II. fig. ## 12).—Body black, about an ineh in length. Brought from New Holland by #. Lesueur.

The seeond division of this section exhibits the prolonged languette of the Erodio#s, and the palpi eomposed of five articulations; but the elaws of the mandibles are folded inwards instead of downwards. The spinners are six in number; and the first pair of legs, instead of the fourth, are the longest. Some of these Arachnides have only six eyes.

Genus Dysdera, Latr. Walek.—Eyes six, disposed in the form of a horse-shoe, opening outwards. Mandibles strong and projecting. Maxillae straight, and dilated towards the insertion of the palpi.

Sp. Erythrina. (See Plate L.)—Mandibles and thorax sanguineous; colour of the legs lighter. Abdomen soft and silky, and of a grayish yellow.

Inhabits the south of Franee and England, beneath stones. It is rare in the latter country, but has been taken near Plymouth, Exeter, and London. A variety of this speeies has been described by Seopoli under the name of *Araneahombergii.*Genus Filastata, Latr.— Eyes eight, placed on a small elevation at the anterior extremity of the thorax. Mandibles small; maxillae arched on their exterior side.

Of this genus the *F.testacea* of Walckenaer was discovered near Marseilles. The *F. bicolor* is described in the *Faun. Franc. Arach.* vi. 1-3.

Sect. II.— Dipneumones.*A. Sedentariae.*

The genera of this great division are possessed of only a pair of pulmonary saeks, and corresponding stigmata. The palpi, composed of five joints, are inserted on the exterior side of the maxillae, near their base, generally in a sinus. The languette is advanced between the maxillae, and is sometimes nearly square, sometimes triangular or semieireular. The spinners are six in number. The last article of the palpi in the males is more or less ovoid, and usually contains the generative organs in an excavation.

The first four tribes of this section may be considered as forming a large group, whieh we name *Sedentaria.* They either spin webs for the capture of their prey, or throw out isolated and irregular threads for the same purpose. Their eyes are grouped aeross the front of the thorax. Of these there are usually eight; four or two in the centre, and two or three on each side. Sometimes there are only six eyes.

The eyes of spiders are occasionally observed to shine in the dark like those of cats, moths, &c., and they probably enjoy the faculty of seeing both by night and day.

The first three of these tribes, viz. *Tubitelae, Inaqui· teloe,* and *Orbiielae,* are sometimes included under the more general appellation of Rectigrade, from their straightforward mode of progression, particularly as contrasted with that of the fourth tribe or *Laterigradce,* whieh, like many of the erustaeeous elass, can direct their steps in different directions without turning the body. In these tribes the relative length of the legs is variable. In many the first and the last pair are the longest; in others the two

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anterior pairs; while in some the third and fourth pair are the most extended. The eyes, in their general disposition, do not form a crescent, or the segment of a circle.

Tribe I.— Tubitelae.

Spinners cylindrical, close to each other, directed backwards. The fcet are robust; the first and last pair are the longest.

GenusClotho, Walckcnaer. Uroctea, Dufour.—Mandibles very small, capable of little extension, and without teeth. Crotchets small, body short, legs long, the third and fourth pair rather longer than the preceding. The eyes are disposed as in genus Mygale. The maxillae have on their external side a slight dilatation at the insertion of the palpi, and terminate in a point. The languette is triangular. The superior or lateral spinners arc the longest; but the most peculiar character, according to #. Dufour, is the existence, in the position of the intermediate spinners, of a pair of combshaped valves, which open or close at the will of the [1] animal.

Sp. b-maculata.— Body about an inch in length, of a c#esnut-brown colour; the abdomen black, with five small round yellowish spots, of which four are disposed transversely in pairs, and the fifth is single and posterior.

This species was found in Egypt by #. Savigny. It occurs in Dalmatia, and near Montpellier; also in Catalonia, and other parts of Spain. Its manners have been described by #. Dufour.

Genus Drassus, Walck.—Mandibles robust, projecting, toothed beneath. Maxillae obliquely truncated at their extremity. The eyes are nearer the anterior edge of the thorax, and the line formed by the four posterior exceeds in length that formed by those on the anterior line. The fourth and second pair of feet are obviously longer than the others. The legs and first joints of the tarsi are armed with sharp points.

The spiders of this genus live under stoncs, in the clefts of walls, and among leaves. They form little dwelling-places of white silk. The cocoons of some are orbicular, flattened, and composed of two valves applied one against another.

I *Sp.Relucens.*— Small, cylindrî#al, with a yellow thorax, covered with a purple silky down. The abdomen is thin, red, and green, with metallic refiections, and two transverse lines of golden yellows of which the anterior is arched. One variety has also four additional golden spots. 1 he species is generally found running on the ground, lt is common in the environs of Paris, and is one of the most beautiful of the tribe.

GenusSegestria, Latr.—Eyes six, of which four are anterior on a transverse line, and two posterior, placed on each side behind the two lateral eyes of the preceding line. The languette is elongated and almost square. Ihe first and second pair of feet are the longest, and the third pair the shortest.

Ihe species of this genus spin cylindrical elongated webs in the clefts of old walls, in which they lic concealed, with thcir anterior pair of legs stretched forwards. Divergent threads of glutinous silk border the external open- [13] g to their habitation, and form a net for the capture of their insect prey.

^*P· Se#oculata.*— Thorax blackish-brown. Abdomen oblong, grayish, with a longitudinal band of blackish spots.

^! [e] S [s] pale brown, obscurely banded. Inhabits rocks and #ld buildings.

GenusAranea, Latr. Tegeneria, Walck.—The two upper spinners conspicuously longer than the others.

The four anterior eyes placed in a curved line, bending backwards. The first and last pair of legs the longest. This genus inhabit the interior of our dwellings; also the angles of old walls, on plants, hedges, &c. They construet large webs, nearly horizontal, at the higher part of which is a tube or tunnel, where the spider lies concealed.

Sp.Domestica.— Of a livid ash colour. Thorax of the male without spots. On that of the female there is on each side a blackish band. Abdomen blackish, with a longitudinal spotted band on the back.

This is the most frequent inhabitant of our houses, and an object of more than common aversion. It sometimes attains to a large size. According to Homberg, it is subject, especially in the kingdom of Naples, to a disease which renders it more than usually hideous. Its body becomes covered with scales, among which a number of mites engender. Geoffroy was of opinion that a spider was supplied only with a certain portion of spinning material; that if the web was intentionally destroyed, and an individual frequently obliged to reconstruct its web, it became at last incapable of further exertion in that line, and would probably perish for want of the usual means of subsistence.

The spiders of this country are entirely harmless, from their want of power to pierce the skin. But that they arc furnished with a poisonous liquid, which they instil into the wound of their victims, cannot be doubted. Olivier, indeed, reports, that a farmer in one of the Isles d'Hières was bitten by a large spider while turning a sheaf of wheat. The wound occasioned at first only a slight inflammation, so trivial that it was for some time neglected, till its increase created alarm. Gangrene and death ensued. They may be taken internally with impunity. "J'ai vue," says Latreille, "le célèbre astronome Lalande avaler de suite quatre gros individus de cette espèce." *(A. domestique.)*GenusArgyroneta, Latr.—Maxillae inclined upon the languette, of which the form is triangular. The four central eyes form a quadrangle; the lateral pair of each extremity are grouped together, and placed on a small eminence.

