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OF THE

Folkestone NATURAL HISTORY SOCIETY.

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DECEMBER, 1868.

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ADDRESS.

In the present glut of the literary market as regards periodical literature, an apology will be expected in bringing before the world another scientific quarterly. It will then, perhaps, be well to state the grounds on which such a course of action may best be defended.

The days are happily long gone by, when scientific theories were constantly being propounded regardless, or nearly so, of experimental observation, and when each philosopher thought it his duty to outbid all others by the wildness and extravagance of his speculations. And with the expiration of what may be called the theoretical period of science, and the substitution for it of a more solid method of reasoning, the

professors of each particular branch of natural science have endeavoured to obtain in all parts of the world, and in as many localities as possible, in our own island, persons who should become accurate observers of all classes of natural phenomena.

It is with this great object steadily kept in view, that the Folkestone Natural History Society has been formed, and, by keeping it in view as its main object alone can it hope to flourish, or this paper to succeed. We must not expect all of us to become great naturalists, so as to introduce important changes in classification, or by propounding deep theories, but we should all of us endeavour to be good and accurate observers.

This journal will contain such papers from among those that have been read before the society as shall seem suited for publication; and we shall be glad to receive original papers, records of scientific discoveries, and other communications that may seem likely to promote the great object that we have set before us. We shall also devote a portion of our pages to notes and queries. It will be our endeavour to exclude as much as possible irrelevant matter, and we shall do the utmost that lies in our power to further the prosperity of the Folkestone Natural History Society, and to furnish a satisfactory record of our local scientific phenomena to its members and to the stranger naturalists who may from time to time visit our town.

PROCEEDINGS OF THE SOCIETY.

A meeting of gentlemen interested in the study of Natural History was held in the Town Hall, by kind permission of the Mayor, April 4th, C. E. Fitz Gerald, M.D., in the chair.

After a few remarks on the desirability of forming a society for the above study, and on the natural facilities for it which abounded in our neighbourhood, the Chairman called upon Mr. Ullyett, formerly secretary to the High Wycombe Society, to explain the mode of formation and working. After this had been done, it was resolved that a society should be formed in Folkestone, all those present, about five-and-twenty, giving in their names. C. E. Fitz Gerald, M.D., was elected president, and a committee was appointed with power to add to its number. The subscription to be half-a-crown per annum, for ladies or gentlemen. Mr. Ullyett was elected secretary. It was resolved that a field day should be held on the first Saturday in each month during the summer; but the first ramble should be on the Wednesday in Easter week, as a day when the majority of the members would be at liberty.

FIELD DAY, APRIL 15th.

The members met at Tower No. 2, for a geological ramble over East Wear Bay; about five-and-twenty were present. On arriving on the sands, the secretary read the following paper on the

GEOLOGY OF THE WARREN.

We are standing on ground full of historical interest. Before us stretch the white chalk cliffs of Albion that tempted the Roman conqueror across from Gaul. Far away inland runs the line of hills of which they are the termination, until the Plain of Salisbury is reached, fraught with no less interest as the spot where the ancient inhabitants

of our land reared one of their largest temples. All the chalk ranges of England commence at Salisbury Plain, radiating from it to the north-east, east, south-east, and south-west. What we see here is the termination of the east range, known generally as the North Downs, forming the Northern boundary of the Weald of Kent. The precipitous and abrupt appearance of the cliffs will cause any thoughtful mind to ask the question—Did the range ever extend farther seaward than it does now? As the cliffs appear to be continually undergoing degradation, there are certainly grounds for supposing that it did. Cast your eyes across towards France, and when the atmosphere is in a favourable condition you will behold a similar termination of chalk hills on the opposite coast, just as abrupt, just as steep. The geologist will tell you that in ages gone by the cliffs of Albion were united with those of Gaul, that our country was not then an island, but a portion of some large continent; and that the separation has been effected by a gradual sinking of the land, and the incessant dashing of the ocean waves on a barrier too feeble to resist their mighty influence. The increased shallowness of the water in the line between these cliffs, compared with that of the sea on either side of it, supports this view, as does also the fact that the other formations found here beneath the chalk occur there in the same order. This hypothesis accounts at once for the mode in which our present island became populated with its various wild inhabitants, as well as with the lions, elephants, monkeys, hyænas, &c., the remains of which are disinterred by the geologist. They crossed over, not by water, but by the land that is now submerged.

The Chalk is the uppermost of the secondary series of rocks, and is a very extensive deposit, being found not only in England but in various parts of Europe between us and the Black Sea. It is formed chiefly of the remains of shell fish and microscopic animals, being found to consist of carbonate of lime; and was evidently deposited in a tranquil deep sea, far from land, as the nature of the animal remains testifies. The climate, too, was a much more equable one then than it is at present, and much warmer; very few vegetable remains of any kind are found in it. The fossils found in it in this locality are abundant, but I have not as yet worked them much; here we may get, however, numerous *Terebratulæ*, Sea Eggs of several kinds, *Ananchytes*, *Micraster*, and *Cidaris*, with their detached spines, and any quantity of shells and fragments of *Inocerami*; the last-named, together with *Rhynchonellæ*, are very abundant in the detached blocks at the foot of the cliffs near the Coast-guard Houses.

Besides the Chalk, we have here the Upper Greensand, Gault, and Lower Greensand. The strata, as you would observe better in going along the Lower Sandgate Road, are not horizontal, but inclined at a small angle and dip to the east, cropping up, you will notice, from beneath the superincumbent formations as you go westward. Very little, indeed, of the Upper Greensand is to be seen; there are a few

blocks scattered here and there, and some small remnants *in situ* far out on the beach. I have not yet succeeded in extracting any fossils from it except a few specimens of wood, though there are plentiful traces of apparent organic remains in some portions of it.

Next below it comes the Gault, or Blue Clay, as it is locally called, and here it is that the fossil remains appear so exceedingly abundant and beautiful. If we wished to place a young geologist where he would be likely to meet with the least disappointment, we ought to set him down either in a Lias quarry or on a bed of Gault. They are scattered about on the beach here in the utmost profusion, though they are more easily attainable at some particular times: the tide overflows the clay twice a day and washes them out, but it sometimes covers them up with sand instead. It is difficult to preserve them, as they are apt to drop to pieces as soon as dug out; it is very disappointing sometimes, just as you fancy you have got a good large Ammonite out, resplendent with all the hues of the rainbow, to see it separate into four or five parts. It is best to dig out the lump of clay in which the specimen lies, carry it carefully home, and soak it a short time in a thin solution of gum. The most abundant fossils here are *Ammonites*, several species, *Belemnites* by hundreds, *Baculites*, *Hamites* &c., the pretty *Nucula pectinata*, and one or two other bivalves. I have come across one tooth belonging to a species of shark, and some bits of fossil wood. From the frequent occurrence of the latter substance in the Gault and Greensand it would appear that they were formed in the vicinity of land; in fact many geologists regard these formations as a littoral deposit going on in some places simultaneously with the deposit of Chalk in the deep sea. Fragments of *Inocerami* may be found in every block; *I. sulcatus* is one of the most common and curious. It is of little use working in the dry blocks above high water mark, as everything there is so friable. The thickness of the Gault is best seen by observing the high promontory to the left, beyond Tower No. 3, which is wholly composed of the Blue Clay.

Between this Gault and the Lower Greensand is a very narrow bed of unique formation, known as the Folkestone Junction Bed, it is seen only near the aforesaid promontory; it is very ferruginous, and contains sulphur, with small portions of selenite; it produces a few fossils, particularly wood.

Next below the Gault we find the Lower Greensand, well known to us all, forming the cliffs near the harbour and those all along the Lower Sandgate Road. I have worked in it scarcely at all; one of its characteristic fossils is a large oyster, *Ostrea sinuata*, to be seen in most of the loose blocks scattered about below East and West Cliff. The formation consists, at Folkestone, of layers of tolerably hard stone, with intervals of loose sand between them, on which the Gorse and other wild plants flourish luxuriantly. The beds of Sandgate are less sandy, and mixed with Fuller's earth, while at Hythe they become much more compact and are known as Kentish Rag. To geologists

these three are known as the Folkestone, Sandgate, and Hythe Beds respectively. Below West Cliff, at a considerable distance from the surface of the Lower Greensand, is a large black deposit of sand and clay, quite friable in some spots and in others drying like the Gault. The surface appears to be uniformly level, and the deposit itself is probably a very sandy mixture of Fuller's earth. I extracted a long piece of wood from it this morning. One more formation remains—a conglomerate, blocks of which are lying in the clay and sand some distance to our left, and a long stratum immediately beneath the Chalk past the Coast-guard Houses. Nodules of Iron Pyrites are exceedingly abundant on the beach, and blocks of Iron Sandstone as well, also up higher on the Warren. It is hardly necessary to remind you that before the use of coal in smelting there was an immense quantity of iron dug from the Weald of Kent. In the time of James I. there were 400 furnaces at work in this and the adjoining counties, smelting the iron ore with the wood then so abundant in this part of the country.

The whole of the coast immediately before us is being rapidly destroyed; even in a week or two we should look in vain for the identical spots we may notice now at highwater mark. This destruction is, of course, owing partly to the action of the waves, but much more to the loosening effects of the land springs, which wash out subterranean channels for themselves, and by so doing cause the mass of earth immediately above them to sink down more or less suddenly. A large slip occurred on the 10th March just beyond the Coast-guard Houses; the mass of earth went down at all once, but preserved its own level so well that any one standing on it would have received no injury, probably not even a fall.

From this very imperfect sketch of local formations, we may see that a rich harvest awaits any who intend collecting and studying; and there is also the interesting opportunity of watching a coast visibly wearing away, and of thus being able to form some little idea of the power of one of the grand agents in nature in altering the surface of the earth.

The members then worked for themselves in the Gault; the high water prevented their going to the most productive spots, but many good specimens were found. Among them were—*Ammonites lautus*, *A. tuberculatus*, *A. splendens*, *Nucula pectinata*, *N. ovata*, *Inoceramus sulcatus*, *I. concentricus*, *Belemnites Listeri*, a *Natica*, Shark's Tooth, &c.

Much assistance in identifying these and others was afforded by the Rev. E. Langdon, F.G.S., who had drawn sketches of the commoner ones for the occasion.

FIELD DAY, MAY 2nd.

The members met on the Lees, and proceeded to the canal at Seabrooke. The Rev. E. Langdon read the following paper on

FRESHWATER MOLLUSKS:

The *mollusca*, or mollusks, form one of the most numerous specifically and individually, and the most widely distributed, both in time and space, of all the great divisions of the animal kingdom. Most widely distributed in time, for geologically we find their remains embedded in all rocks of sedimentary origin, from the very oldest to the most recent; the most widely distributed in space, for in every quarter of the globe where life can be supported the mollusca in some form are met with. Called mollusks from the softness of their bodies, they have no articulated skeleton nor vetebral canal. Their nervous system is not united as in the vertebrata by a spinal cord, but scattered about in nervous masses, disposed in various parts of the body; the principal one, or brain, if we may so call it, forming a nervous collar or ring round the gullet. A large number of them have no head or brain, as having no need of nerves for the transmission of the impressions received by organs of special sense. In them, the inlet for food is simply an opening or beginning of the alimentary canal, without jaws, tongue, or mouth, properly so called. All the remaining mollusks are provided with a head, which generally support feelers, or tentacles as they are called, eyes, and a mouth armed with jaws. So that we at once get a good division of them into two classes, both of which I hope I shall be able to shew you to-day:

ACEPHALA, or mollusks without heads.

ENCEPHALA, or mollusks with heads.

The headless mollusks all live in the water, and are divided into three further classes:

Tunicata, Brachiopoda, and *Lamellibranchiata.*

Of these, the first two I will pass over, as we shall be unable to obtain any practical knowledge of them to-day, merely pausing to make one remark about the *Brachiopoda.* They are among the most abundant of the molluscous remains that the geologist finds in the early deposits, and very abundant in all up to the time of the chalk, after which they become less frequent; but the point to which I wish to call especial attention is that the geologist knows somewhere about 3,000 species, whereas in our own times only 13 species are known, and those very difficult to be procured.

But to leave them for the *Lamellibranchiata*, of which I hope the canal will furnish us some specimens.

Bearing in mind that all mollusks with a double shell are set down as "oysters," "cockles," or "mussels," by the uninitiated, I beg you all to keep a good look out to-day for "mussels" and "cockles."

Now just a word or two about the way in which these *Lamellibranchiata* are grouped.

When they are in their ordinary condition you will see them in the water with one or more tubes projecting from the partly open shell for inhaling and exhaling the surrounding fluid; but if they are disturbed or alarmed in any way the two shells are drawn close together. Now you will ask, how do they close their shells? In a very simple manner, by having a muscle attached to each shell, which they have the power of expanding or contracting at their will, very much like those India rubber springs with which doors are sometimes kept closed.

Now some of these *Lamellibranchiata* have one of these muscles attached to each shell, and form a class called the *Monomyaria*, or one-muscled *Lamellibranchiates*. Of these the oyster is a common example, and the next time you have an oyster shell in your hand, you will see on it a scar where the muscle was attached. Of this group we find only one in freshwater in our country; and I fear we must not expect to find it to-day, although it is far from improbable that there are some to be met with in this canal.

Others of the *Lamellibranchiata* have two of these muscles attached to each shell, and are called *Dimyaria*, or two-muscled *Lamellibranchiates;* these are the "cockles" and "mussels." In them you will see two scars on each shell.