Sp.Aquatica. Aranea Aquatica, Lin. Geoff.—Of a blackish-brown colour, the abdomen deeper, surface silky, the back with four impressed points. Lives in ditches and slow-running waters, beneath the surface of which it spins

a beautifully constructed web. “The habitation of *aranea aquatica,* the other spider to which I alluded, is chiefly remarkable for the element in which it is constructed, and the materials that compose it. It is built in the midst of water, and formed in fact of air! Spiders are usually terrestrial; but this is aquatic, or rather amphibious: for though she resides in the midst of water, in which she swims with great celerity, sometimes on her belly, but more frequently on her back, and is an admirable diver, she not unfrequently hunts on shore, and having caught her prey, plunges with it to the bottom of the water. Here it is she forms her singular and unique abode. She would evidently have but a very uncomfortable time were she constantly wet; but this she is sagacious enough to avoid, and, by availing herself of some well-known philosophical principles, she constructs for herself an apartment, in which, like the mermaids and sea-nymphs of fable, she resides in comfort and security. The following is the process :— First she spins loose threads in various directions, attached to the leaves of aquatic plants, which may be called the frame-work of her chamber; and over them she spreads a transparent varnish resembling liquid glass, which issues from the

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middle of her spinners, and which is so elastic that it is capable of great expansion and contraction; and if a hole be made in it, it immediately closes again. Next she spreads over her belly a pellicle of the same material, and ascends to the surface. The precise mode in which she transfers a bubble of air beneath this pellicle is not accurately known; but from an observation made by the ingenious author of the little work from which this account is abstracted, he concludes that she draws the air into her body by the anus, which she presents to the surface of the pool, and then pumps it out from an opening at the base of the belly, between the pellicle and that part of the body, the hairs of which keep it extended. Clothed with this aerial mantle, which to the spectator seems formed of resplendent quicksilver, she plunges to the bottom, and, with as much dexterity as a chemist transfers gas with a gasholder, introduces her bubble of air beneath the roof prepared for its reception. This manoeuvre she repeats tcn or twelve times, until at length, in about a quarter of an hour, she has transported as much air as suffices to expand her apartment to its intended extent, and now finds herself in possession of a little acrial edifice—I had almost said an enchanted palace—affording her a commodious and dry retreat in the very midst of the water. Here she reposes unmoved by the storms that agitate the surface of the pool, and devours her prey at ease and in safety. Both sexes form these lodgings. At a particular season of the year the male quits his apartment, approaches that of the female, enters it, and enlarging it by the bubble of air that he carries with him, it becomes a common abode for the happy pair. The spider which forms these singular habitations is one of the largest European species, and in some countries not uncommon in stagnant pools.”Tribe II.— Inaequitelae.

External spinners conical, convergent, slightly projecting, disposed *enrosette.* Legs slender, first and last pair usually the longest. The maxillae are inclined on the tongue, and are either narrow or present no sensible enlargement at their superior extremity. The abdomen is more voluminous, softer, and more highly coloured than in the preceding tribe. Their webs constitute an irregular net-work of various forms, the threads of which cross each other in different directions. They bind their prey with cords, which, though silken, secure them very effectually. The species are short-lived, and tend their eggs very carefully till the exclusion of the young.

Genus Scytodes, Latr.—Eyes six, disposed in pairs. #. Dufour states that the crotchets of the tarsi are inserted in a supplementary article.

Sp.Thoracica.(See Plate L.)—Pale reddish-white, spotted with black. Thorax large, somewhat orbicular. Abdomen not globose.

This species inhabits houses. It has been found near Dover, but is otherwise scarcely known as a British species.

Genus Theridion, Walck.—Eyes eight in number, of which four in the centre form a square, the two anterior being placed upon a small eminence, and a pair are placed on each side upon a common elevation. The thorax is almost triangular, or shaped like a heart reversed.

Sp. Malmig#atto.Aranea13-guttata, Fab.—Lateral eyes, separated from each other. Body black, with thirteen small round spots of a blood-red colour on the abdomen. This species inhabits Corsica, the inhabitants of which island hold it in great dread, from the belief that its bite is dangerous, if not mortal.

Another species, the *Thcridi#nbenignum* of Walckenaer, may from its name be presumed to possess another character. It lives in autumn among the clusters of grapes, where it watches for its prey, and thus deters many insects from injuring the fruit. The prejudice against this genus probably arises from several of them being of a dark colour, with red spots resembling drops of blood upon their bodies.

Genus Episinus, Walck.—Eyes eight, near each other, and placed upon a common elevation. The thorax narrow and almost cylindrical.

Sp.Truncatus.— Thorax acute in front, rather longer than broad, obscure brown above, reddish brown beneath. Abdomen pyramidal, truncated behind, its anterior portion brown, third pair of legs whitish, the others brown.

Genus Pholcus, Walck.—Eyes eight, tuberculated, divided into three groups, of which there is one on each side composed of three eyes disposed in a triangle, and a third in the centre, somewhat advanced, composed of two eyes on a transverse line.

Sp. Phalangioides, Walck. *Araignée domestique à longues pattes,* Geoff.—Body long, narrow, pubescent, of a livid or pale yellow colour. The abdomen is almost cylindrical, very soft, and spotted above with black. The legs are very long and slender, with whitish rings at the extremities of the thighs and tibiae.

Mémoire pour servir à commencer#IIistoiredes Araignées Aquatiques.

Introduction to Entomology, by Kirby and Spence, vol. i. p. 469.

This species is common in houses in the western parts of England. Its body vibrates like that of some tipulae. The female carries her eggs in an agglutinated mass between her mandibles.

Tribe HI.— Orbitelae.

In this tribe the exterior spinners and the legs resemble those of the preceding, but the maxillae differ, being straight, and sensibly broader at their extremity. The first and second pair of legs arc the longest. The eyes are eight in number, of which four are placed quad-rangularly in the centre, and a pair on each side. These spiders differ from the *Incequiteloe* in the form of their webs, which are composed of a regular net-work, formed of concentric circles, crossed by straight lines or radii, proceeding from the centre, where the animal lies, to the circumference. Some conceal themselves in cavities, or in chambers built by themselves, near the margins of their webs, which are sometimes horizontal, sometimes perpendicular. Their eyes are numerous, agglutinated, and inclosed in a large cocoon.

Genus Linyphia, Latr.—Four central eyes, of which the posterior pair are larger, and separated by a larger space; the others are in pairs, one on each side, and placed obliquely. The maxillae are enlarged at their superior extremity.

This genus constructs among brooms and other bushes a slender, open, horizontal net, from which various threads proceed irregularly upwards to different points.

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Sp· Tridngvldris.— Pale red, inclining to yellow. Thorax with a dark dorsal line, bifid in front. Abdomen oval, incli#i# # to globose, with spots and angulated bands of brown and white. Inhabits the European hedges, and constructs its webs on brooms and pine-trees.

Genus Ulobo rus· Latr.—Four posterior eyes placed at equal distances on a straight line, and the two lateral eyes, of the first line nearer the anterior margin of the thorax than the intermediate pair, so as to form an arch bcnt backwards. The maxillae commence in this genus to enlarge a little above their base, and terminate in the form of a spatula. The tarsi of the last three pair of legs arc terminated by a single claw. The first article of the two posterior pair have a range of small hairs.

These spiders repose in the centre of their webs, with their four anterior feet stretched forwards; the third pair are extended laterally, and the posterior pair backwards.

Sp. Walckenarius, Latr.—Of a reddish-yellow colour, covered by a silky down, forming on the upper part of the abdomen two series of small bundles. Length about five lines. The legs are marked with paler rings. Occurs near Bordeaux, and other southern departments of France.

Genus Tetragnat#a, Latr.—Eyes placed four and four on two nearly parallel lines, and separated by almost equal intervals. Maxillae long, narrow, enlarged only at their superior extremity. Mandibles also very long, especially in the males. Their web is vertical.

Sp. Extensa.— Abdomen oblong, golden green, with the sides and two lower lines yellowish. Sits with its legs extended on a vertical web. Inhabits moist places.

Genus Epeira, Walck.—A pair of eyes on each side, almost contiguous; the other four forming a central quad-rangle. The maxillae dilated from their base.

With the exception of that of *E. curcubitina*, which is horizontal, the webs of this genus are either vertical or inclined. Some repose in the centre of their webs, with their bodies reversed, or heads downwards; others construct a sheltering habitation, sometimes formed of leaves spun together, sometimes like a silken tube, or of a more ' open form like a bird’s nest, in the vicinity of their nets. Some foreign species construct such powerful webs as to arrest the flight of small birds, and even to incommode the traveller while journeying through the forests. Many of the species are remarkable for the beauty of their co lours, their singular forms, and still more singular habits. Between 60 and 70 species are described by #. W’alck-cnaer in his *Tableau des Araneides;* and #. Leon Dufour has greatly contributed to illustrate the history of this extensive genus in the *Annalesdes Sciences Physiques* of Brussels, and the *Annalesdes SciencesNaturelles* of Paris. We regret that the limits of our present undertaking do not admit of our entering into further de-

#.Diadema. (See Plate L.)—Reddish; abdomen globose-oval, with an elevated angle on each side near the base; dorsal band darker, broad, triangular, dentate d, with a triple cross of yellowish-white spots, and four impressed dots disposed in a quadrangle. Legs and palpi spotted with black.

This is one of the largest of the British species. It rcquents the borders of woods, rocks, and gardens; also 31 °ors and other desert places. It varies considerably 0 i m size and colour. We are indebted to Treviranus 0r an account of its anatomical structure. The heart presents a character not observed in that of any other

V#T ##r - j species. From its inferior and anterior part proceed two muscles, which, at first united in one, diverge as they approach the posterior portion of the abdomen. The heart itself exhibits several branches, the two anterior of which are sent to the branchia; and the function of these last-named organs, according to Treviranus, is to absorb humidity from the atmosphere, and convey it to the circulating system. The true respiratory organs are discoverable in a species of stigmata placed in the thorax and abdomen. These stigmata are not pierced, like those of insects; but numerous vessels are seen distributed over thcir surface.

The sceptre or diadem spider, as this species is frequently called, pairs about the end of summer, and deposits its eggs in autumn. The eggs are of a fine yellow, inclosed in a cocoon of a close texture, but covered with a looser

substance of a yellowish hue. This spider forms no nest, but shelters itself beneath a leaf or some other natural covering. Its web is large and vertical. The young are hatched in spring, and are at first yellow, with a blackish spot on the upper part of the abdomen.

#. Vautier has described a singular species of this genus, remarkable for the posterior enlargement of its abdomen, which is terminated by a couple of arched and elongated spines. *{Annalesdes SciencesNaturelles,* tome i. p. 261.) It is named *Epeira curvicauda.* (See Plate L.)

Tribe IV.— Laterigradae.

The species which constitute this tribe are, like those of the preceding, of sedentary habits; but they differ in their mode of progression, being able to walk sideways and backwards, as well as straight forward like the others. Hence the designation of the tribe. Their four anterior feet are always longer than the others. In some the first pair are longer than the second; in others they are nearly equal. The mandibles are usually small, with their crotchets transversely folded, as in the preceding tribes. The eyes are always eight in number, frequently unequal, and forming by their union a crescent, or the segment of a circle. The maxillae in the generality of this species are inclined upon the lip. The body is generally flattish, crabshaped, with the abdomen large, rounded, and triangular.

The genera included in this division can scarcely be said to spin webs,—they merely throw out a few isolated threads. They are usually found on plants, tranquil and stationary; sometimes concealed between two leaves, of which they fasten the edges together. They watch their eggs with great care till the young are hatched.

Genus Micrommata. Sparassus, Walck.—Maxillae straight, parallel, rounded on their edges. Eyes disposed four and four, on two transverse lines, of which the posterior is the longer, and arched backwards. The second and first pair of feet are the longest. The languette is semicircular.

Sp.Smaragdina.— Colour bright green, sides bordered with yellow. Abdomen greenish-yellow, with a darker green line upon the back.

This species places its cocoon in the centre of three or four leaves fastened together and lined with silk.

Genus Senelops, Dufour.—Maxillae straight, or slightly inclined, without lateral sinus, pointed, and obliquely truncated on the internal side. Languette semicircular. Six eyes in front, on a transverse line; two others behind, one on each side. The legs are long; the first pair are the shortest.

S#. Omalosoma.— Four lines in length, very flat, of a reddish-gray colour, with cinereous spots, and the feet ringed with black. The abdomen appears to present

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posteriorly the vestige of rings or segments, forming a sort of dentation along the sides.

This rare species was discovered by #. Dufour in the kingdom of Valentia. It inhabits rocks, and runs with singular rapidity. It occurs both in Egypt and Syria.

Genus P#ilodromus, Walck.—Maxillae inclined upon the languette, which is higher than broad. The eyes, nearly equal in size, are disposed in the form of a cross or semicircle. The mandibles are lengthened and cylindrical.

Sp.Tigrina.— Thorax very broad, flattened, of a red- .dish fawn-colour, brown laterally and posteriorly, white .in front. The pentagonal abdomen variously coloured by means of minute red, brown, and white hairs, by which it is covered. It is bordered with brown along the sides, and is marked on the dorsal region with from four to six impressed points. The belly is whitish. The legs are long, slender, reddish, with brown spots.

This species is common on trees. When touched it immediately either runs off with great rapidity, or suddenly drops to the ground. Its cocoon, of a beautiful .white colour, incloses about one hundred unagglutinated eggs. It places them in the clefts of trees, and guards them with great care.

Genus Thomisus, Walck.—Mandibles shorter than in the preceding genus, wedge-shaped. Four posterior feet, shorter than the others. The sexes frequently differ in their size and colours.

Sp.Citreus.— Colour citron-yellow. The abdomen large, broader behind; the back with two red spots. Inhabits flowers. The female is common in Britain; the male more rare, of a smaller size, brown, banded with .yellow-ish-green.

E. Erraticae.

The four preceding tribes are characterized by their usually sedentary habits. The remainder of the Ar a,neides are of a more wandering disposition. This is in proper accordance with their other capabilities; for, as .they cannot spin webs for the capture of their prey, they are under the necessity of moving about from place to place to extend the sphere of those exertions, the successful 'ssue of which depends on agility as well as cunning. “Such,” says Evelyn, “1 did frequently observe at Rome, which, espying a fly at three or four yards distance, upon the balcony where I stood, would not make directly to her, but crawl under the rail, till, being arrived to the antipodes, it would steal up, seldom missing its aim; but if it chanced to want anything of being perfectly opposite, would, at first peep, immediately slide down again.—till, taking better notice, it would come the next time exactly upon the fly’s back; but if this happened not to be within a competent leap, then would this insect move so softly, as the very shadow of the gnomon seemed not to be more imperceptible, unless the fly moved; and then would the spider move also in the same proportion, keeping that ust time with her motion, as if the same soul had animated both these little bodies; and whether it were forwards, backwards, or to either side, without at all turning her body, like a well-managed horse; but if the capricious fly took wing and pitched Upon another place behind our huntress, then would the !s#ider whirl its body so nimbly about, as nothing could be imagined more swift; by which means she always kept the head towards her prey, though, to appearance, as immovable as if it had been a nail driven into the woo#, fi# by that indiscernible progress (being arrived within the sphere of her reach) she made a fatal leap

swift as lightning upon the fly, catching him in the pole, where she never quitted hold till her belly was full, and then carried the remainder home."

Though the species above alluded to, and others consti· tuting the ensuing tribes, spin no webs, they are yet provided with a sufficiency of the necessary material toen· able them to construct cocoons for their eggs, and also to throw out an occasional thread to break their fall when leaping on a vertical surface.

The eyes of the erratic spiders are always eight in number, and are grouped rather along than across the thorax, forming a curvilinear triangle, or a truncated or quadrilateral oval. One or two pair of eyes are general] much larger than the others. The thorax is large, and the legs robust.

Tribe V.— Citigradae.

In this tribe the legs are generally fitted for running. The maxillae are always straight, and rounded at their extremities. The eyes are grouped in a curvilinear triangle, or in an oval or oblong figure, of which the anterior side is much narrower than the thorax taken in its greatest breadth. The thorax itself is ovoid, narrower in front, and somewhat ridged or keel-shaped in its longitudinal centre.

The females fur the most part keep close to their cocoons, which they carry about them, either suspended at their extremities, or applied between the chest and the base of the abdomen. They watch over their young for some time after they are hatched.

Genus Oxyopus, Latr. Sphasus, Walck.—Eyes ranged two and two on four transverse lines, of which the two at the extremes are the shortest; they describe a kind of oval figure, truncated at each end. The languette is elongated, narrow at the base, dilated and rounded at the extremity. The first pair of legs is the longest; the fourth and second are nearly equal; the third is the shortest.

Sp.Variegatus.— Body hairy and gray, variegated with red and white. Legs pale reddish, spotted with brown the tibial *spines* elongate. Inhabits France.

S#.Lineatus. (See Plate L.) Abdomen elongated, yellowish, with lengthened black spots on the sides, and a black longitudinal band beneath. This species forms its web on low growing plants, but nestles among the leaves of trees about the period of laying.