1st. The *Anodonta cygnea*, or Swan Mussel, of which we may, I hope, be fortunate enough to obtain specimens three or four inches in length, and which have been known to attain as great a measurement as nine inches.

2nd. *Unio*, a smaller and rounder mussel than the preceding, of which there are three species, that I shall be happy to name if any gentleman finds specimens.

3rd. *Cyclas*, a kind of freshwater cockle, of which there are five species, all small, the largest barely an inch across.

4th. *Pisidium*, another cockle, of which there are seven species, the largest no bigger than a pea.

These are all the *Lamellibranchiates* to be found in English fresh water.

We must now turn to the *Encephala*, or mollusks with heads.

These are divided into *(a) Pteropoda*, creatures that swim by two wing-like muscular expansions extended outwards from the sides of the head. There are only three or four modern genera, all found in salt water.

(b) The *Cephalopoda*, creatures having their feet or organs of motion attached to their head, so that literally it is a question whether they stand on their head or their heels, as the expression is. These we

shall not find in freshwater; but you are most of you familiar with some of them, such as the Ammonite, Belemnite, Squid, and Cuttlefish.

And lastly *(c)*, the *Gastropoda*, creatures that creep by means of a muscular disc attached to their belly, such as the slug and snail. It is with this class, and with those members of it called the freshwater snails, that we have the most to do to-day.

We shall, however, find a shell named *Succinea*, which although an air-breathing and not a water-breathing mollusk, is never found except in wet places. I shall hope to point it out to you presently. The genus *Succinea* contains three species.

Next we come to four families of shells, the inhabitants of which breath both air and water, and can, consequently, live on mud and on the banks of rivers a short time, although water is their more congenial element.

1st. *Planorbis*, shaped somewhat like an Ammonite, of which there are eleven British species, and of which we may hope to find some specimens, at any rate *Planorbis complanatus*, which is flat one side and has a sharp keel; and, perhaps, *Planorbis crista*, a small, delicate, ribbed shell, with which I made my first practical acquaintance in this canal about five weeks ago.

2nd. *Physa*, of which there are two species: always coiled to the left, as you will see if you find a specimen by holding it with the aperture facing you and the apex or spire upwards: the aperture then will appear on the left hand side. The common snails are coiled to the right, and a left-handed garden snail would be a rich prize as there are not a dozen in the British Museum.

Physa may be easily recognised by its body being much too large for its shell.

Its shell, too, is very bright, its occupant continually polishing and cleaning it by portions of its body folded up over its shell like little fingers; we may take it home as a model for housewives, if we can succeed in finding a specimen.

Physa has the property of letting itself down from the top of the water, or from the leaf of a water plant, by a thread of mucus.

This has been doubted by several able authorites, among them the late Lovell Reeve; but I have had the good fortune to witness it myself, and experimented on it in the presence of some friends with such conclusive results that the above-mentioned eminent conchologist expressed himself perfectly satisfied when I gave him an account of my investigations.

3rd. *Lymnæa*, the commoner family of water snails, of which we have eight in Great Britain, of which one is confined to Ireland and two others are very rarely met with.

We shall find, I hope, to-day, at any rate two species, *L. limosa*, also known as *L. peregra;* and *L. palustris*, a shell easily recogised by the malleated appearance of its surface as if it had been hammered all over. Nor do I see any reason, except in the fact that I have not yet

met with them in this canal, why we may not expect to find **L. auricularia*, a pretty shell in the shape of an ear, *L. stagnalis*, the largest British species, and *L. truncatula*, making, in all, five out of the eight. If not in this canal, we must not, I think, at any rate rest satisfied until we have found them somewhere in the neighbourhood.

4th. *Ancylus*, or freshwater Limpet, of which there are two species. They are usually found adhering to stones or water weeds, more commonly the former, unless found in situations with a very muddy bottom. Of the two, they rather prefer clear to stagnant water, although they will live for years in a healthy aquarium. They are both small; the larger, *Ancylus fluviatilis*, never exceeding half an inch in diameter.

This completes my list of those that respire both air and water, and they are all, like the common snail, without an operculum or trap-door with which some mollusks shut themselves in when they retire within their shell.

We now come to those that are provided with an operculum, such as you must have noticed in the common periwinkle. Of these we have in England two genera, which, like the common snail, breathe air only; but these I pass over as foreign to our purpose to-day. The remainder (there are but five families) respire water only.

1st. Of these I pass over one, Dr. Gray's *Assiminea*, as it has been only as yet found in the River Thames.

2nd. *Bythinia*, a genus of pretty mollusks of which there are three species, and of which we must make up our minds to find one at least. The animal when crawling puts forth two white, elegantly-curved tentacles, and is, altogether, a genteel looking creature and exceedingly dainty in an aquarium, choosing out for itself all the youngest and most tender bits of water weed.

3rd. *Paludina:* Of this there are two species, not particularly easy to distinguish.

These are certainly by far the handsomest of our fresh-water shells. The colour of the shell is a dark olive green with three purple bands running round it; the animal which is shy and unlike the peacock, not fond of exhibiting itself, is of a rich dark umber tint, covered with minute yellow dots, suggesting the idea of gold dust.

It has the peculiar characteristic of hatching its young in the ovary, and ejecting them when alive three or four at a time when they are about two months old. Whenever I have found in the breeding season shells of these creatures *with the operculum perfect, in which the animal had perished*, I have invariably found two or three of the young fry also, about ¾ of an inch in diameter.

4th. *Valvata*, of which there are two species.

This is a small animal generally found adhering to stones and sticks in still and gently running waters. The animal is pretty, being almost

*This shell was found on the day in which this paper was read.

milk white, its blue-black eyes showing conspicuously at the base of each tentacle. It has two characteristics almost peculiar to itself; one is, two almost crescent-shaped projections on either side of the front of the foot, reminding one somewhat of the feet of birds in Noah's Arks. The other is its branchia, or breathing apparatus, which is somewhat like a feather, and is sometimes protruded outside the shell above the head, protected by a third tentacle, which curls about as a sentry to see that the coast is clear.

Both the species are small.

5th and last. *Neritina* of which we have but one British species.

It is not unlike in shape to *Nerita*, the little yellow shell that is so common on our coasts on rocks at low tide. It may be found on stones or on the gravelly bottom of rivers and streams, but not, I fear in the still waters of the canal.

Before closing my paper, I must make a few remarks on the order generally.

Some of them are hermaphrodites; *i.e.* contain the male and female organs in one individual; others have the sexes distinct. Some bring forth their young alive, without any distinct eggs; others like *Paludina* hatch their eggs within their body. They have no distinct organ of smelling as yet discovered, although they undoubtedly, for the most part, possess that sense. The organs of hearing in some of them are very curious. They consist of two round cells containing fluid and crystalline particles, called otolites or ear stones, which, by means of minute hairs or ciliæ, spin round and round at a tremendous pace, and will continue to do so for some hours after they have been removed from the animal, when the ciliæ stiffen and drop off and all motion ceases. The best creature for obtaining these otolites from is *Paludina*, the handsome purple-banded shell I have spoken of.

The organs of respiration vary; some have branchia, or gills, some have lungs, and some both. The tongue is, in all the *Gastropoda*, an organ for the attrition of its food. It could not, one would think, convey any sense of taste to the so-called brain, as it is of a silicious or flinty nature. It forms a beautiful object for the microscope.

There are many other objects of exceeding interest connected with these animals; their microscopic appearance in the early stages of development, their distribution throughout the globe, theories connected with origin and range of species, which I hope, with the leave of the president and committee, to discuss on a future occasion in a paper on the land mollusks.

I can only conclude by recommending any who desire to become further acquainted with these interesting creatures to search for themselves, and to set up an aquarium, by which alone any real knowledge of their habits and other points of interest connected with them can be acquired; and I shall be most happy to render any assistance in the way of instruction or advice to those desirous of doing so, and also to lend and recommend books on the subject.

I should be glad to be shown any new specimens that any member may find now or hereafter, as I am forming a catalogue of the local species.

Nets and bottles then made their appearance, and a good collection of shells, &c., was procured among the members. Among them were—*Lymnæa limosa*, *L. palustris*, *Succinea gracilis*, *Bythinia tentaculata*, *B. Leachii*, *Planorbis complanatus*, *Cyclas ovalis*, with fragments of *Anodonta cygnea*, and *var. anatina*.

Several new members were added.

SOIREE, MAY 13th.

A microscopical soirée was held at the President's residence, at which about forty members were present. Fifteen microscopes were provided for the occasion, all well supplied with objects. The President read the following paper on

THE MICROSCOPE:

The microscope is an instrument of great antiquity; indeed, there is no doubt that it was in use in its simplest form—namely, a globe of glass filled with water, at a period long antecedent to the birth of Christ. Seneca and Pliny, both of whom were born at the commencement of the Christian era, mention lenses made with glass or water; and Ptolemy speaks of magnifying glasses and refraction in his work on Optics. This, however, was the microscope in its most primitive and simple form—a single lens of glass or water. It was not until the middle of the 17th century that the compound microscope, consisting of a combination of lenses, came into limited use; these microscopes were large, unwieldy tubes, with the objects fixed in them. Very unfamiliar instruments they must have been, for we read about this time of a travelling philosopher who fell ill with fever and died in a certain town. The municipal authorities examined his effects, and found an immense brass tube, some six feet long, which on peeping into they found to contain his *familiar demon*, an immense monster of a very "uncanny" appearance. Of course, the philosopher was refused Christian burial; and it was not until some time had elapsed that an adventurous burgess, who had succeeded in unscrewing the end of the

apparatus, was astonished to find that the philosopher's familiar demon was nothing more formidable than the familiar flea. Although the microscope was known so many centuries ago, it is really only within the last 30 years that it has been brought to its present state of perfection. During that time it has made giant strides, and has advanced from being a scientific toy, giving a confused and coloured image, to its position of pioneer in the investigation of every mystery of nature. I myself can remember when a lens with a quarter-inch focal distance, magnifying 200 diameters, was the highest power known; and when, about ten years since, a 1-26th of an inch lens was manufactured by one of our enterprising opticians, it was considered, and indeed is, a marvel of delicate workmanship. Since then, however, they have succeeded in making lenses with a focal distance of 1-50th, and within the last few weeks 1-70th of an inch, and magnifying between 4,000 and 5,000 diameters. I should perhaps mention, that the power of a lens is known by the distance at which it is held from the object magnified. This is the instrument with which we now penetrate deeper and deeper into the secrets of nature, and solve doubts and problems which only a few years ago seemed hopeless mysteries. It was by the aid of the microscope M. Trembley first discovered that wonderful creature the hydra, or fresh water polype. I suppose there is no other creature on earth which could undergo and flourish on such treatment as this can. It is nothing that it propagates itself by buds like a plant, and that any part cut off is reproduced; but you may cut off or slit up its heads, and each piece will produce a new one; you may cut it in halves or quarters, and produce two or four new creatures; you may turn it inside out, so that what is now stomach becomes outer skin, and vice versa. You may splice two or three individuals together, head to head, tail to tail, or head of one to the tail of the other, and they will become one animal, not only without injury, but with every sign of placid enjoyment.

In observations made with the microscope, errors will, of course, sometimes arise, not from any fault of the instrument, but from want of care in observation. Thus there was great dispute some years since as to the real form of the blood corpuscles. The blood consists, as most of you know, of a colourless fluid, in which float numerous red and white discs called blood corpuscles. Well, some observers described them as globular, others as flattened discs, a third as slightly convex, a fourth as highly convex, a fifth as concave, &c.; whereas the form of a corpuscle in freshly drawn blood is a circular disc, with slightly concave surfaces, the differences of form being produced by maceration, or soaking in water or other fluids, during or before the time of observation. One of the most curious results of microscopic research is the much greater certainty with which it enables us to give to various creatures and plants their right places in creation. Great obscurity prevailed among the older microscopists as to what they termed animalcules. There are sometimes not less than 27 varieties of

animalcules in a single drop of water, bearing, as we now know, no further resemblance one to the other than their microscopic size; some are plants, some are animals, though which is which, is, or was, difficult to decide. Many a fierce debate has been held, many a fiery word spoken on this subject; for even natural philosophers are not devoid of angry feelings. The borderline separating the animal and vegetable kingdom has long been debateable ground, and the tribes in close contiguity on either side have constantly, though unconsciously, shifted sides, now being claimed by the animal philosophers, now by the vegetarians. Now, some unmistakeable spontaneous motion being discovered, they are given up to the animal world; then their outer coverings yield un-doubted evidence of starch, and they are claimed as true vegetables. There is one specimen in particular, the *Volvox Globator* which has changed sides so often, that could it be supposed to posesss our finer feelings, it must be quite ashamed of itself. For a long time it was considered an unmistakeable animal, as it whirled round in the water by the aid of its ciliæ or hair-like appendages, and was described as possessing an eye, a mouth, and several stomachs. There is now, how-ever, no donbt as to its vegetable character. Perhaps you will say, what *is* the difference between a plant and a lower animal? Well, the boundary line is faint, and somewhat uncertain, and there is no one characteristic mark by which to distinguish one from the other. Certainly spontaneous motion is not one; for so frequent is it among vegetables, that I really think the safest plan for the young microscopist is, when he sees anything he is quite convinced is an animal, to at once put it down as belonging to the vegetable kingdom. Perhaps the most practical test is that given by Carpenter—the dependence of the animal for nutriment on organic compounds taken into the interior of its body; of the vegetable, its power of obtaining its own alimentary matter from inorganic material on its exterior. At any rate these are the characteristics of the animal and vegetable world as a whole. For while we find the simplest animals, the *Protozoa*, nothing more in fact than a mass of jelly, deriving their nourishment as much from other animals and plants as we do from beef or potatoes, so we find the *Protophyta*, the humblest class of plants, drawing their support from water, carbonic acid, and ammonia (inorganic compounds), and liberating oxygen and absorbing carbonic acid, in the same manner as the most highly organised plants.