Genus Ctenus, Walck.—Eyes placed on three transverse lines (2, 4, 2) forming a curvilinear triangle, reversed, and truncated anteriorly. The languette is square and almost isometric. The fourth pair of feet are the longest; the first pair are next in length; the third are the shortest. , „

This genus, according to Latreille, was established tor the reception of a species found in Cayenne. Others, possessed of the same generic characters, have been found both in that colony and n Brazil, but their descriptions have not yet been made public.

Genus Dolomedes, Latr.—Eyes disposed on three transverse lines (4, 2, 2,) representing a quadrilatera ig urc ' somewhat brcader than long. The two posteri

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placed upon an eminence. The second pair of legs are equal to the first, if not somewhat longer; and the fourth pair are the longest of all. The languette is square, and, like that of the preceding genus, is as broad as high. . .

Of this genus, some have the two exterior eyes of the anterior line larger than the pair comprised between them; and the form of the abdomen is oblong oval, with a terminal point The females construct a silken nest, funnel-shaped, or in the form of a bell, which they place in a thicket, or among leaves near the summit of a tree. In this they deposit their cocoons of eggs, of which they are exceedingly careful. When they leave their retreats, either to hunt for prcy, or from any cause of alarm nearer home, they never fail to carry their bundle of eggs along with them. Clerk *(Araneisuecicoe)* mentions his having observed species of this genus spring with great activity upon flying insects.

Other species of Dolomedes have the four anterior eyes of equal size, and the abdomen oval, and rounded at the extremity. These inhabit the margins of water, run over the surface with agility, and even proceed a little beneath the surface without being wetted. The females form coarse irregular nets, suspended between the branches of plants, and place their cocoons upon them.

Sp.Mirabilis. Aranea saccata, Linn.—Colour pale reddish, covered with grayish down. Thorax heart-shaped, anteriorly abruptly sloping; the anterior angles and dorsal line whitish. Abdomen conical, suboval; darker on the back. Inhabits the woods of Europe. The female carries about her eggs inclosed in a dirty orange-coloured or whitish bag.

Genus Lycos#, Latr.—Eyes disposed in a quadrilateral figure, longer than broad, the posterior pair not placed on an eminence. The first pair of feet are sensibly longer than the second, but shorter than the fourth, whieh are the longest of all. The mâxillae are truncated obliquely at their external extremity. The languette is square, but rather longer than broad.

The species of this genus run swiftly on the ground. They live in holes, either previously formed by the accidents of nature, or hollowed out by themselves, and fortified along their interior walls by silken threads. Some dwell in the cavities of walls, where they form silken tunnels, covered externally by minute particles of earth and sand. In these retreats they undergo the periodical renewal of their skins; and also pass the winter, after having previously closed up the outer orifice of their dwellings. 1he females likewise deposit their eggs in these elongated cells. Their cocoons are usually fixed to the. extremity of the abdomen, and when the mothers go abroad, they have thus no

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Evelyn's *#ravel# in Italy.*

difficulty in carrying their eggs along with them. As soon as the young are hatched, they collect on the back of the female parent, and remain there till they gain sufficient strength to shift for themselves. Hie species are exceedingly voracious, and defend the possession of their domiciles with the greatest courage.

'#· T#rentul#,Araneatarantula, Linn. (See Plate L.) Colour ashy brown above; thorax with a radiated line, and margins griseous; abdomen marked anteriorly with t##gonal spots, posteriorly with arcuate transverse streaks o black, bordered with white; beneath saffron-coloured, with a transverse black band; thighs and tibiae beneath rufous white, with two black spots.

1h#s species, an inhabitant of the south of Europe, is e celebrated tarentula, of which so many extraordinary accounts have been given by travellers. It is scarcely necessary to observe that these are fabulous. Its bite was ^{i} *·# to produce symptoms equally severe with those of the most malignant fever, and of such a nature as to admit of being cured only by means of music. Some authors have even given a list of the tunes which are most efficacious in restoring the *tarentolati* (for so the patients were called) to health. The true tarentula occurs in the south of Italy, especially near the town of Tarentum, from which it has no doubt derived its name. It is the largest of the European species.

A species of this genus exists in the south of France, which bears a close resemblance to the Italian species, and appears to have been confounded with it by Olivier. It is the *Lycosa Melanogaster* of Latreille, and the *Tarentul#-Narbonensis* of Walckenaer, and differs from the species above described chiefly in being somewhat less, and in having the abdomen black beneath, and the edges only of a red colour.

Genus Myrmecia, Latr.—Eyes placed on three transverse lines; four in front, then two somewhat nearer the centre than the outer eyes of the first line, and two others behind the preceding pair. The mandibles are strong. The maxillae are rounded and hairy at the extremity. The tongue is almost square, somewhat longer than broad. The feet are long, almost filiform, the fourth and first pair being the longest. The thorax appears as if divided into three portions, of which the anterior is the largest, and of a square form; and the others are hunched or knot-shaped. The abdomen is much shorter than the thorax, and is covered from its origin as far as the middle by a solid epidermis.

Sp. Rufa.— Length about six lines. Fulvous, shining, nearly smooth, with the extremities of the palpi, the thighs, the first article of the posterior feet, and the end of the abdomen, blackish. Found near Rio Janeiro.

Tribe VI.— Saltigradae.

In this group the eyes are placed in a square figure, of which the anterior line extends along the breadth of the thorax. The thorax is demi-ovoid, or nearly square; flat, or but slightly bulged above; as broad before as elsewhere, and sloping suddenly down the sides. The legs are adapted both to running and leaping, and the thighs of the anterior pair are generally remarkably large and strong.

Several of the species construct among leaves and stones small oval sacks of silk, open at both ends, in which they seek refuge during bad weather, and while changing their skins. When any danger threatens these retreats they appear on the outside, and after a moment's reconnoitring run off'with great agility. The females form small tents, which afterwards serve as cradles for their young, and where the mother and her progeny dwell for some time together. The males, in their battles with each other, exhibit many singular manoeuvres.

The genus *Tessar#ps* of #. Rafinesque, and that of *Palpimanus* established by #. Dufour, both belong to this tribe. That first mentioned is said to have only four eyes. The latter is very rare, and was discovered in Valentia. We are not yet acquainted with the characters of either.

Genus Eresus, Walck.—Four eyes approached in a small trapezium, near the centre of the anterior portion of the thorax; and four others on its sides, forming a larger square. The languette is pointed and triangular. The tarsi are terminated by three crotchets.

Sp. Moniligerus.— Black; abdomen above cinnabarcoloured, with four or six black dots, arranged in two longitudinal lines; joints of the legs whitish; hinder sides of the thorax, the thighs, and the first joint of the four hinder legs, pale cinnabar. This is the *Araneaquadrigut-*

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tata of Rossi's *FaunaEtrusca.* It inhabits France, Germany, and England.

GenusSalticus, Latr. A##us, Walck.—Four eyes on a transverse line on the anterior portion of the thorax, the two intermediate larger than the others; the remaining eyes are placed two and two on each side of the thorax; they thus form a kind of parabola or part of a square, open posteriorly. The languette is very obtuse, and truncated at the summit. The tarsi have only two crotchets at their extremity. The mandibles of many of the males are very large. The shape of the thorax and the length and proportions of the legs vary according to the species.

Sp. Scenicus. Aranca scenic#, Linn.—Black, margin of the thorax covered with white down; abdomen short ovate, covered above by a reddish white pubescence, with three transverse arcuate lines, and the termination white; the first band is basal and entire, the others acutely bent anteriorly, and interrupted in the middle.

This species is called in Britain the hunting spider. It occurs on walls and palings, and is a common species, of considerable beauty. It loves exposure to light and heat, and is frequently seen near windows in sunny weather. Its movements are lively and amusing. When it sees a fly or a gnat it moves towards it with a slow and gentle motion, and then springs upon it with a single rapid bound. It leaps upon its prey as securely down a perpendicular wall as on a horizontal surface, by means of a thread which, previous to each of its bounds, it has the precaution to attach to the plane of its position. The palpi of the female are whitish; her legs reddish-gray, with darker spots. The mandibles of the male are very large.

Family II.— Pedipalpi.

Palpi very large, extended in the form of arms, and terminated either by pincers or a claw. Mandibles with two fingers, of which one is movable. Abdomen composed of distinct segments, without any terminal spinners. Sexual organs at the base of the abdomen. Thorax consisting of a single piece, and presenting near its anterior angles three or two eyes, approached or in groups, and two other eyes close together in the centre of its anterior or posterior margin. Four or eight pulmonary sacks.

Tribe I.— Tarentulae.

Our present division corresponds to the gcnus tarentula of Fabricius. The abdomen is attached to the thorax by a pedicle, or by a portion of the transverse diameter, without comb-shaped plates at its inferior base, or sting at its extremity. The stigmata are four in number, placed near the base of the abdomen, and covered by a plaque. The mandibles are terminated merely by a claw or movable crotchet. The languette is elongated, narrow, dart-shaped, concealed. Maxillae two, formed by the first joint of the palpi. Eyes eight, of which three are disposed in the form of a triangle near each anterior corner, and two are placed upon a tubercle near the centre of the anterior margin.

Naturalists have as yet acquired buta slight knowledge of this tribe of Arachnides. They inhabit chiefly the warmest countries of Asia and America.

Genus Piirynus, Olivier.—Palpi terminating in a claw.

Body flat, thorax broad, crescent-shaped. Abdomen without a tail. The two anterior tarsi long, slender, antenniform.

This genus was named Tarentula by Fabricius, but we prefer retaining the name previously bestowed by Olivier not only on account of its possessing a prior claim, but because the term Tarentula, as generally understood, ap. plies to a spider of the genus *Lycosa,* the *Araneat#rent* $_{u}l$ $_{\#}$ of Linnaeus.

Sp.Lunatus. (See Plate L.)—The arms or foot-palpi of this species are nearly three times the length of #e body. They are unfurnished with spines, except at the extremity of the fourth article. This is the *phalangiumlunatum* of Pallas. *Spicil. Zool.* fasc. 9. tab. fig. 5, 6.

S#.Reniformis. Phalangium reniforme, Linn. Herbst. *Tarentulareniformis,* Fabr. (See Plate L.)—Arms very spiny on their interior margins; the third and fourth articulations elongated. The fifth articulation is furnished with four spines. According to Mange this species is much dreaded by the negroes of the Antilles.

Genus Thelyphonus, Latr.—Palpi shorter and thicker than those of the preceding genus, terminated by pincers or double fingers. Body long, thorax oval, abdomen furnished with a slender articulated prolongation or tail. The anterior tarsi are short, with few articulations.

This genus appears to have been confounded by Gronovius with *Scorpio,* by Linnaeus with *Phalangium,* and by Fabricius with *Tarentula.* It forms the passage in the natural progress of generic forms to the scorpion tribe.

S#.Caudatus, Latr. *Phalangium caudatum,* Linn. (See Plate L.)—Some confusion seems to exist in regard to the exact or characteristic locality of this species. It is now said to occur in Java. South America furnishes another species, called by the inhabitants of Martinique *vinaigrier,* on account of its extremely acid odour.

Tribe II.— Scorpionides.

Abdomen sessile, or united to the thorax by its entire breadth, and furnished at its lower base with two movable comb-shaped plates, and terminated by a knotted base, armed with a sting at its extremity. Stigmata eight in number, four on each side along the belly. Mandibles terminated by two fingers, of which the exterior is movable.

The thorax of scorpions assumes the form of a lengthened square. There is a triangular appendage at the base of each of the four anterior feet, which in combination produce the appearance of a lip of four divisions; but of these, according to the views of Latreille, the lateral pair ought to be regarded as maxillae, and the two others as forming the languette. The abdomen is composed of twelve articulations, including those of the tail, which are six in number. The first division of the abdomen is composed of two parts, the anterior of which bears the sexual organs, the posterior the comb-shapcd appendages. These last-named parts are composed of a principal portion, narrow, lengthened, jointed, movable at its base, and furnished along its inferior side with a range of small, narrow, elongated, parallel plates, hollowed interiorly, united to the principal piece before mentioned, and somewhat resembling the teeth of a comb; their number seems to vary according to the species, and probably even with the age of the individual. The uses of these organs in the economy of the animal have not yet been determined. The four following segments of the abdomen have each a pair of pulmonary sacks and stigmata. Immediately behind the sixth segment the abdomen becomes suddenly narrow, and the six following knotty rings compose the tail, terminated by an arched slender point, beneath the extremity of whjch are two small holes, from which, at

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the will of the animal, there flows a poisonous fluid, contained in an interior reservoir. The tarsi resemble each 'other, and are composed of three articulations, the last of which is armed with a pair of crotchets. The four posterior legs have a common base, and the first article of the haunches is as it were soldered; the posterior pair are in part joined by their back part to the abdomen.

Two nervous cords, which derive their origin from the brain or superior ganglion, unite at intervals and form seven other ganglia, of which the last belongs to the tail. In all other Arachnides, according to Latreille, the number of these ganglia never exceeds three.

Eight stigmata mark the position of an equal number of whitish purses, containing a great number of small delicate plates, among which it is believed the air permeates. A muscular vessel prevails along the back, and Communicates by means of two other vessels with each of these purses. The intestinal canal is straight and slender. The liver is composed of four pair of glandular bunches, which discharge their fluiddnto the intestines at four points. The females are viviparous.

Scorpions occur in the warmer regions of Europe, Asia, Africa, and America. Several of the larger exotic species are poisonous, but the bite of the European kinds is rarely attended by fatal consequences, except to small animals. Maupertuis tried various experiments upon dogs and poultry with the scorpions of Languedoc. Only one dog died. The others, as well as the poultry, though repeatedly stung by *exasperated* scorpions, suffered no injury. Redi's experiments on pigeons were followed by a different result. They generally died in convulsions in about five hours after the infliction of the wound. Some, however, appeared to suffer no inconvenience from the bite of these animals. This difference may be attributed to the particular condition, or rather the quantity of the poison contained in the vessels at the time of the trial. The scorpions of Tuscany are so harmless that they are handled by the peasants without any fear.

Scorpions generally inhabit sombre and shady places, under stones, among old ruins, deserted dwelling-houses, and even, though more rarely, such as are occupied by man. They prey upon various kinds of insects, whieh they sting with their envenomed tails. They arc very fond of t#e eggs of spiders and of insects. In running, they usually carry their tails curved forwards over their backs; and they possess the power of moving them in all directions, either as offensive or defensive weapons. We have already mentioned that they produce their young alive. Redi states the number of these to amount to between 26 and 40, but some species are more prolific. Maupertuis found from 27 to 65 in the bodies of those which he examined. They were suspended or connected by a lengthened thread, and each was inclosed in a very delicate membrane. The European kinds appear to produce in August, and arc afterwards observed to change their skins. Some naturalists are of opinion that they couple twice a year. The female carries her young for several days upon her back, and watches over and defends them for about a month.

In the preceding generalities we have given the principal characters of the old genus scorpio. That genus has been recently divided into two, in conformity with the number of the eyes.

Genus Scorpio, Latr.—Eyes six.

S#. Europaeus.— Colour brown, varying in shade. Feet and terminal joint of the tail of a paler yellowish brown. Claws angular and heart-shaped. Pectens, or comb-shaped appendages, each with nine teeth.

The characters given by Linnaeus to his S. Europaeus do not accord with our observations on those found in France and Italy. "Cauda sub aculeo mucronata est." An American species is furnished with a projecting point' *beneath the sting,* and the existence of that feature in the Transatlantic species seems to have induced De Geer to mistake the latter for the one described by Linnaeus as inhabiting the southern countries of Europe.

Genus Buthus, Leach.—Eyes eight.

Sp. Occitanus. (See Plate L.)—Colour yellowish or reddish. Tail rather longer than the body, with elevated and delicately granulated lines. Each pecten furnished* with 28 teet# or upwards. About two inches in length.

This is the species experimented on by Maupertuis. He inclosed about 100 in one place, and after the lapse of a few days he found only 14 survivors, which had killed and eaten their companions. It occurs in France, Portugal, and Spain; likewise in Barbary.

Sp. Afer. (See Plate L.)—Nearly half afoot long, and of a blackish brown colour, with large heart-shaped claws, chagrined on their surface, and slightly haired. A notch in the anterior angle of the thorax. Number of teeth in each comb, thirteen. Occurs both in Africa and India.

Sp.Americanus.— Body slender, elongated, yellowish, with brown spots. Combs with twenty-eight teeth. Arms long and thin; claws filiform. Tail three times the length of the body. Sting with a point beneath. Inhabits America.