The microscope has been most invaluable in investigating many diseases, or blights, as they were called. Thus it was discovered that the silkworm disease (muscardine), which annually carried off immense numbers of silkworms, was a fungous vegetation; that that most troublesome malady to which our country men north of the Tweed are more particularly liable, and which James I. said no one but a king should be allowed to have, is caused by the burrowing of a small insect (*Acarus scabæi*) beneath the skin: and what is stil the more important, we have within the last few years discovered the

Trichina spiralis, a little spiral worm, which is generated in the muscles of unwholesome pork, and is the cause of a frightful disease if taken into the human body. It is for this reason, I should perhaps mention, that it is so very necessary pork should be always thoroughly cooked, or this animalcule is very tenacious of life, and will live through any but the fiercest heat. That troublesome disease called ringworm is now known to be of vegetable origin, consisting of a fungoid growth; and the same may, to a certain extent, be said of the thrush to which infants are so liable, and even of diptheria. By the aid of the microscope it was discovered that all things, animal and vegetable alike, are but a conglomeration of cells. In the lower forms of life, each individual cell may be considered perfect in itself, forming sometimes the entire individual, and capable of independent life; in man and the higher animals the whole complex organisation is gradually developed from the multiplication and secretion of a single cell; this, however, is far too vast and abstruse to be more than alluded to in a fugitive paper like the present. Another very interesting result of microscopic discoveries is the curious metamorphosis or transformation that goes on in the lower animals during the different stages of life. We are all familiar with the change which takes place from the tadpole into the frog; but this, which we are accustomed to consider an exception, appears rather to be the rule in the lower organisations. I shall show you presently the larva of the Mayfly, swimming and diving through the water like some ugly little fish, and as unlike the light aerial fly which it ultimately becomes as any two objects can be. Again, there is not much similarity between a crab and a barnacle, yet in their earlier stages they are like Pompey and Cæsar, very much alike, both very much like the little water flea. Indeed the very youthful crab was at one time considered and described as a perfect adult animal of the water-flea class; it must therefore be quite impossible for a parent to know its own offspring.

The wonders which reward even a superficial knowledge of the microscope are far too numerous to be alluded to in the limits of this paper; for what can be more interesting than to watch the circulation of the blood corpuscles in the living animal, and then to compare it with the analogous process which goes on in plants, and is so well seen in the *Valisneria*, &c.? What more wonderful object in nature than the compound eyes of many of our common insects, which are made up of hundreds and thousands of separate eyes placed side by side, each eye provided with iris, retina, and optic nerve? The common fly is provided with no less than 4,000 eyes; while the cabbage butterfly has 17,000, the dragon-fly 24,000, and the Mordella beetle no less than 25,000. To the zoologist the assistance of the microscope is invaluable. By its aid he can determine from the minutest portion of bone or tooth, not only the natural family, but the genus and species to which its animal possessor belonged. The geologist again is not less indebted to this wonderful instrument, for by its aid he is able to

determine the nature of various deposits which would be quite inscrutable to the naked eye. By this means it has been discovered that the calcareous shelled foraminifera constitute a large proportion of the chalk deposits, and that the silicious or flinty coverings of the diatoms form extensive flinty deposits; and this is the way in which some geologists account for the layers of flint in chalk formations, the presence of which was at one time a source of great speculation. The whole city of Richmond is built upon a layer of infusorial earth 18 feet thick, and extending to unknown limits; while the remains of foraminifera form a band often 1,800 miles in breadth and of enormous thickness, that may be traced from the Atlantic shores of Europe and Africa through Western Asia to India and China, as well as over large areas of North America. The material of which the pyramids are built consists of remains of a species of foraminifera known as nummulites. Indeed, minute fossil remains, often too small to be recognised without the aid of the microscope, constitute no small portion of the crust of the earth. The Greensand, for example, which underlies the chalk, is composed chiefly of silicious casts of the interior of foraminifera and minute molluscs. And lastly, in the discovery of crime the microscope plays no unimportant part. By its means many of the vegetable poisons are detected; and especially is it of use in deciding whether stains are produced by blood or other fluids, for although the blood discs bear a general family resemblance, there are marked differences between the blood of man and some other animals. This was well exemplified recently, where there was a train of circumstantial evidence pointing to the guilty man, and where, although there was no moral doubt of his having committed the murder (he had cut the throat of a young girl), there was just one legal link wanted to complete the chain, which was supplied thus: the man had carefully washed his clothes; no stain could be identified as blood; even the knife found in his pocket had evidently been carefully wiped, but on removing the blade a small dark-coloured mark was discovered in the hinge, which being scraped off and placed under the microscope displayed unequivocal evidence of being blood; nay, more, a few epithelial cells peculiar to the lining of the air passages were also found mingled with it; and from this evidence the microscopist was not only able to pronounce with certainty that the stain was blood, but that the blood had flowed from the windpipe of a human being.

And if you seek, reader, rather for pleasure than for wisdom, you can find it in Nature, pure and undefiled. Happy, truly, is the Naturalist. He hath no time for melancholy dreams. The earth becomes to him transparent; everywhere he sees significancies, harmonies, laws, chains of cause and effect endlessly interlinked, which draw him out of the narrow sphere of self-interest and self-pleasing, into a pure and wholesome region of solemn joy and wonder.—C. KINGSLEY.

FIELD DAY, JUNE 6th.

About forty members assembled at Tower, No. 2, and proceeded to the Warren, where the Rev. C. L. Acland, read a paper on

THE FERTILIZATION OF ORCHIDS.

I have been asked, on the occasion of this, the third of our pleasant rambles, to read a paper on Orchidaceous plants, or more shortly Orchids. Considering that Sowerby enumerates 44 orchids as natives of the British Islands, and distributes them among 14 genera, it is obvious that an exhaustive account even of our own orchids, would require a treatise rather than a paper. Considering moreover that this family of plants is perhaps without exception the most extraordinary of the whole vegetable world; that it presents wonders of form, diversities of colour, strangeness of smell far beyond that shown by any other class of plants that we know, it becomes again evident that I can do my subject but scant justice in the short time I can now ask you to devote to listening to me. I have therefore thought it best to confine my attention to one apparently minute, but really most interesting point connected with the subject of orchidaceous plants, the story namely of their birth, and I will beg your attention while I point out to you the principles on which, from the tiny Dwarf Orchis of our chalk hills to the gigantic *Angræcum sesquipedale* of the Madagascar Forests, the agency of insects is absolutely essential to the fertilization of the plants, and so to the continuance of the different species. I may mention, in passing, a peculiarity about the roots of most, if not all, of our perennial orchids. Although perennial, that is, coming up year after year, the plant does not come up from the same root two years in succession. Notice the double bulb of this root. One of these bulbs has given rise to the plant now in my hand, the other is ready to give rise to the plant of next year, last year's bulb has rotted off in the ground. Each successive year the plant, the same plant observe, springs from a new root, and as these new roots are always developed in the same direction from the old one, always to the right or always to the left, the plant actually moves from year to year, and at the end of several years is some inches from its original position. Any amount of this kind of work however, so long as one bulb of this year gives but one bulb for next year, could lead to no increase in the number of individual plants. The orchids do not, like the lilies, throw out fresh bulbs in all directions, so that a single plant becomes in turn a patch; each bulb produces its one successor and no more, and the chance destruction of an individual plant would at once and for ever lessen by one, the number of individuals in existence but for the propagation by seed, of which I must now speak.

Let me ask you to call to mind the flower of the White Lily. All of you know it with its beautiful white petals, bright yellow stamens, and long green pistils, or rather three pistils joined in one—confluent pistils they are called—standing in the middle of the yellow stamens. At a certain period of the year, the stamens become covered with a yellow easily-removed dust; the noses of most of us, no doubt, have been discoloured by it before now. At precisely the same period, the top of the green pistils, called the stigma, becomes sticky, and as a breath of air, an insect, a nose, it may be, removes the yellow powder or pollen from the anthers, some of it gets on to the sticky pistil, each particle which does so begins to grow, throws out a long thin thread, which runs down one or other of the hundreds of tubes of which the stalk of the pistil is formed, like a bundle of straws on a small scale, and makes its way into the ovary, there to fertilise some one of the many seeds it finds waiting for it. This process must take place with all seed-bearing plants, properly so called. Cut away the stamens from the flower, and unless pollen is brought from a neigbouring flower, the pistil is of no use, for the seeds cannot be fertilized; remove the pistil and the pollen is wasted. In most plants this fertilization is very easily effected, as the pollen dust "sits lightly on its throne," and is removed by any slight shaking, or chance crawling of an insect.

(To be continued.)

THE PLANORBIS COMPLANATUS,

Or Experiences of Aquarium Life.

AN AUTOBIOGRAPHY.

I was born, at least as far as I can ascertain, in the River Cherwell, a tributary of the Isis, and must have lived there about three months, when a revolution took place in my fortunes, to which I may trace the origin of the following eventful history. Phew! how hot that summer was. I thought I should have been boiled, at least I felt a very curious sensation, although at the time I did not know it was boiling. Well, one day I was floating lazily on the surface of the water, when the whole of the liquid element was rocked fearfully, and seemed to rise and fall in hollows and eminences, up and down which I was borne in great consternation. "Dear me" thought I, "I had better go down," and was just drawing in my head for that purpose when I felt a blow that shook my whole house, and quite unsettled my stomach. This had scarcely passed before I felt myself lifted up into the air upon something which reminded me of the palings

at the side of the river, on the corners and crevices of which I was accustomed to hide myself in stormy weather, only much whiter and smoother. This I afterwards learnt was what they call in the upper world an Oar. "Oh it is only a Planorbis Complanatus" exclaimed some gigantic being near me, "throw it in again;" to which another human monster replied "you may as well keep it, you have not too many." This conversation I listened to as you may believe with mingled feelings. In the first place my mother poor thing, she died before I came, though my egg shell had given no information about my origin and family, and consequently this was the first time I had heard my name. My family I knew was very ancient as I had heard from some conversation with an elder brother, and I have since heard that a great authority on genealogies, a Mr. Darwin has declared that we are descended from the distinguished family Pleurosigma, a noble branch of the famous race of Diatoms. Again I was indignant at the small estimation in which the first speaker regarded me, so I drew in my head and determined not to look at him; and indeed for what seemed to me a very long period, I was subject to such fearful concussions, that had I been enabled to stifle my feelings fear would have prevented me from stirring. Consequently what elapsed during these to me trying hours is better imagined than described. My next recollection is a cessation of these direful jars to which I had been subject, and a sensation of coolness owing to my being once more in an *atmosphere* of water. Having remained quiet for some little time, I ventured to put my head out and rise to the top. I had scarcely done so when a horrible monster with dingy red scales, a vulgar brute I can assure you, mistaking me in his blindness for a caddis worm no doubt, or some other low thing upon which he feeds, opened his mouth and swallowed me house and all. This was not to be tolerated by a personage of so good family as myself, so I made a hard bite at his inside and forced him to let me go again all up his red mouth, and I flatter myself that I cured him of such rude inconsiderate behaviour. I fancy also the style of architecture in which our family have always been accustomed to build their house must have rather teased him, we always have a sharp angular moulding all round it, which I think must have scratched his throat in an unpleasant way. As soon as I had recovered my usually quiet demeanour, for I am not accustomed to such rudeness, I began to crawl over the stones at the bottom of the water, but I had not gone far before I came to a sort of barrier which puzzled me exceedingly, for I did not see it until close to it, and then knocked my head against it. I conclude it was a sort of stone, but quite smooth, and I could see through it, and what should I see but the monster who slighted me so in the river; however, I determined not to appear disconcerted, especially as there was a barrier between us, and I began crawling up it. I soon to my delight met one of my family, but on looking closer saw that he had not got the sharp moulding round his house which we always pride ourselves on, and thought of passing by, but began to entertain a feeling of reverence towards him when I saw how wrinkled he was and what a long green beard he had, nearly three

times his own length; so I determined to speak to him, so I bade him "good morning" and asked him "how he fared." "Very well as things go" said he, "only this weed incommodes me so much I can hardly crawl." I remarked that I had been admiring his beard, and thought it his only redeeming point, as he lived in such an ugly house. "Ah!" said he, shaking his feelers indignantly, "I see how it is, you are evidently a yonng upstart, and when I come to look at you I see that you are not a *Planorbis corneus*, only a distant branch of our family, a *Planorbis complanatus*, called so because your house is plain. Plain you always were and plain you always will be. Phew! how hot it is, no room to move or breathe." The old gentleman seemed in a talkative mood, so I thought I would just swallow his taunts and listen. "It is all because of this American weed. My great-great-great-great grandmother was alive when it was first introduced, and a fine fuss there was about it, and many were the long names they called it. My great grandmother would have nothing to do with the vulgar stuff, although some of the youngsters used to go and poke their noses into it (they were as ignorant as you). She always said that these new-fangled notions (reform forsooth!) would never do; she never lived to see her words come true, but I have, and here it is like all reforms, sweeping away everything that is good, and forcing itself upon us. Where are all the pretty Starworts, and other delightful institutions gone? they must make way for master Yankee. Where is the sweet little water Crowfoot? It must make way for master Yankee; why even the duckweed which I used to eat floating on my back at the top of the water has no room to live in, and all because master Yankee wants more room, and so master Yankee has choked us up (I wish he would choke himself) till the water can't sparkle, and we can't crawl, but get covered with this nasty green weed, which you, young green-horn mistook for a beard. But I must not stop talking to you any longer, I want something to eat." So we parted, and I started forth determined to see the world. I could not help thinking of what *Planorbis corneus* had told me; though sometimes when he used hard words I did not understand him, but I held down my head, and inclined my feelers downwards, as people do when they want to look wise or are in profound thought, and although at times the opinions he seemed to hold were jarring to my feelings, especially when he made personal remarks, yet I could not help entertaining a sort of respect for his profound knowledge and sagacity. However, I must tell you about my travels. I had not gone far before I heard a fairy voice above me singing—

"See me toil and see me spin,
None but those who strive can win."