The *Scorpiodentatus* of Herbst is allied to the preceding. It inhabits Sierra Leone.

Order II.— Trachearіae.

The Tracheal Arachnides are distinguished by their respiratory organs, which consist of radiated or branched tracheae, receiving air only by two stigmatic openings. They possess no (ascertained) circulating system, and their eyes vary from two to four. Müller assigns six eyes to the *Hydrachnaumbrata,* but Latreille is of opinion that some optical or other deception may have interfered with the usual accuracy of the great Danish naturalist. The respiration of the Pycnogo#ides is unknown, no stigmata having been observed in that family.

The Arachnides of this order are the smallest of their class. Some species are almost microscopical. They are naturally divided into two great divisions. Those which belong to the first are more nearly allied to the preceding order, the pulmonary Arachnides, in the form and structure of their masticating organs; such as pertain to the second have the parts of the mouth more simply constructed of certain parts, which, in union with the languette, constitute a kind of trunk or sucker. But many of the species arc so minute, even in their general dimensions, that the examination of these organs, and the consequent classification of the species in accordance with a *cibarian* system, are attended with considerable difficulty, and, in the opinion of Latreille, ought not to be had recourse to, except in default of other more obvious characteristics.

The long-legged spider (commonly so called), which is a species of *Phalangium,* frequently met with in hay fields and other places during the summer season, is a familiar example of this order. So also are mites and other acarideous species.

Family I.— Pseudo-Scorpiones.

Thorax articulated, the anterior segment the larger. Abdomen distinct and annulated. Palpi large, in th# form of feet or claws. Both sexes with eight feet, having two equal hooks at the end of the tarsi, the two anterior

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sometimes excepted. Two mandibles *(antenne-pinces* or *cheliceres* of Latreille) terminated by a couple of fingers; and two maxillae formed by the first article of the palpi. This family consists of two genera, the habits of which are terrestrial; their bodies oval or oblong.

Genus Galeodes, Oliv. Solpuga, Lichtenstein.

Mandibles very large, with vertical,, strongly toothed fingers, of whieh one is superior, fixed, frequently furnished at its base with a slender pointed appendage; the other movable. Palpi large, advanced, in the form of feet or of antennae, terminated by a short button-shaped article, vesicular and hookless. . Anterior pair of feet resembling the -palpi; but smaller; they are also bookless. Eaeh of the other feet has the terminal joint of the tarsus furnished with a pair of hooks. The posterior pair of feet have five remarkable scaly excrescences placed upon foot-stalks, and ranged along the inferior surface of their first two articulations. The eyes, two in number, are very close to eaeh other, and are situated on an eminence of the anterior portion of the first segment of the thorax, which presents the appearance of a large head bearing the anterior pair of feet, in addition to the masticating organs.

According to M. Dufour the terminal article of the palpi incloses a particular disc-shaped organ, of a whitish colour and pearly lustre, not visible externally unless the animal is irritated. The lip *(labre)* has the form of a small beak, much compressed, recurved, pointed, and hairy. The languette is small, keel-shaped, and terminates in two divergent threads, each placed on a small articulation. Latreille perceived a pretty large stigmatie opening on each side of the body, between the first and second feet, and another cleft at the base of the abdomen. The abdomen is oval and composed of nine rings. We lately received two species of this genus from Persia.

Sp. Ara#eoides, Olivier. (See Plate LI.) *SolpugaArachnoides,* Herbst.—Colour pale yellowish-brown. Inhabits Africa and the western countries of Asia.

Genus Chelifer, Geoff. Obisium, Illiger. — Palpi elongated, furnished with didactile pincers at their extremity. Eyes placed on the sides of the thorax. Legs nearly equal in size, each terminated by a pair of crotchets. Body flat. Thorax almost square.

These animals run swiftly, both backwards and forwards. They carry their eggs about with them after the manner of spiders. The elder Hermann is of opinion that they spin webs. Sueh of the species as have the thorax divided or impressed by a transverse line form the genus Chelifer of Dr Leach. Their eyes are two in number. Others have the thorax undivided, and of these the eyes amount to four. They form the genus Obisium of the last-named author.

Sp.Fasciatus.— Hands oval. Segments of the abdomen bordered with white. Lives beneath the bark of willow and other trees. Sometimes occurs near London. Leach, in *Linn. Trans,* xi.

Sp. Canoroides. (See Plate LI.)—This species measures about a line and a half in length. The body and legs are of a reddish brown. The palpi are about twice the length of the body. It is a European species, inhabiting old books, herbariums, &c. and preys upon the bodies of several destructive insects. It ought therefore to be cherished in the live state by collectors.

Family II.— Pycnogonides.

Trunk composed of four segments, occupying almost the entire length of the body, terminated at each extremity by a tubular article, of whieh the anterior portion sometimes simple, sometimes accompanied by mandibles *(antenne-pinces)* and palpi, or by one or other of these organs, constitutes the mouth. Both sexes have eight feet proper for running; but the females are moreover provided with two false feet, placed near the anterior pair, and serving to carry the eggs.

The species of whieh this family is composed inhabit the sea. They usually keep themselves concealed among , sea-weed along the shores, and feed upon small marine animals. Their movements are slow. Their bodies are generally linear, the legs very long, composed of from eight to nine articles, and terminated by two unequal crotchets, of which the smaller is cleft. The first articulation of the body, or that whieh represents the head and mouth, forms an advanced, nearly cylindrical tube, pierced at its extremity by a triangular opening. It also bears the mandibles and palpi. The former are linear or cylindrical, composed of two pieces, of which the last is pincer-shaped, with the inferior or fixed claw shorter than the other. The palpi are filiform, with a crotchet at the end, and composed of from five to nine articles. Each of the succeeding segments of the body, with the exception of the last, serves as a point of attachment to a pair of legs; and the segment which articulates with the mouth is provided on its dorsal portion with a tubercle bearing the eyes, and on its ventral portion (in the females) with a small additional pair of feet on whieh the eggs are distributed. The terminal segment is small, cylindrical, and pierced at its extremity. The stigmatic openings in the bodies of this family have not yet been discovered.

M. Savigny is of opinion that this family forms the natural transition from the class Arachnides to the crustaceous tribes, and great uncertainty still prevails in the minds of naturalists regarding their true position in the system. We place them in the position which they now occupy in our present arrangement, in accordance with the views of M. Latreille. M. Milne Edwards, who has studied these animals in their native places, informed that celebrated entomologist, that in the interior of the Pycnogonides he observed caeca or lateral expansions of the intestinal canal.

Genus Pycnogonum, Brunn#ch.—In this genus the mandibles and palpi are wanting, and the length of the feet scarcely exceeds that of the body, which is proportionally short and thick. The species are parasitical on cetaceous animals.

Sp. Ealoenarum. (See Plate LI.) *PhalangiumBalaena#um,* Linn.—Inhabits the European Ocean. This species is frequently taken by the trawl-fishers in Plymouth Sound. It has been found by #. d'Orbigny on the coasts of France.

Genus Phoxichilus, Latr.—In this genus the palpi are wanting, as in the preceding; but we observe a pair of mandibles, and a greater elongation of the legs.

Recent observations induce the belief that these creatures breathe through their skins,—a peculiar character, which, when satisfactorily established, may lead to their being erected into a separate order, intermediate in some respects between the Arachnides and the apterous insects of the parasitical order. (See *Règne Animai,* tome iv. p. 277, *note.)*

To this genus belong *Pycnogonum spinipes* of the *Fauna Groenlandica,Phalangium hirsutum* of Montagu *(Linn. Trans,* ix.), *Nymphon hirtum* of Fabricius, &c.

GenusNymphon, Fab.—Resembles the preceding genus

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in the narrow and oblong form of its body, the length of its legs, and the presence of mandibles; but in addition to these organs there are likewise a pair of palpi.

Sp. Gracile, Leach. *(Zool.Mise.* i. 45.)—Colour cinereous; thighs cylindrical. Inhabits most parts of the British seas. We are doubtful whether this species should be considered as synonymous with the *Nymphongrossipes(Phalangiumgrossipes,* Linn.) figured on Plate LI. The term *grossipes* is certainly very inapplicable to either kind.

Genus Ammothea, Leach.—Mandibles much shorter than the rostrum, with equal joints, the fingers arcuate, and meeting at their tips. Palpi nine jointed, the third joint very long. Legs slender; coxae with the middle joint longest; tibiae with the first joint rather the shortest; tarsi with the first joint small; claws double, unequal. Egg-bearing organs nine-jointed, inserted under the first legs, behind the rostrum.

Sp. Caro##nensis. (See Plate LI.)—Body entirely brown, testaceous; back with three trigonate tubercles. *(Z#ol. #liscdl.* i. 34.) From South Carolina.

Family HI.— Holetra.

The groups composing this family are characterized by the union of the thorax and abdomen in a single mass, beneath a common epidermis. The thorax is almost divided into two by a contraction; and the abdomen, in some species, presents the appearance of rings, formed by the folds of the epidermis. The anterior extremity of the body frequently projects in the form of a beak or muzzle. The generality are provided with eight feet; some have only six.

Tribe I.— Piialangita, Latr.

Mandibles very conspicuous, terminated by didactylous pincers. Palpi filiform, and composed of five articles, of which the last is terminated by a small nail. Two distinct eyes. Two maxillae formed by a prolongation of the radical article of the palpi; and besides these there are sometimes four other jaws, which, however, result merely from a dilatation of the haunches of the first two pair of legs. Body oval or rounded, and covered, at least on the thorax, by a skin of a somewhat solid texture. The legs, which are always eight in number, are long, and distinctly divided, like those of insects. Many are provided near the origin of the two posterior legs with two stigmata, one on either side, concealed by the haunches. The species of this tribe are for the most part of active habits. The generative organs are placed internally beneath the mouth.

GenusPhalangium, Linn. Fab.—-Mandibles projecting, much shorter than the head. Eyes placed upon a common tubercle. The feet are long and slender, and when separated from the body they for some time afterwards exhibit signs of irritability. The females are provided with a membranous oviduct, filiform, annu-late#, and flexible. The tracheae are tubular.

#he species of this genus are of predacious habits. They prey upon small insects, which they seize with their mandibles, pierce with their crotchets, and suck to death. 1hey are of pugnacious tempers. Though analogous to spiders in (heir external forms, they cannot spin. They are short-lived, as those hatched in the spring are all supposed to die in the autumn.

Sp. C#rnutum, Linn, (the male). *Opilio,ejusd.* (the emale)—Body oval, reddish or ash-coloured above, white eneath. Palpi long. Two rows of small spines on the tubercle which bears the eyes. Thighs.with prickles. Mandibles horny in the males. A blackish band with a festooned border on the back of the female.

Of certain species of this genus Mr Kirby has formed' his genus *Gonoleptes.* (See *Linn. Trans,* vol. xii. Plate XXII. fig. 16.)

Genus Siro, Latr.—Mandibles projecting, almost as long as the body. Eyes distant, each placed upon an iso-^ latcd tubercle.

Sp. Rubens. (See Plate LI.)—Colour pale rcd; legs paler. Dwells in moss at the roots of trees.

Genus Macrocheles, Latr.—Mandibles long and projecting· Eyes sessile, or none. Two anterior feet, very long, and antenniform. The upper part of the body forms a plaque or scale, without any distinct rings.

According to Latreille, the *Acarusmarginatus* and *tes-tudinariu's* of Hermann *(fills)* belong to this genus.

Genus Trogulus, Latr.—Anterior extremity of the body advanced in the form of a hood or *chaperon,* and receiving in an inferior cavity the mandibles and other parts of the mouth. The body is very flat, and covered by a strong skin.

S#. Nepa>formis.— Colour obscure ash-colour. Central portion of the dorsal part of the abdomen, and the sides, obsolctely subcarinated. External apex of the first joint of the tarsi produced. Inhabits France and Germany, lurking beneath stones.

Tribe II.— Acarides.

Sometimes furnished with mandibles composed of a single pincer, didactylous or with a simple claw, and concealed in a sternal lip; sometimes furnished with a sucker formed of plates or laminae joined together. A few have only a simple cavity for the mouth, without additional appendages. ·

The species of this tribe (corresponding to the genus *Acarus* of Linnaeus) are almost microscopical, and are universally distributed. Some are erratic, and occur in a great variety of situations, among stones, on trees, among flour, cheese, and variöus other substances, whether animal or vegetable; others are parasitical on the skins of living creatures, which they sometimes greatly weaken by their excessive multiplication. The disease called itch, if not occasioned by, is at least in some way connected with, the presence of minute species of this family. Dr Galet has

demonstrated that that disease may be communicated by the transmission of mites from one (infected) individual to another. Small mites have even been found in the brain and in the eyes of the human race.

Many of the species, when first produced, have only six feet. They arc oviparous, and deposit a great number of eggs.

Genus Trombidium, Fab.—Mandibles *en griffe,* or terminated by a movable claw. Palpi projecting, pointed, with a movable appendage or finger at the extremity. Two eyes, each placed at the end of a small fixed pedicle. Body divided into two parts, of which the first or anterior is very small, and bears, besides the eyes and mouth, the first two pair of legs. ¡.*Sp. Ilolosericeum.*— Of a blood-red colour. Abdomen almost square, narrower behind, and notched. Back furnished with papillae, hairy at the base, and globular at their extremities. Common in gardens during spring.

Sp.Tinctorum. (See Plate LI.)—This species is three or four times larger than the preceding. It occurs in the East Indies, and produces a fine dye. ’

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Genus Erythraeus, Latr.—Mandibles and palpi as in Trombidium, but the body is undivided, and the eyes are not mounted on a pedicle.

Sp.Phalangioides.— Legs very long, the last joint broad, compressed. Body obscure red, with a dorsal band of orange yellow. Inhabits most European countries, running on the ground with great rapidity.

Genus Gamasus, Latr.—Mandibles didactylous; palpi projecting, distinct, filiform.

Some species of this genus have the upper surface of the body clothed, in whole or in part, with a scaly skin, while others are entirely soft.

Sp. Coleoptratorum.— Anterior pair of legs somewhat longer than the others. Coriaceous parts of the back fuscous.

Inhabits the excrements of horses and cattle, and is frequently found adhering in great numbers to the bodies of coleopterous insects of the genus Scarabaeus, Hister, &c.

To this genus belongs the *Ac#rusmarginatus* of Hermann, which is sometimes found in the brain *{corpus callosum)* of the human race.

Genus Cheyletus, Latr.—Mandibles didactylous. Palpi thick, arm-shaped, falcated at the extremities.

Sp.Eruditus. A carus eruditus, Schrank.—Colour brownish. Inhabits books and museums.

Genus Oribata. —Mandibles didactylous. Palpi short and concealed. Body covered by a coriaceous or scaly skin, in the form of a shield or buckler. Legs long, or of medium length.

The body in this genus is prolonged anteriorly in the form of a muzzle. There is sometimes an indication of a thorax. The ends of the tarsi are terminated by a single crotchet in some, by two or three in others, without any vesicular ball or cushion. The species are found beneath stones, among moss, and on trees. Their movements are slow.

Sp.Geniculata.— Of a brownish chesnut colour, shining, hairy. Legs pale brown, thighs sub-clavate. Common in Sweden, Germany, and England.

Genus Uropoda, Latr.—Mandibles pincer-shaped; palpi not conspicuous. Body covered by a scaly skin, and terminated by a slender filament, by means of which the species adhere to the bodies of coleopterous insects.

Sp. Vegetans. (See Plate LI.)—Brown, smooth, and shining. Inhabits France and England, attaching itself to the legs and other parts of insects by its pedunculated anus.

Genus Acarus, Fab. Latr.—Furnished like the preceding genera with didactylous mandibles, and very short or concealed palpi; but the body is soft, and unfurnished with a scaly crust. The tarsi are provided at their extremity with a vesicular tuft. Many species live on the substances used as aliments by the human race.

Sp. Sir#. The cheese-mite. (See Plate LI.)— Whitish, with two brown spots. Body ovate, the middle coarctate, with long hairs. Legs of equal length. Inhabits houses, feeding on flour and long-kept cheese.

Sp. Sc#biei. (See Plate LI.)—A microscopical species, which inhabits the skin of man in a diseased state. It appears, from the observations of Bonnani and others, that this insect usually accompanies the disease called the *itch.*Genus Bde#la, Latr.—Palpi elongated, bent, terminated by hairs or bristles. Four eyes, posterior feet the longest. Sucker prolonged in the form of a conical or awl-shaped beak. Found in moss, beneath stones, and under the bark of trees.