I looked up and saw the most delicate little house with a pretty little lady in it, sailing gracefully down. "Take care you dirty thing," she said, "Why don't you get out of the way," and, before I could reply, dropped down at my feet. "Oh, you pretty creature," I said. "None of your nonsense," she replied, "may be I'm pretty, may be I'm not; at

any rate I'm clean, which is more than can be said of you. Why you never clean your house; I met a relative of yours as I came down, he had three inches of nasty green weed dangling about, and nearly broke my ladder rolling about; I can't think why the waywardens don't tell such people not to stop the thoroughfares." She was indeed very pretty, and I was so lost in admiration that I scarcely knew what to say, but I made bold to ask her how she kept her house so clean and shining. "Oh, because I have been educated properly," said she, "My mother always said that all her daughters should know how to look after their own establishment, and quite right too, so I'm never idle; I don't mind a chat, but you must excuse my rubbing up my ceiling a bit." I could not see the necessity, it shone like a bead of gold, but I noticed that she kept five or six busy fingers at work, reaching out from the door of her house, and carefully polishing the roof and walls; and one thing I saw, which seemed to me strange in so *dexterous* a lady,—she was left-handed. Her complexion was as fair as a lily, and all her motions showed me that she must be descended from distinguished parentage. She came down by a pretty rope of the most delicate silk with an ease that would have puzzled all the female Blondins that ever existed. I ventured to ask her name. "Physa," she said, "but it is a great liberty to take with a strange lady; however, one does not expect much from boys like you. Now I would lay a wager," says she, "that you are lounging about doing nothing, talking of seeing the world or something of the kind. Well I don't mind giving you a hint or two. Perhaps you would like to know something about my family. Once upon a time, years ago, there was a great quarrel between us. A very distant ancestor of mine was one day going abroad for his morning constitutional—we always take exercise soon after sunrise—when he saw one of the family with his house very much out of shape, longer and not so elegant; besides the rascal had the audacity to build it blacker and less transparent. He remonstrated with him but to no purpose, the renegade said that he and his wife were not going to be dictated to, they had determined to build their house in this shape, and they wern't going to alter it for all the world; why should they always go on in the conventional way, they would strike out a new line for themselves and form a noble family. Such a thing as this was not to be passed over, my ancestor called a council of the oldest and most experienced in our tribe, and it was unanimously determined that they should be banished from the clear water, so they went away and lived in moss, and people called them *Physa hypnorum*. They are, I believe, a large family, but they live a secluded life and are seldom to be seen, and we think ourselves well rid of them. But what I am going to tell you now is not creditable to us; a part of our family have determined to give up their cleanly habits, and you may see them sometimes about in black muddy places; however, like all vicious people, they suffer for it, and instead of being like I am (here she looked down over her white neck and shoulders) their bodies are almost black. "What can you expect from a pig but a grunt?" said I "Very true," she said, you have

more sense now than I gave you credit for. However I must go, and take one word of advice before I go. As you are going about to see the world remember one thing; it is no disgrace to draw in one's horns, and so I advise you to be never ashamed of doing so; if you will be bumptious you will meet with some hard blows in this world and wont find every one as considerate as I am." I was going to make some pretty speech to the effect. that the advice of so sweet a lady could not fail to be excellent, but while I was thinking of a proper phrase to express it in, she had disappeared up her ladder and I heard her voice above me

"Toil and spin, toil and spin,
None but those who strive can win."

(To be continued.)

CORRESPONDENCE.

All communications should be addressed to MR. H. ULLYETT, *Folkestone. We shall be glad to receive notes concerning any of our local plants and animals, times of appearance, abnormal forms and colours, popular names and traditions, &c. These must be authenticated by the writer's name and address, but not necessarily for publication.*

To the Editor of the *Quarterly Journal of the Folkestone Natural History Society.*

SIR,—I shall esteem it a favour if any of your readers can assist me in discovering the origin of the following names of British plants:

Pagle: This name variously spelt Paigle, Pagle, Pagel, Peagle, Pegyll, Peggle, and Pygil, is now applied to the Cowslip *(Primula veris)*. The Bulbous Crowfoot *(Ranunculus bulbosus)* has, however, been so called; and Gerarde assigns the name "Pagle," and a somewhat similar one, "Pygie," to the Great Stitchwort *(Stellaria Holostea)*.

Kingfingers: Applied to the Early Purple Orchis *(Orchis mascula)*, a plant called also "Bloody-man's fingers," "Kingfisher," and "Giddygander."

John Georges: A Buckinghamshire name for the Marsh Marigold *(Caltha palustris)*.

Church-brooms: A name given in Essex to the Teasel *(Dipsacus sylvestris)*.

What is the origin of the name "Charlock," applied to the Wild Mustard *(Sinapis arvensis* and *S. alba)*? Other forms of this word are—Chedlock, Chadlock, Curlick, Curlock, Ketlock, and Kadlock. In Cheshire another yellow-flowered weed, the Ragwort, is called "Kadle-dock." Have "Kadle-dock" and "Kadlock" the same origin?

JAMES BRITTEN.
High Wycombe.

[By the kindness of a correspondent, we are able to insert an answer to Mr. Britten's question in this number.]—ED.

When Anglo-Saxon words are transferred into modern English the labials B and P are often interchanged. The word "Pagle" or "Peagle," applied to the Cowslip, is compounded of two Anglo-Saxon words—"Beag," "Beah," "Beh," or "Beeh," a garland or crown, and "Gylden," "Gelden," "Gealde," or "Gelde," golden or yellow; thus "Beah-Gelde," Golden-Garland.

Michael Drayton, in describing the wedding garlands of his day, says:—

> To sort these flowers of show with others that were sweet,
> The Cowslip then they couch, or Oxlip for her meet.

It is just possible that the term "John Georges," as applied to the Marsh Marigold, may be a corruption of the Anglo-Saxon words "Geond," over or through, and "Geres," a fen or marsh, in allusion to its habital.

No doubt the Common Teazel was called "Church-brooms" from its resemblance to the long-handled "Turk's-head" brooms with which they sweep the cobwebs from church ceilings, &c.

The modern word "Charlock" or "Carlock," is derived from the Anglo-Saxon "Cawel," "Cawl," or "Cael," cale or cabbage, and "Leac," a herb, thus we have "Gear-leac," Spear-leak, or Garlic, "Cerse-leac," "Cress-leak," or Nasturtion. Many herbs whose seed vessels or flowers bore a fancied resemblance to a purse were called in Anglo-Saxon "Codd-leac," from "Ceod" or "Codd," a purse or small bag, and "Leac," whence the English word "Kadledock" or "Kadlock" is no doubt derived.—C. E. Fitz Gerald.

NOTES AND QUERIES.

The two Clouded Yellows, *Colias Edusa* and *C. Hyale*, have been tolerably plentiful along the Lower Sandgate Road this season.—Q.

A slow-worm of unusual length was brought to us from the Warren, a short time ago. The body measured eight and a half-inches, and the tail eleven, making a total of nineteen inches and a half. We were also told that one was taken out of the stomach of a viper that had been killed; this is not a usual meal for him, we believe.

White Varieties of Plants.—I have obtained white varieties of the following plants from the Warren, viz.—*Geranium pratense*, *Echium Vulgare*, *Ophrys Apifera*, and *Campanula Trachelium*.—C. H. Dashwood.

Anagallis Tenella.—Last summer I found one plant of this pretty and somewhat rare Pimpernel, growing in a damp piece of ground on the Warren. I have not met with any other specimens.—C. H. Dashwood.

PARIS QUADRIFOLIA.—In April, 1867, I found the five leaved variety of this plant growing in considerable abundance, in a small wood near Paddlesworth Church.—C. H. DASHWOOD.

THE WASP *(Vespa Vulgaris)*.—The common wasp may frequently been seen flying in numbers round the flowers of the Water Figwort *(Scrophularia Aquatica)*. For what purpose these insects frequent this particular plant, I am unable to say.—C. H. DASHWOOD.

THE VIPER.—Can any of our readers inform us of any *well authenticated* cases of death resulting from the bite of the viper? We have never been able to trace any report to its foundation, and as the question excites some attention among naturalists, we shall be glad of any information on the subject.

MELITEA CINXIA, one of our more uncommon Fritillaries, has been said to occur along the Lower Sandgate Road. We have looked for it in vain, although the situation is favourable, and the food-plant of the caterpillar, *Plantago lanceolata*, is very plentiful. Have any of our readers met with the butterfly in the neighbourhood at all?

FIVE-SPOTTED BURNET MOTH.—I took several of these *(Zygæna trifolii* I believe), in company with the common six-spotted species, this summer, on the hills west of Cherry Gardens. I captured one good variety, too, having all the spots running into each other.—Q.

QUEEN OF SPAIN FRITILLARY—*Argynnis Lathonia*.—Hearing that this rare butterfly had been captured at one or two places along the Kentish coast, I paid one or two special visits to the Warren in search of it, but in vain. Mr. W. Purdey, of Grove Terrace, was however, more fortunate, as he took a tolerably good specimen there on September 7th.—HENRY ULLYETT.

LOCAL NAMES.—We are particularly anxious to obtain as many as possible of the local names of plants and animals (especially birds). The assistance of all who take an interest in the subject is requested. Lists will be gladly acknowledged by the editors, or by James Britten, Esq., High Wycombe.

Want of space compels us to postpone the publication of two or three papers until the next number.

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Subscribers are respectfully informed that it would save much trouble, and ensure punctuality in the delivery of the Magazine, if they would forward their names and the year's subscription to the Secretary at their earliest convenience.

Postponed for want of space, communications from S. Greenstreet, Q., and A. B.

All Communications should be addressed to H. ULLYETT, *Folkestone. We shall be glad to receive notes concerning any of our local plants and animals, times of appearance, abnormal forms and colours, popular names and traditions, &c. These must be authenticated by the writer's name and address, but not necessarily for publication.*

BUTTERCUPS.

Those who love to exaggerate the difficulties attendant on a systematic study of any branch of Natural History usually enlarge upon—I. the technical terms employed; II. the minute distinctions on which the separation of one species from another depends. Now as to the former charge, we do not deny that a page of, say, Babington's "Manual," does look rather formidable to a novice: and as to the latter, there is no doubt that, in some cases, very minute distinctions *are* of great importance; thus the difference of size between the pollen-grains of *Lotus major* and *L. corniculatus* (two species of Bird's foot Trefoil) is one of the chief points by which these nearly-allied plants are determined. But technicalities are as necessary in science as they are in any branch of manufacture; and minute distinctions are only *exceptionally* exalted to very great importance, unless in connection with other evident marks of difference. As an illustration of this, and as showing that, in some cases at any rate, the distinctions between allied species are sufficiently obvious, we may take the three species of *Ranunculus* which are usually called "Buttercups," glancing first of all at the other species of the genus to which they belong.

The genus *Ranunculus* contains twenty-five British species. Twelve of these, however, are but developments, forms, varieties, modifications, which you will, of the Linnean *Ranunculus aquatilis;* and a thirteenth, the Ivy-leaved Crowfoot (*R. hederaceus*), a small species with white blossoms, growing in mud, or in shallow water, may be dismissed from our notice. Considering these thirteen as Water Crowfoots (*Batrachium*, Fries,) we may pass them over with the remark that they all have white flowers, and grow in, or near water; while the remaining twelve have yellow blossoms.

Now let us take these twelve yellow-flowered species, and select from them the "Buttercups," which we are going to consider. Three of the twelve have long, entire, narrow

leaves, and grow in marshy places, sometimes even *in* the water: these are called Spearworts, and scientifically *R. Lingua*, *R. Flammula*, and *R. reptans*—this last very rare, and only recorded from one locality in Scotland. Then we have the Pilewort, or Lesser Celandine (*R. Ficaria*), with roundish or heart-shaped glossy leaves, and starlike, equally glossy, flowers. The remaining eight have divided leaves. The Celery-leaved Crowfoot (*R. sceleratus*) is marked by its hollow stem; it grows by or in water, and has small pale yellow flowers in which the oblong head of immature fruit is conspicuous; this has very glossy leaves, as has also the Wood Crowfoot (*R. auricomus*), distinguished by its kidney-shaped root-leaves, and affecting shady places. We may remark, in passing, that *R. auricomus*, as a rule, has not its full complement of petals, or rather that they are not fully developed; three or four attain their proper size, but one or two are usually either absent, or very diminutive; this gives the flower an irregular appearance. The Corn Crowfoot (*R. arvensis*) is an inhabitant of cultivated fields (usually cornfields); it is a smooth, upright, pale-green plant, with lemon-coloured blossoms, which are succeeded by large prickly carpels, these at once determining the species. Another (*R. parviflorus*) has very hairy leaves, spreading and hairy stems, and minute, almost petalless, flowers; this grows in dry banks, but is somewhat rare. A fifth, *R. hirsutus*, is even less frequent; it is an annual species, and grows in cultivated fields or on waste ground; we shall have occasion to refer to it again.