Sp. Rubra. La Bdelle rouge of Latrei#le. (See Plate LI.) —Rostrum longer than the thorax. Colour coccineous, legs paler than the body. Dwells beneath stones. This is the *pincerouge* of Geoffroy, and the *Acarus lo#gic#r#is* of Linnaeus. It is a minute insect, measuring scarcely half a line in length.

Genus Smaridia, Latr.—Distinguished from the preceding genus by the palpi, which are scarcely longer than the sucker; straight, and without bristles at the extremity. Eyes two. Anterior pair of legs longer than the others.

Sp.Sambuci.AcarusSambuci, Schrank.—Colour red, the body slightly haired. Movements slow. Dwells beneath the bark of trees, more especially that of the elder, observed by Latrei#le in the south of France. This genus is represented in Plate LI. by a figure of *Srnaridia passerina.*Genus Ixodes. —Palpi inclosed in the sucker, along with which they form a short projecting beak, truncated, with a slight expansion at the end.

The animals of this genus occur among bushes and underwood, from which they detach themselves to fasten on dogs, sheep, cattle, and other quadrupeds, to which they adhere with remarkable tenacity. Their eggs, of which they lay a prodigious quantity, are, according to #. Chabrier, obtruded by the mouth.

Sp.Reduvius. Acarus reduvius, #Àï\n. (See Plate LI.)— The colour and appearance of this species vary according to its state of repletion. The legs are black.

GenusArgas. —Palpi conical, composed of four articles, not inclosed in the sucker.

Sp.Reflexus.Acarusmarginatus, Fab. (See Plate LI.) —Pale yellowish, or flesh-coloured, with deeper anastomosing lines. Inhabits houses in France, sucking the blood of doves.

A species of this genus found in Persia (the *rnalleh de mianeJi)* is considered to be extremely poisonous. It appears, however, from the observations of #. Szovits, a naturalist recently employed by the Russian government to explore the Caucasus, that the bite of these bugs of Minna, as they are sometimes called *{ArgasPersicus* of Fischer), is in reality by no means dangerous.

The three following genera correspond to the genus *Hydrach#a* of Müller. Their habits are aquatic, and their forms oval, or nearly globular, and of a soft consistence. The number of their eyes varies from two to four, and even to six, according to Müller. They were usually confounded with the mites till the time of the last-named observer, who inferred that as they lived habitually in a different element, they ought to form a separate division. They resemble small spiders, and probably on that account received the name of Hydrachna, which signifies water-spider. Fabricius, who only employed in the formation of his groups characters drawn from the structure of the mouth, has united Hydrachna with Trombidium. The observations of Latreille have led not only to the distinct separation of these two genera, but to the subdivision of the genus Hydrachna into at least three distinct groups of species, all of which may be readily distinguished from the various kinds of mites (Acari) by their ciliated or natatorial legs.

The minute beings now under consideration occur

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abundantly in stagnant or slowly moving waters. The spring season is the most favourable for the observance of 'their habits. They *run* through the water with great rapidity, with a continual movement of their legs. Their dispositions are carnivorous, and their food consists *of* animalcular species, of minute insects, small flies, and aquatic larvae. Müller kept many Hydrachnae in vessels of water full *o#animalcula infusoria,* millions of which were eaten in a few days, soon after which the Hydrachnae were found in a state of great languor, and transparent from exhaustion. They speedily revived when a few drops of water containing animalcules were mingled with that through which they swam.

The males are usually much less than the females, and the sexes frequently differ in colour. Only four or five species were known before the time of Müller, to whose persevering labours we owe the best elucidation which has yet been given of their history.

Latreille is of opinion that the structure of the masticating organs authorizes the establishment of the three generic groups which follow.

Genus Eylais, Latr.—Mandibles terminated by *a* movable crotchet.

Sp.Extendens. Atax extendens, Fab. (See Plate LI.)—- Body rounded, smooth, shining, immaculate, red. Hinder legs straight. Inhabits stagnant waters.

Genus Hydrachna, Latr.—Mouth composed of plates forming a projecting sucker. Palpi provided at their extremity with a movable appendage.

Sp.Geographica. (See Plate LI.)—Black, marked with coccineous spots. Inhabits gently flowing waters. A beautiful species, not uncommon in several parts of Britain.

Sp.Cruenta. (See Plate LI.)—Distended, red; legs of nearly equal length. This is the *Tro#ríbidiumglobator* of Fabricius, and the *mite aquatique ronde* of De Geer.

Genus Limnoc#ares, Latr.—Resembles Hydrachna in its sucker-shaped mouth, but the palpi are simple.

Sp. H#l#sericea.— Body ovate, red, rugose, soft; eyes black. This is the *Acarusaquaticus* of Linnaeus, and the *mite satinée aquatique* of De Geer. Inhabits the waters of Europe, and occurs frequently in ponds during the summer months. It varies in colour from a bright red to *a* #rayish red. According to Fabricius, it deposits its eggs 1 on water scorpions *(Nepoe).*

The remaining genera are distinguished from all other Arachnides by having only six legs. Their habits are parasitical.

Genus C#ris, Latr.—Sucker and palpi apparent. Body rounded, very flat, and covered by a scaly skin.

Sp.Vespertilionis.— Body fuscous. Found on bats.

Genus Leptus. —Sucker and palpi apparent. Body soft and ovoid.

'#·Autumnalis.AcarusAutumnalis, Shaw. (See 1 late Ll.)—Colour red, very minute. Common during the summer months on grasses and other plants, from which it detaches itself, and fixing in the skin of the human species, occasions an insupportable itching. "Acarus Autumnalis," says Dr Shaw, "popularly known by the name of the harvest bug, is also one of the most minute of the genus, and is of a bright red colour, with the abdomen bent on its hind part, with numerous white bristles. This troublesome insect will make itself sufficiently known to most people, during the months of July, August, and September. It is easily distinguishable on the skin by its bright red colour, and adheres so tenaciously when it has once fixed itself, as to be scarcely separated without violence; its motion when disengaged is pretty quick, though by no means equal to that of some other acari. On the part where it fixes it causes a tumour, generally about the size of a pea, sometimes much larger, accompanied by a severe itching. These insects abound on vegetables, and are generally contracted by walking in gardens, amongst long grass, or in corn fields." *(General Zoology,* vol. vi. p. 464.)

According to Mr White of Selbourne, this minute creature greatly abounds in the chalky districts of Hampshire. He was assured that the warreners are much infested by them, and are sometimes throw n into fever by their bites. Another species is common on *Phalangium opilio.*Genus Aclysia, Audouin.—Form like that of a bagpipe.

See O. F. Müller's *Hydrachnae,* 1 vol. 4to, 1781.

A syphon, without distinct palpi, placed beneath the anterior extremity, which is narrow, curved, and obtuse. The legs are very small.

The species of this genus are parasitical on the bodies of water-beetles of the genus *Dytiscus.* The only one of which we have any knowledge *(A. dytisc#)* is described by #. Victor Audouin, in the 1st vol. of the *Mem. de la Soc. (#Hist. Nat. de Paris.* We found it on *Dytiscusmarginalis,* in the vicinity of Edinburgh. A second species has been recently discovered in Russia by Count Manheiren. Genus Astoma, Latr.—Neither sucker nor palpi visible.

The mouth consists merely of a small opening, situated in the breast. The body is soft, and oval; the legs very short.

Sp. Parasitica. (See Plate LI.)—Body cocc#neous, slightly contracted in the centre. This is the *mite parasite* of De Geer. It inhabits the bodies of flies and other insects.

Genus Ocypete, Leach.—This genus, arranged by Dr Leach in the same stirps as *Trombidium,* is placed by Latreille at the end of his Hexapod Arachnides. It differs from those with which it is conjoined by the possession of mandibles.

Sp. Rubra, Leach, *Linn. Trans,* xi.—Colour red, back furnished with a few long hairs. The legs are covered with many hairs of a rufous cinerescent colour. The eyes are blackish brown. This curious little animal, which is not larger than a grain of sand, is parasitical, and frequently occurs on the larger tipulae, adhering to their legs. Dr Leach obtained no less than 16 specimens from one insect. (T.)

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