We have now but three species to consider—known indiscriminately as Buttercups. Many, doubtless, are not aware that there is more than one species comprehended under that name: and yet, although there is a general likeness among them, a very little examination will show us very evident points of difference.

When the meadow grass is beginning to shoot up, while the primroses still linger on the banks; when the cowslips are just bursting into blossom, we shall find the Buttercups beginning to show themselves. Here and there a flower expands, and, if we look down among the grass, we are sure to see in every direction the soft, hairy, cut leaves, and among them soft, hairy, green buds; giving promise of the wave of gold which will, in a week or two, pass over the meadow land,

when Dame Nature produces everywhere a "Field of the Cloth of Gold," far more effective than the one celebrated in history, and far less costly. The species which is the chief contributor to this display is the Bulbous Buttercup (*R. bulbosus*), readily distinguishable—if you will take the trouble to pull one up—by the bulb-like base of its stem. Yet not by this alone. There are but two other species, with divided leaves and yellow flowers, with which *R. bulbosus* could be confounded; and, if you do not care to examine the stem, you may determine this one by its flowers. Blossoms are usually—as far as their non-essential parts are concerned—composed of corolla and calyx, the "flower" and the flower cup. The corolla is formed of petals, the calyx of sepals, which are, in the Buttercups, small, green, and insignificant, five in number, So insignificant are they that you may possibly never have noticed them; but you have only to turn a Buttercup upside down to be convinced of their existence. Now, in the two species which we have yet to consider, these sepals, like the petals, spread upwards; but in *R. bulbosus* they abruptly turn down. The only other species with *reflexed* sepals is *R. hirsutus*, to which we have before alluded; but besides the difference in locality, time of flowering, etc., *R. hirsutus* is destitute of the bulbous stem which marks *R. bulbosus*.

Our second species is the Creeping Buttercup (*R. repens*); and this, too, has a peculiarity of its own. It is *stoloniferous*: that, is, it sends out long, creeping, rooting shoots, which are called—without any ritualistic significance—*stoles*. The main stem is usually upright, especially when the plant grows in damp or watery situations, and the flowers are very like those of *R. bulbosus;* but the different position of the sepals at once distinguishes them. This Creeping Buttercup has a very happy knack of adapting itself to circumstances. It is equally at home in meadows and cornfields, on dry banks or damp banks, in cultivated land or waste ground.

The third Buttercup (*R. acris*) is a more elegant plant than either of the preceding. It has very deeply cut leaves, the segments of which are pointed, and tall slender upright stems, which support flowers of a somewhat paler hue than those of *R. bulbosus* or *R. repens*, having sepals spreading upwards as in the latter. Neither the bulb of *R. bulbosus* nor the stoles of *R. repens* are found in this species.

For practical purposes, therefore, we may note the following as among the essential points of difference between these Buttercups.

R. acris. Stem erect, without bulblike base. Sepals spreading upwards.

R. repens. Stoloniferous. Main stem (usually) erect. Sepals spreading upwards.

R. bulbosus. Base of stem bulblike. Sepals reflexed.

The three differ somewhat in their times of flowering. *R. bulbosus*, speaking generally, begins to blossom about the middle of April, and ceases about the middle of June: *R. repens* is in perfection during the summer months, but occasional specimens may be found almost all the year round: *R. acris* comes into flower about a fortnight later than *R. bulbosus*, and continues until the end of June; occasionally as in the late autumn of 1868, producing a second crop of blossoms.

All the Buttercups have a tendency to produce double flowers. Examples of the transition or conversion of one part of a plant into another will occur to every one: an admirable example will be found in the White Waterlily *Nymphæa alba)*, in which the outer circle of petals is tinged with green, thus approximating to the sepals, and the inmost circles pass almost imperceptibly into the stamens. The large number of stamens in the Buttercups offer ample opportunities for conversion into petals, and thus it is that, especially in *R. repens*, we often find one or two odd petals among the stamens. Occasionally *all* the stamens become thus changed; and the result is a perfectly double flower, such as Gerarde says he found while "walking in the field next to the Theatre by London, in the company of a worshipfull merchant named Mr. Nicolas Lete". The double-flowered variety of *R. acris* is permanent, and is cultivated in gardens under the name of "Bachelor's Button." A curious figure is given by Gerarde of a double Crowfoot which "thrusteth forth of the middest of the floures one other smaller floure," in a manner similar to a monstrosity which not unfrequently occurs in garden roses, when a leaf-bud, or a second blossom, grows through the centre of the flower.

Having said thus much about the plants, we will glance for a moment at their names. Whether the practice, common

among children, of holding the flower under the chin, and judging from its reflection whether the individual thus tested "likes butter"—whether this may have originated the name Buttercup, depends, to a great extent, upon the antiquity of the custom itself. Such an origin seems, at least, possible; but Dr. Prior derives its name from the "French *bouton d'or*, the cup, being the Old English *cop*, a head, a word that became obsolete, and was replaced with *cup*. It will have meant originally *button-head*." As far as the latter half of the word is concerned, it seems to me that the shape of the blossom at once accounts for it; and as to the former, if, as Dr. Prior states, the name *bouton d'or* was originally "given to the double variety," it seems hardly likely that it would, as long ago as Gerarde's time (who gives "Butterfloures" as a synonym) have been extended to the wild form. Another old name for *R. bulbosus* was S. Anthony's Rape, or Turnip. In Gloucestershire, Wiltshire, and throughout the Cotswold district Buttercups are known as "Crazies"—a word, which is, in Buckinghamshire embodied in "Butter-creeses" and "Yellow creeses," applied indiscriminately to the three species. "Creese" is but a vulgar pronunciation of "cress;" and it seems at least possible that "crazies" may be intimately connected with this latter word; "cress" is usually supposed to be applied especially to cruciferous plants; it is a word of obscure origin.

Thus have I endeavoured to show you in plain language a few of the more noticeable characteristics of our Buttercups. Should this short paper be fortunate enough to prove interesting to any who have not yet begun to study our British plants, I would urge them to make a beginning by collecting as many species of *Ranunculus* as possible, and observing their pecu-liarities: they will find in the living plants ample materials for careful study, and an interest far exceeding any which can be raised by mere descriptions.

JAMES BRITTEN.

High Wycombe.

THE FERTILIZATION OF ORCHIDS.

Continued from page 18.

Now let us see how the same work is done for orchids. If we examine the fertilizing apparatus of one of our common orchids,—*Orchis pyramidalis* will serve our purpose, and we shall very easily find it—we shall at once see how utterly unlike it is to the inside of a lily, or of any other flower we can call to mind. Let us cut away all the petals and sepals of the flower, except the lower petal. This petal, which in the orchids developes into a host of forms of every size and colour, and is called the *labellum*, has very frequently a long tube at the back part of it, the nectary, which from its surface secretes the nectar—the drink of the gods in the days of old, but now reserved for the insects. Looking at our flower from the front we see the dark opening to the nectary under, and hidden by a small roundish projection, whose use we shall learn directly. The anther, above this projection, is single, and, instead of the pollen being sprinkled all over its surface, it has deposited within its substance two club-shaped masses, consisting of little lumps of pollen-dust, held together by a network of fine threads. The surface of the upper part of the inside of the nectary, just under the projection I have mentioned, is called the *stigmatic surface*, and when the pollen is ripe, this stigmatic surface becomes very sticky, and is prepared to fulfil the same function as the stigma of ordinary plants, if only the pollen can get to it—a thing absolutely impossible so far as we have seen.

The *pollen-clubs* have stalks which run down through the side of a small box—the projection I spoke of—and are attached to a disc of membrane in it, on the under side of which is some very adhesive gum, constantly kept moist and fit for use, when once the flower is mature, by a liquid almost like water, with which the box is filled. When all this is quite ripe this box cracks across the front, and remains in position, suspended by its lid, ready to open downwards on the application of the slightest force. On the bright colored

labellum, or lip, are two guiding plates set up on edge, which form a sort of passage leading direct to the mouth of the nectary. Bear in mind that the pollen-clubs, though they cannot be shaken out of the anther or knocked out, can very easily be drawn out from the bottom, like sticks out of a bundle, and that the little box held fast by its lid opens downwards at the least pressure on the front, and you will see a most admirable trap ready laid, and wanting nothing but somebody or something to spring it.

A moth approaches, flying busily about in search of nectar, for bees are by no means the only insects who search for it, in fact, bees seldom visit orchids. He perches on the labellum, and led by the guiding plates, puts his proboscis straight into the nectary; it is longer than he thinks for, and the nectar must be reached by pushing the proboscis further and further in. At last the proboscis presses the outside of the little box, and the box, yielding to the push, opens. Now the proboscis touches the little sticky disc at the bottom of the pollen clubs as the unthinking insect sucks in his delicious draught, and when, having drained the cup of joy to its very dregs, he withdraws his trunk, he draws out with it the sticky disc, and two clubs of pollen, which stand up like little horns on either side of his nose.—So ends the first act. The cement at once sets hard, but that is not all, the pollen-clubs thus set upright would be of no use to fertilise the next flower the insect might visit. As he pushed in to the nectary they would but assume a position as close as possible to that from which they had been taken, and no good would be done. Now listen and wonder. As soon as the cement has set, one side of the club-stalks contracts and draws the clubs outward like a capital V. Barely is this motion completed than another side contracts and draws the clubs forward like the same capital V laid flat. Now the insect comes to a fresh flower, pushes into it, the tips of his clubs in their new position strike upon the stigmatic surface, and the stickiness of this surface, forced into full play by the pushing of the insect, takes hold of the pollen-masses and pulls off some of the pollen-dust, held closely together by its network of threads, not strong enough to resist altogether the influence of the stickiness of the stigmatic surface, but too strong to let go all their precious dust at once. Thus then the moth goes from flower

to flower, fertilizing all, and acquiring at intervals a new pair of horns, till at last his proboscis becomes useless to himself owing to these appendages (Mr. Darwin saw one unlucky moth with 11) and the poor insect, unable any longer to reach the nectar which is dear to him, perishes miserably—a victim to drink, and the fertilization of orchids.

This is no chapter of a novel that I am reading to you, but a matter of plain every-day fact, which you can soon verify for yourselves. Gather the first orchis you can find, and push gently into its nectary a pin, a bristle, or the point of a pencil. It will not be long before you can withdraw one or more of the pollen clubs; watch them carefully and see them put themselves into the very position in which, and in no other, their heads will reach the stigmatic surface of the next flower; see in the different orchids different sets of circumstances, met by different adaptations. See in the Butterfly Orchis, the strong perfume of which comes out only at night, when the moths by which it is fertilized are flying about, and are at once attracted by its powerful smell in a manner in which they never would be by its pale and inconspicuous flowers—see here the pollen is lying high up out of reach of the proboscis of any insect, and therefore the nectary so long that the insect has to push his head right home into the flower and drag out the pollen-club on his cheeks or his eyes instead of his nose—but I might go on for ever.

I will conclude with a few words about *Angræcum sesquipedale*, the gigantic orchid of the Madagascar forests, which I mentioned just now. Picture to yourselves dazzling white six-pointed stars, some six or eight inches in diameter, growing, numbers of them together, from the trunks of the primeval trees, and you get an idea of something very wonderful. But—and here comes the great wonder—the nectaries of these orchids are twelve inches to fourteen inches long, which means moths with the proboscis twelve or fourteen inches long for their fertilization. Our largest moth, the Death's Head, has a proboscis not an inch long. Fancy a moth as big as a blackbird * hovering over these flowers, and

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* It does not necessarily follow that a moth possessing a very long proboscis must be of gigantic size; there are moths not one sixth the size of

at times inserting his nose, twelve inches long and nearly one eighth of an inch thick into the nectary, drawing away the pollen clubs, fan-shaped in this case, and going on to fertilize other like flowers. Does it not sound like an uneasy dream? These moths have not yet been seen, but there are the flowers and there the moths must be, and by the time the Tananarivo branch of the Natural History Society of Madagascar is holding its third Monthly Ramble, we may hope that the moths will have been found, and specimens of them deposited in the Folkestone Museum.

THE FORMATION OF LOCAL MUSEUMS.

Read before the Society, October 14th, 1868.

As we have now to some extent come to the close of the first working year of our Society, it might be expected that I should give a sort of resumé of what we have done. That, however, is not my purpose this evening. I want to speak to you on a subject closely connected with the well-being of the Society, which will tend to give it an interest in the eyes of individual members greater than can be given by anything else, and which, moreover, ought to present even greater attractions to the visitors, who are, year by year, increasing in numbers, as year by year it grows in completeness and in importance. I mean the formation of a Local Museum.

Before going further into this matter, I must say a few words as to what we have been doing in connection with this subject and what we have to do. We have had several most pleasant and well attended rambles, at which, under the direction of those better instructed than ourselves, we have learned to see

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the Death's Head, with much longer trunks than it possesses. We believe there are specimens of the Madagascar Moth referred to in the British Museum, and that they are of very moderate size.—Ed.

what there is of interest in the Natural History of the neighbourhood, and we have heard a series of papers read more or less calculated to help us in our investigations. And this evening I want to say a few words about a general collection of objects of interest into our museum, to which each of us may do something, and some may do much. That is, observe, we have learnt what to work for and how to work for it, and we are going to consider what to do with it when formed; but, of course it will have struck all the clear-headed of my listeners, that is to say, all who are now listening to me, that there is a great gap between these two—the Rambles and the Museums. They are the extremities and the middle is wanting. How to get it and what to do with it are capital things *to know;* but the actual getting of it, let *it* be what it may, is the thing *to do.* Rambles are good, and Museums are good, but that which comes between is better; the patient individual work by which the knowledge acquired at the rambles, is soon forgotten in the wonders discovered by personal investigation, and the members of our Society, from being merely interested in Natural History, by degrees educate themselves into naturalists. Unless we take up each for himself or herself some one or more lines of search, and follow it out, either singly or in groups of not more than two or three, we shall never become naturalists in any sense of the word; our *rambles* will be nothing but pleasant walks of monthly occurrence during the summer, and our *museums* will never be made, and if made, never filled.

Look at all these books round us on the various subjects connected with Natural History. They are not the result of rambles, nor do they represent the incomes of their writers. In the main they are the work of men's leisure time, and it is by employment of leisure time that you may become naturalists too. However I do not want to preach a sermon, but to give a hint. I want to see a museum in Folkestone worthy of the name, and I want you to make it and fill it.

Such a Museum ought to consist of three portions, an educational and a local *museum* and a *library*. A general museum, a collection of odds and ends, serving no ends, and merely odd by reason of where they are, is not a high type of exhibition, and though, in the first fury for giving, many offers would probably be made of things which it would be

unwise to check the enthusiasm of the givers by rejecting, such as clubs from the South-sea Islands and walrus-tusks from the North Pole, Egyptian dried crocodiles, and Australian boomerangs, still a room full of these is not a museum worthy of the name, and it would be the duty of the Committee to eliminate the hodge-podge element as speedily as possible.

Now the *Educational* part of a museum need not be purely local, in fact, it cannot be. I was in Southampton a few weeks back, and looked in at the Hartley Institute, where there is the commencement of a very good museum, and the educational part struck me much. A series, I take this as an example, but it will explain what I mean, of the *skeletons* of vertebrate animals arranged in an ascending scale, beginning with the lower forms, snakes, lizards, and fish, and ending at the top of the tree, with a *picture* or *stuffed specimen* of the *complete* animal, and a short explanation of how this particular vertebrate animal differed from others, and what were the chief points worth notice in the skeleton, gave one in a few minutes a better notion of comparative anatomy, so far as the vertebrates are concerned, than a whole term of lectures, a whole year of rambles, or a whole Bloomsbury of miscellaneous articles. In fact the *educational* part of the Museum ought to consist of a series of sets of typical specimens, recent and fossil, of each of the great families of animal and vegetable life, duly arranged and descriptively labelled, so as to tell at sight how this specimen differed from that, and what there was characteristic in each.

Don't I wish I may get it? Of course I do, though I don't think it likely, But at the same time we might make a beginning, and the great advantage is that in this sort of thing we may have fifty beginnings, all in the middle, and each good and useful in itself. So much for the Educational Museum.

Next as to the Local. This to be complete ought to represent in miniature the district covered by the Folkestone Natural History Society, so far as the Natural History is concerned. There ought to be complete and well-arranged collections of our local insects, birds, reptiles, plants, and all that is contained in the very wide range of investigation opened up to us by our field days. This too can be done by fifty people at once, each working on his own responsibility, and selecting

his own line of investigation. One adjective ought to be applicable to all you do, and that one is "systematic." Take up something, or some part of something, and stick to it till you have done with it. Don't try to be complete Naturalists all at once; but take one the ferns, one the grasses, one the snails, or what not, and get that done first. Collect your specimens and learn all you can about them; label and arrange them and put them in the museum, when we have got it.

Moreover, Natural History Society as we are, it does not do to be too rapid. I would not exclude from the museum a series of photographs or sketches of local objects of interest in other lines of study. Churches, Castles, Ruins, Scenery, all deserve a place, and in time all ought to find it; while the Pier, the Harbour, the Steam-boats, offer attractions to those whose hands are skilful at woodwork, and to whom the prospect of adorning the Museum of this town, might just give the inducements necessary to lead them to put their theoretical skill into practical working.

Of the library I need say nothing. The advantages to an institution, such as I have attempted to describe, of the possession of a library of reference, consisting of works on Natural History generally, English Natural History especially, and of all both of local interest, whether antiquarian, statistical or scientific, need no explanation of mine. Many of us probably have works of one sort or other that we should be happy to give to such a library, and others would, I am sure, come in when once the library was in good working order.

In conclusion I will only say that I should like to see our society and our museum among the best of the kind in England. But neither can exist as an abstraction; an abstract society, or an abstract museum would be of little service unless to the brains of a metaphysician, apart from the concrete individuals comprising the one, and the concrete specimens contained in the other; and if we individuals will set to work to collect the specimens, this museum will soon cease to be an abstraction, and will have a real existence, and the Folkestone Natural History Society will make a name for itself and a reputation which, depend upon it, will extend beyond Folkestone. At all events if the thing comes to grief, do not let us allow it to be the fault of the original promoter.

C. L. ACLAND,

FOLKESTONE MUSEUM.

As this will be the most suitable place for informing the Members what has been done with regard to the Town Museum, we here give an account of the proceedings.

The following communication was forwarded by the Committee of the Society to the Corporation in September last:

TO THE MAYOR, ALDERMEN, AND COUNCILLORS OF THE BOROUGH OF FOLKESTONE.

September, 1868.

GENTLEMEN,

You are no doubt aware that a Society has been formed in this town called the "Folkestone Natural History Society," the object of which is not only to afford pleasure and recreation by rambles in well known localities in the open air, with descriptive lectures, but to collect specimens connected with Natural History, with which the neighbourhood of Folkestone so richly abounds. The Society though recently formed, consists of upwards of eighty Members, and has met with much encouragement and success during the past season, and has already by the exertions and assiduity of individual Members collected many valuable specimens.

As it is the desire of the Society that any benefit which it may attain, shall not only be for itself but also for the town, and that the results of its labours shall be open to all, the Society is very anxious to secure some place where the specimens may be exhibited, and entertaining explanations may be given on the subject, and as the Society is aware that a very valuable collection of specimens (though in sad disorder) is already possessed by the town, the Society beg to ask you whether you will allow it to have the use of the room at the Sessions Hall, where the present collection is placed, and to have the present museum placed under its charge. If this request is granted, the Society will undertake the charge of the museum, to arrange and classify the specimens, to furnish a catalogue to the Corporation, to keep the museum open for public inspection at suitable periods to be fixed by the Society, and in the event of the dissolution of the Society, to return to the Corporation all the specimens placed by that body under its charge.

The Society will also pledge itself to preserve the specimens, and to use the room only as a museum and for holding meetings and giving lectures and entertainments connected with the objects of the Society.

By this means the present collection will be utilized and placed under the care of gentlemen well acquainted with its value and importance.

The Corporation are no doubt aware that the room and the specimens are now in a useless state from dirt and dust, and as it will not only be a matter of great labour, but of considerable expense to arrange the specimens and to put the museum into a state fit for public inspection, the Society trust that the Corporation will give them some substantial aid towards cleaning and painting the room, towards fitting it up with shelves, cases, and other adjuncts, and for adapting it for the purposes of a museum.

The Members of this Society trust that you will be pleased to entertain their request, and thus further their exertions in securing a museum for this town.

We have the honour to be,
Gentlemen,
Your obedient servants,
C. E. FITZ GERALD, PRESIDENT.
Members of the Committee, on behalf of the Society,
HY. ULLYETT, SECRETARY.

In reply to this, the following was received by the Committee in January of the present year:

Borough of Folkestone in the County of Kent. } At an Adjourned Quarterly Meeting of the Council of the said Borough, held at the Town Hall, in the said Borough, on Wednesday, the Twenty-seventh day of January, 1869.

PRESENT—

Mr. Alderman John Gambrill (in the Chair), Aldermen Ham Tite, and James Tolputt. Councillors Ebenezer Pope, Henry Stock, Francis Coules, John Hoad, John Sherwood, James Jinkings, Joseph Christian Davidson, John Bamford, and John Fitness.

The following Report of the Museum Committee was read, and ordered to be received and entered upon the Minutes:—

MUSEUM COMMITTEE.

"In pursuance of the instructions that your Committee should consider the Memorial received from the Members of the Committee on behalf of 'The Folkestone Natural History Society,' relative to the Fossils at the Sessions Hall, and report thereon to the Council.

"Your Committee have considered the Memorial and the application made thereby, and beg to recommend, with a view to secure the objects contemplated by the Society,

"1st—That the Corporation do grant the use of the large room of

the Sessions Hall to the Society, with all the fixtures, shelves, cases and fittings, rent free.

"2nd—That the tenancy be yearly, subject to the determination by either party, on giving twelve months' notice.

"3rd—That the present collection of Fossils and Specimens be placed under the sole charge of the Society.

"4th—That the Corporation do forthwith at their expense, properly repair, cleanse, and paint the inside of the room, and the doors and passages leading thereto.

ON CONDITION

"5th—That the Society do take every care of, and preserve the present collection and specimens.

"6th—That the Society do at their expense arrange, clean, and classify the present specimens, and furnish a catalogue of them to the Corporation.

"7th—That the Society do keep open the museum for public inspection, and grant free admission thereto at suitable periods; and that the Society do use the room as a museum only, and for holding meetings, lectures, and other entertainments connected with the objects of the Society.

"8th—That in the event of the dissolution of the Society, or if the room ceases to be used by the Society for those purposes, the room shall be delivered up to the Corporation with all fixtures, shelves, cases, and fittings, and the present collection of fossils and specimens undamaged.

"9th—That the Mayor and Deputy-Mayor for the time being and one of the members of the Museum Committee to be appointed by that Committee and notified to the Society, shall at all times be ex-officio members of the Committee of the Society.

"10th—That in labelling the specimens those belonging to the Corporation shall be distinguished by a distinct label with the letter C in red marked thereon.

"Dated this Twenty-fifth January, 1869.

JOHN GAMBRILL, Deputy Mayor."

In discussing the contents of this reply, the Members of the Committee felt that their offer had not been met with that liberality which the interests of the town demanded, and though they were, and are still extremely anxious that the museum should not continue to be, as it has been for so long, a disgrace to the town, yet they could not take upon themselves the pecuniary responsibility, which the conditions laid down by the Council would involve. The following resolutions were passed and forwarded to the Council:

1st—That having an anxious desire to make the present collection of fossils and specimens of public utility, the Society are willing to

undertake the arrangement of the same, and to pay certain expenses out of their subscriptions and funds in aid thereof.

2nd—That having regard to the heavy expenses which will be entailed upon the Society by the strict conditions of the Council, and to the great labour which will at the same time fall upon the members of the Society individually, and no pecuniary assistance whatever being offered by the Council towards the object of so much importance to the town, the Society with great reluctance must decline to accede to the conditions imposed by the Council.

3rd—That the Society regret that their efforts to utilize the collection neglected for so many years, and greatly injured from want of care, have been received with so little sympathy by the members of the Council, and hope that the Council will be induced themselves to establish the museum for the town on a proper footing.

PROCEEDINGS OF THE SOCIETY.

Wednesday, June 24th, 1868.—Members met in the evening at the Half Way Rocks, where an exceedingly interesting paper by Mrs. Bateman on the "Wonder of the Deep" was read by the Rev. C. L. Acland. A cordial vote of thanks to both writer and reader was passed, and two hours were spent in examining the objects left bare by the receding tide.

Saturday, August 1st.—Members met at Victoria Grove, and traced the Bayle stream nearly to its source. Our readers will recollect the popular error connected with this stream and the legend as well. The water is said to run up hill, and in fact is believed to do so by many people; the cause of this phenomenon is found in the following legend:—A religious house on the Bayle had great difficulty in obtaining water, S. Eanswithe exerting her miraculous influence, went to a spring situated at the foot of the hill, and caused the water to follow her to the Bayle, where it formed the present pond, and still continues to feed it. To any one standing by the side of the stream and looking towards its source, it does seem to be flowing up hill; this is a curious optical illusion arising from the nature of the ground.

Wednesday, October 14th.—A conversazione was held at the house of the Rev. C. L. Acland. Many valuable works on Natural History were on the table; among them several publications by the Ray Society, Harris's Aurelian, Moore's Nature Printed Ferns, Sowerby's Shells, &c. A living Death's Head Moth, Spider's Nest and Eggs, and some dried plants were also shown. The paper on Local Museums (see p. 10) was read producing some little discussion, and the rest of the evening was spent in examining microscopic objects.

Wednesday, December 2nd.—A conversazione was held at the President's house. On the table was a collection of Folkestone Gault Fossils, and some Land and Fluviatile Shells, lent by the Secretary. A paper on Winter Work was read by the Secretary, after which there was an animated discussion on the Reasoning Faculties of Animals, which had been incidentally mentioned. In speaking of Migration, A. H. Taylor, Esq. said that swallows might sometimes be seen in the Warren on mild days in December and January.

Saturday, January 16th, 1869.—W. Bateman, Esq., kindly placed his house at the disposal of the Society for a meeting. Among the objects exhibited were a collection of local marine shells and dried plants by the Secretary, a beautiful case of Lepidoptera by the Rev. C. Reed, and some works on Natural History. Captain Crozier, R.E., read a valuable and interesting paper on diatoms, illustrated with specimens under the microscope.

PRIZES.

The following Prizes have been kindly placed at the disposal of the Committee:—

I.—By C. H. Dashwood, Esq., F.Z.S., Three Prizes, 20s., 10s., and 5s., for the three best collections of Dried Flowering Plants.

II.—By C. E. Fitzgerald, Esq., M.D., Two Prizes, 30s., and 10s., for the two best collections of Fossils from the Gault, and the Junction Bed. Not more than three of any species to be shown.

III.—By The Rev. C. L. Acland, M.A., Two Prizes, 30s., and 10s., for the two best collections of Insects, (excluding Lepidoptera.)

CONDITIONS:

Specimens to be collected personally during the present year; to be collected within an area of five miles radius from the Town Hall; and to be delivered into the care of the Secretary (properly named), before December 1st, 1869.

The Prizes are open only to Members of the Society.

WINTER WORK.

Read before the Society, December 2nd, 1868.

The glorious Summer weather of 1868 is all past, and the usual October and November gales sent us rather sooner than we expected into the regions of winter. All around us now is inhospitable and bleak, and there is little inducement to follow out in the open air the practical study of Natural History. So we are tempted, perhaps, to sit still and ponder over the rambles we took in the summer, to regret that they are over, and to wish they would soon come again. It is well, perhaps, that we should do so, for they ought to have supplied us with a whole treasure-house full of "studies," from which we may draw one after another to gaze at and admire. It is well to ask ourselves now, with these pictures set in the golden frame of memory still fresh before us, whether we valued them so much before they were thus framed—in plainer words, whether we thought at the time that we really had great opportunities for gathering food for thought in quiet hours. Did we do all we might have done? In what respects did we fall short? So we may gather experience to guide us when the swallow and the cuckoo return again. Perhaps some of us made a tolerable collection of objects, which we had not then time to arrange, perhaps, not even to name. Now is the time; the collector would never get through his work if he were always collecting, if he never had any seasons of leisure, for simply *gathering* objects is but half the work; they have to be compared, classified, and specified; general laws deduced, hasty conclu-

sions tested, perhaps reversed; all this you know is specially the work of the mind, and the mind at such times must not be hampered by the body, leisure and freedom from disturbance is essential for contemplation and study. There are our Land and Water Shells; it was no easy task to name some of them, and no doubt some of us have got three or four pill boxes full of shells somewhere or other labelled "doubtful." Now is the time, when the drizzling November rain keeps us in doors, to sit down, and by the aid of Lovell Reeve and a magnifier to settle the question. A few papers of dried flowers too, not yet properly labelled, will occupy us now and then for an hour or two, perhaps also birds' eggs, seaweeds, and fossils. Winter is necessarily the time for theoretical study; we cannot do so much out of doors, and in Summer, when all is favourable for so doing, it would be folly to be reading books at home. We must perfect and complete in December what we began in the early spring.

But there is an impression I know that no active out-door work can be done by a naturalist in winter. I should be glad to do something towards removing this impression. Winter is not so lifeless as we are apt to think. I look back on many mild days in December and January when I experienced great pleasure and gained no little knowledge in my rambles—days spent in the leafless woods perhaps, but yet where the squirrel might be surprised at a winter meal, and the hawk at its feast of blood. True, there is not in winter the mysterious abundance of life around us which astonishes us in summer, but the very lack of this abundance makes it easier for us to make observations on those objects that are left. In June and July we are so embarassed by the multitude of objects we see around us, that we do not know where to begin, we feel quite helpless till some friendly hand comes and puts us to work. Now Botany is a subject which is associated so thoroughly with summer that few ever think it possible to do anything at it in the cold weather. Yet winter has a flora of its own, and even now, in December we might go and gather a handful of flowers. There is more room however for active work among the mosses which flourish most luxuriantly in the midst of snow and rain. Many of them ripen their fruits only in the dead of winter, and for beauty of detail, they rival all the rest of the botanical creation.

It is worth a damp walk to some woody dell to see their varied hues of green, and the marvellously contrived mechanism for the dispersion of the fruit which characterises these "children of winter;" they appear all the more flourishing by reason of those very influences which lay their more sturdy brethren low. And many an evening's amusement may be obtained by studying these mosses with a microscope. In Geology a great deal can be done, when neither plants nor animals put in an appearance we can always go geologising. I do not mean simply fossil-hunting, but geologising in the fuller sense of the word—gaining a knowledge of all the formations in our neighbourhood, where they crop up, and their line of strike—the gravels, the clays, the sands, and the drift, as well as the harder rocks; all these will afford plenty of room for speculation, too much, perhaps, but at any rate they will set us a thinking. And if we go out simply in search of fossils, we shall meet plenty to encourage us in this rich neighbourhood. Among the chalk on the cliffs crowded with fragments of *Inocerami* and *Rhynchonellæ;* in the Greensand blocks scattered over the beach in East Wear Bay, rich in oysters and fossil woods; and above all in the blue clay left bare by the receding tide, studded with countless ammonites and belemnites—here we shall find ourselves surrounded by the remains of a former world, and find problems set us that men very far wiser than ourselves have never yet been able to work out. Although it is certainly not pleasant to stand chipping corners off stones with a cold hammer, with the wind and sleet driving in our faces, yet there are many mild soft days in the very depth of winter when we may thus comfortably amuse ourselves.

But now, to pass to the animal world. Many of our sylvan inhabitants have, it is true, retired for the winter, but they are not wholly lost to us. Many a time, when rooting among the mosses we shall turn out perhaps a beetle snugly ensconced, or a plump caterpillar, perhaps a dormouse fast asleep, and this sets our mind astir in another direction, we ponder over that mysterious thing called *hybernation. Why* these animals should thus pass away the winter we can perhaps see—change of climate and scarcity of food render it necessary; but *how* it is done is beyond our ken. We see it in all sorts of creatures—in the great Brown Bear in the forests of Russia,

in the Marmot, the Squirrel, down to the tiny Caterpillar not the tenth part of an inch in length. We see it again in those weird creatures the Bats. Go into some sheltered cave and you will probably find numbers of these creatures hanging by their claws to the roof, head downwards, their wings closely enwrapped around them—not a sign of life, not even any perceptible breathing. It is not merely sleep, you may rouse up an animal from its ordinary sleep, and it does not take long to collect its faculties; unlike the lords of the creation, there is no stretching of limbs and rubbing of eyes, the creature springs up from slumber and is on the alert at once. But not so with hybernation; it takes some time to rouse a bat, the wakening comes very gradually and is generally fatal. It is evidently a much nearer approach to death than sleep is—the breathing is so slight as to defy investigation, and the blood courses so sluggishly along that you can detect no pulsation; the air in which the creature passes the winter, undergoes no change, and strangest of all the animal will exist for some time in gases that would be immediately fatal to it if awake. I just refer briefly to these points in hopes to provoke a discussion on the subject presently. By thus exploring caves and other suitable spots, we may become acquainted with some species of bats not otherwise often seen. I remember once going into a chalk cave and finding four species, the Pipistrelle, Noctule, Long eared Bat, and the Lesser Horse Shoe Bat having the curious leaf-like appendage to the nose.

Again, we may study *birds* as well during the winter as in summer, perhaps some species better. The little Tits may be seen in flocks of about a dozen flitting in and out of the hedgerows, or busily running up and down the stems of trees searching for sleeping insects; the little Wren often scuds across the road a foot or two above the ground; the song of the Skylark may be heard on a sunny day in any month of the year. The habits of most of our birds change as they don their winter plumage; they begin to flock together in great numbers, especially the Starlings, the Larks, the Finches, &c. The Chaffinch is seen in large flocks, containing only males, very few females are to be seen, and these mostly in the south. Another question here arises—Why this collecting together in flocks? And why in winter and not in summer?

Well we, perhaps, can understand *why not* in summer, because of the family duties which engage them, and the intense rivalry and jealousy of the males. These feelings, however, die away with the summer months. Do they congregate in the winter for warmth, or for food? Scarcely the latter, since it would be easier to obtain food singly.

Then there are the birds of passage—those going and those coming; the Swift, the Swallow, the Cuckoo, and others disappearing; the Fieldfare, the Redwing, the Hooded Crow, &c., coming. The latter, as of course you know, frequents the shore and the adjacent fields now in search of food, and at once attracts notice by the hood it wears. Where does it raise its family? Does it ever breed in England? Why does it come here at all?

Migration is almost as wonderful as hybernation. Before it was so well established a fact as it is in the present day, hybernation was much more extensively allowed. The Swallow tribe in particular attracted most notice, as was but natural, and they were all firmly believed to spend the winter in this country, hidden up in caves and rock crevices, old buildings and places similar to those where we find the bats; some thought even in the bottom of lakes and rivers buried in the mud. Dr. Johnson in his usual dogmatic style, once remarked in the course of conversation—"Swallows certainly sleep all the winter. A number of them conglobulate together by flying round and round, and then all in a heap throw themselves under water and lie in the bed of a river." And Gilbert White, of Selborne, could never bring himself to totally disbelieve in their hybernation. Nor has the belief died out even in the present day, for there was a discussion about it in the pages of "Science Gossip" only a few months ago. But this is rather digressing.

There is often much talk about the "mysterious" instinct which guides birds in their migrations. I confess I can see little mystery in it, not nearly so much as in hybernation.

Disbelieving totally, as I do, in what is commonly called the "instinct" of the lower animals, and believing that the whole animal creation possesses pretty well the same faculties and reasoning powers as ourselves, nay, I may go further and say, an immaterial and undying principle similar to our own, the mystery commonly supposed to be connected with

the instict of animals, vanishes in my mind to a considerable extent. It is improbable in the highest degree, that a flock of birds all of the first year, should set off for a foreign land alone, with no old ones in their company, who have been the road before; and therefore, I believe there are always plenty in a flock to guide them. And if so, why should not birds be able to travel about just the same as men? But even supposing for the sake of argument that such an improbability as I have stated takes place, what then? A flock of birds feel the weather in their locality, getting too cold for them. They do what a tribe of men might do, try to find a warmer place. If they fly northwards, they only experience colder winds, what should they do then but turn round to the south? In that direction they meet with warmer air, and are beckoned continually on and on by more balmy breezes, until they arrive in a locality which suits them, and there they wait until they feel compelled by circumstances to go back again. In short they act like *reasonable* beings as they are. I should be glad if some one would take up the discussion of the subject presently.

I fear I have trespassed somewhat too much on your attention, and must now draw to a close my desultory remarks. I have simply tried to show what we may all do in what are generally called the dreary months of winter, and I hope I have proved that there is plenty of occupation both for mind and body.

We have received the "*Fifth Annual Report of the Belfast Naturalist's Field Club*," containing the proceedings of this energetic Society during the season of 1867-68. The accounts of the excursions are exceedingly interesting and instructive. We heartily wish the Club continued success.

LOCAL NAMES.—It is desired to collect as many as possible of the local names of British plants; and the assistance is requested of all who take an interest in the subject, or who may have the opportunity of ascertaining and recording them. Any list sent to Mr. JAMES BRITTEN, High Wycombe, or to Mr. ROBERT HOLLAND, Mobberley, Knutsford, will be thankfully received and acknowledged.

NOTES AND QUERIES.

MILDNESS OF THE PAST SEASON.—On the morning of Christmas day, 1868, I took on my dressing table at Abingdon, Berks, a specimen of the common Tortoise-shell Butterfly, and on the day before Christmas day a Garden White was seen flying outside the house.—C. L. ACLAND.

I have started a small fresh-water aquarium. I put into it several specimens of *Notonecta Glauca*, the Water Boatman, but they were so destructive to everything else, that I transferred them to another vessel. On one occasion I found that one of these beetles had attacked one of his fellows, and would have killed it had I not separated them. I also found one of them firmly fixed to the side of a Newt ten times his own size. They are themselves destroyed by *Dytiscus latus*, the great Water Beetle. I feed the Newts and Beetles with meat chopped very fine. The Water Boatman will not eat fat.

I found on one of the great Water Beetles spots of what looked like white mould or mildew. Under the microscope these proved to be dense bushes of infusorial animalcules. From a well defined root sprang branches irregularly and freely forked, and at the end of each branchlets were two, sometimes three pitchers, not unlike those of the common rotifer, but open at the top with a kind of tube projecting from them, shaped like the barrel of an old fashioned blunderbuss, but carved in its whole length. The mouth of this tube (and, I think, the mouth of the pitcher itself, but of this last I am not sure) was ciliated, and the consequent currents were very beautiful. At intervals the projecting tubes were sharply withdrawn into the pitchers, but soon again protruded. Some of the pitchers (there must have been many hundreds on the bush) appeared to survive freely after being separated from the bush, but I am not certain on this point. Can any of your readers learned in infusoria tell me the name of my new friend?—C. L. ACLAND.

[Probably *Epistylus nutans*; we shall be glad of additional remarks from any of our correspondents. —ED.]

GULL PARLIAMENT.—The following scene may be beheld in April, on the beach below Copt Point, Folkestone. One aged gull appears amongst a crowd of others to act as judge, moderator, or speaker. A great deal of fussiness takes place, whether of business or pleasure I cannot tell, but it is evidently of great importance. From time to time you will see a member of the community apparently receive notice to quit from the ancient swell, and immediately he flies away to sea. Whether this said victim is on the "staff," or on a ticket-of-leave, or is compelled to visit other climes, but not at his own expense, is, at least with me, an undetermined question. But I have seen the above take place several times, sometimes on successive days, the birds gathering together on the sea shore. It may be worth while noticing, that all this occurs just before *nesting* begins.—A. C. TAYLOR

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THE

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OF THE

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And Sold by all Booksellers.

THE FOLLOWING IS A

LIST OF OFFICERS

OF THE SOCIETY.

PRESIDENT:

C. E. FITZ-GERALD, M.D.

COMMITTEE:

H. B. Mackeson, F.G.S.	A. M. Leith, Esq.
C. H. Dashwood, F.Z.S.	W. G. S. Harrison, Esq.
Rev. C. L. Acland, M.A.	W. Bateman, Esq.
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G. M. Scholey, Esq.	

Honorary Secretary, Hy. ULLYETT.

Subscribers are respectfully informed that it would save much trouble, and ensure punctuality in the delivery of the Magazine, if they would forward their names and the year's Subscription to the Secretary at their earliest convenience.

All Communications should be addressed to H. ULLYETT, *Folkestone. We shall be glad to receive notes concerning any of our local plants and animals, times of appearance, abnormal forms and colours, popular names and traditions, &c. These must be anthenticated by the writer's name and address, but not necessarily for publication.*

PROCEEDINGS OF THE SOCIETY.

WEDNESDAY, MARCH 17th, a conversazione was held at the President's house. The Secretary exhibited a collection of *Ranunculaceæ*; Mr. J. Fitness, a very beautiful collection of drawings of microscopic objects; the Rev. C. L. Acland, some Gault Fossils from East Wear Bay. Microscopes were on the table as usual. The President read an interesting paper on the "Mechanism of the Human Voice" and this was followed by another on

THE LATE LANDSLIP ON THE WARREN.

By the REV. C. L. ACLAND.

By permission of the President I am going to say a few words on the subject of a great landslip on the Warren, which occurred on the night of Thursday, the 25th of February. Of course you all know that the Warren itself is one great landslip, and that one part or other of its surface is always on the move, so that an attentive observer finds something fresh at almost every visit. I hope all of you have seen or will see this latest slip for yourselves, and I also hope that after I have said what I have to say, or during my remarks if you like better, any of you will put in statements or opinions of your own.

The beginning of the slip is a little this side of the Long Pond, and its further end is some quarter of a mile or so from the Coast Guard houses. The whole slip is very regular in shape and dimensions, and when you stand at the far end of it, and look back towards Folkestone, you cannot help being struck by the magnitude of the dislocation, nor can you help speculating as to what could have caused it. A long narrow strip of land, about half-a-mile in length and from 50 to 70 yards wide, has sunk down, so quietly and

evenly as to have scarcely misplaced a single stone or bush, through some 15 feet on one side of it, and five feet on the other. Those who did not know the Warren pretty well might easily, especially if they approached it from the eastward, walk over the ground that has given way without noticing anything exceptional, so little is the ground broken up or the paths and landmarks disturbed. Going along the path on the right hand side of the railway which leads to the Coast Guard Station, you first become aware of the slip when you reach the steep slope which led downwards on to the lower part of the Warren. Here the path is suddenly dislocated, and you see it 15 feet below you. Descending by a flight of newly made steps rather to the eastward of this dislocation and walking still on to the east, you have on your left hand a raw edge in the shape of a bank, of about 15 feet slope, generally composed of smooth chalk rubble, but in parts covered with large lumps of chalk, which in one particular spot have fallen onto and obliterated the old path. On the seaward side of the main valley the slope is from five to six or seven feet only, and the ground is on this side more broken and cut up than on the other. As I said, the view from the eastward end of the slip is very remarkable. The high ground on either side is not disturbed, and as far as I have been able to make out there is nowhere any thrust of the seaward slopes onto the shore. But some 50 or 80 yards from the foot of this seaward slope there has appeared a very remarkable ridge, now rapidly undergoing destruction by the waves. This ridge consists of (1) loose lumps of chalk, (2) upper greensand in much larger quantities than I have ever seen it on this shore before, (3) gault of both kinds both, dark and light, and (4) a large quantity of what I believe to be clay iron-stone, with large quantities of the solidified iron stone, lumps of which lie in such profusion all along Eastwear Bay. One or two splendid blocks of stone covered with hæmatite I noticed as I walked along this ridge on Wednesday last. These may have been visible before, but I had not noticed them. The work of the sea in reducing the ridge is shown by the specimens of comminuted chalk and gault which lie before you. The ridge is being rapidly reduced, as I said before, to the general level of the shore, and in a few months will probably be hardly distinguishable.

I ought to mention the effect of the landslip on the Long Pond. It is unquestionably wider than it was. The sloping banks on each side have slid down forward, and while filling up, no doubt the bottom have so advanced downwards that the opposite sides of the water are farther apart than they were, and while on one side the path that ran by the edge of the pond is entirely submerged, on the other, bramble bushes, which till lately grew high and dry on the bank, are now in a most unwelcome depth of water.

Such is a brief and imperfect description of the features of this remarkable slip, and I hope that our committee will, as soon as the weather can possibly be pronounced sufficiently genial, organise a ramble to the Warren, that those of us who have not seen the slip may do so, and that we may meet on the spot and compare notes. I should have said that the alteration in the banks of the Long Pond, will, I fear, render it utterly unproductive in the matter of Natural History for this year; as the old bottom of the pond is no longer approachable, and water snails and other such beings, naturally prefer *living* water plants to *dead* land ones.

If you are not tired I will say a few words on the theory of such slips as these, and on the causes which have led to the present one. Doubtless, you know that, all along the Warren, the Gault, a stiff greyish or blueish clay, underlies the chalk, and is much more easily acted on by water than is the chalk. Now chalk hills are invariably well supplied with springs, and if you walk with your eyes open along Eastwear bay, and note the many runnels of fresh water finding their way across the beach to the sea, you will see that our chalk hills are no exception to the rule. These chalk streams, and such as these have caused this landslip. The *surface* of this portion of the Warren at which it has occurred is chalk, and therefore underneath it is the gault. This being reduced by degrees to a more or less liquid condition by the water, and you must remember what unusually heavy rains we have had, and how the underground streams must, consequently, have been swollen, has at length been unable any longer to support the superincumbent chalk, and, the whole being in a state of unstable equilibrium for some time past, as soon as any one point began to sink the motion must have extended to all,

while, going down, as it did, upon the surface of a tenacious mud, the fall has been very gradual and steady, and the consequent disruption of the ground very small. Had the gault underneath been in a very liquid condition, it would, doubtless, at several points, have forced its way up through the overlying chalk, and a geological phenomenon of a totally different nature would have presented itself. As it was, the enormous weight of this vast body of chalk produced a pressure on the gault beneath, which could be relieved only by a giving way at the point of least resistance, which in this case happened to be the place where the gault comes to the surface, at and near low water mark. Here, therefore, the internal pressure has come into play, with the result of throwing up the ridge, of which I have spoken, along the shore. But observe, that, to produce this ridge, pressure and therefore motion, must have been propagated through the mass underlying the seaward hills and slopes of the Warren; and here I should be inclined to think that the next great slip must occur. Meanwhile let the S.E.R. Co. look to it, for one part of the present slip is within 15 feet of their embankments.

ANNUAL MEETING OF THE SOCIETY.

Wednesday, April 14th, at the Commercial Hall, Grace Hill. The following objects were placed on the table:—

Collection of Fossils from the formations lying between the Tertiary beds and the Silurian.

Land and Fluviatile Shells

Marine Shells (local).

Several families of Plants (dried).

Cases of Lepidoptera, &c., &c.

There were also four Aquaria, temporarily fitted up by the Rev. C. L. Acland, with specimens of aquatic life, both animal and vegetable; and a very beautiful bank of wild flowers gathered and arranged by Mrs. Fitz Gerald.

The President having taken the chair, called upon the Treasurer to read the Balance Sheet, for 1868, which we here present to our readers:—

BALANCE SHEET.

RECEIPTS.	£	s.	d.	*EXPENDITURE.*	£	s.	d.
To Subscriptions received for 1868	8	17	6	By Printing Circulars, &c.	3	19	0
„ Receipts for the Magazine.....	2	2	10½	„ Ordinary Expenses, Postage, &c.	0	13	7½
				„ Postage of Magazines.....		1	10
				„ Cash in hand	6	5	11
	£11	0	4½		£11	0	4½

THE PRESIDENT'S ADDRESS.

Ladies and Gentlemen,

On this our first Annual Meeting, I think I may be fairly allowed to congratulate you on the great success of the Folkestone Natural History Society; a success due not only to the long-felt want of such a Society in this neighbourhood, but to the great exertions and never-ceasing interest of some of our members. Nor do I think it would be right to allow this occasion to pass without thanking our Hon. Secretary and the Rev. C. L. Acland for all they have done for us. They, in fact, are the patient nurses who have guided and guarded the first tottering footsteps of our infant Society until it has become the stalwart stripling we now behold it. Beginning with only 30 members we have reached the respectable number of 85, and are even now daily increasing. Nor is this surprising when we remember that a love of Natural History being once awakened, it becomes the most fascinating of pursuits; every surrounding object, however familiar and common-place assumes a new interest, it is like the first dawn of love in the human breast; immediately every object assumes a

more roseate and lovely hue, and unlike too often the grosser passion, the love of nature lasts until the termination of our life. What greater difference can there be then between the dull "constitutional" along an uninteresting road, taken perhaps at the urgent instigation of some tyrannical doctor, and the happy "ramble" of the Naturalist, to whom every blade of grass, every peeping wild flower or graceful fern, every stone becomes an object of rational interest, to whom every little pond swarms with curious and interesting life; to whom to have discovered a new or even a rare specimen is worth any expenditure of time, trouble, or exertion. What can be more exhilarating than the first dip with the net in a new and tempting looking water; what can equal the healthy excitement when the net comes to the surface laden with what a single glance tells us to be rare or interesting specimens. What care we then for muddy clothes, wet boots, or even aching backs, does not the result fully compensate for such trivial misfortunes? You may laugh, but I only say "Try it!" and if you do not then agree with me, I shall pronounce you different to all the specimens of humanity I have ever met. Perhaps you will say, or think, "But I don't care for a parcel of dirty beetles, snails, and newts." I can only repeat, "Try the experiment and the love will surely come." You will find nature is one lovely and harmonious whole, to which all things, however apparently trivial, contribute. You will find nature is full, she swarms and palpitates with life under a myriad of unseen and unsuspected forms; the very air we breathe is full, each drop of water swarms with life,—with tiny animalcules, so small that 150 millions of them would not weigh a grain. The earth we tread teems with life, and to the naturalist all this is lovingly revealed. He is invited to an intellectual repast, such as might tempt the most fastidious, and his researches are the more delightful because there is still so much to discover, so many difficulties to reconcile, so many theories to corroborate or disprove, so much information to impart to others. Already we have had several highly interesting papers read by members of our Society, one on "Geology," by our indefatigable Secretary, which possessed a peculiar interest for us, because the site whence it was delivered (the Warren) is not only peculiar in its geological formation, but because just now it is undergoing changes produced by the gradual action of landsprings, &c., and gives an admirable instance of how alterations of the earth's crust have been and are even now effected; how chalk cliffs are left perpendicular, the bottoms of lakes changed and elevated, and islands thrown up at sea. All these phenomena have lately

taken place, on a small scale, in the Warren. We are indebted to the Rev. Mr. Langdon for a most elaborate paper on "Freshwater Molluscs," a subject of the greatest importance to the naturalist; and to a distinguished lady member for a most poetic essay on "The Wonders of the Deep." The Rev. C. L. Acland, too, gave us a capital paper on the "Fertilization of Orchids," in which he pursued a most judicious course, and one which I strongly recommend to all of our members (and I trust they may be numerous) who intend to favour us with papers during the ensuing year, and that is to dwell rather on one single point of scientific interest, and explain it thoroughly and intelligibly, than to attempt too much, and leave on the minds of your hearers a confused notion of having listened to a number of very hard words.

I shall hope to hear to night some discussion on a very clever and original paper by Mr. Ullyett, in which he distinctly states his belief in the reasoning powers of the lower animals, and which he believes them to possess in common with ourselves. Although I cannot follow him quite so far as that, I freely grant that the lower animals possess "sense," "instinct," "promptings," (call them what you will, for they are merely words which conceal our ignorance on the subject), which we not only do not possess, but which we cannot even conceive, which our minds cannot grasp. Mr. Ullyett instanced the migration of Birds, which he partly explained (I trust to his own satisfaction) by the existence of reasoning powers, but can a reasoning power tell a vulture that a camel lies dead in the desert when it is far, far out of what we can conceive the limits of sight or smell? Often at sea when the sky has been cloudless and no spec visible on the horizon, have I thrown a morsel of biscuit or meat into the water, and yet within a few minutes hundreds of birds were hovering around the vessel, following in her wake and watching hungrily for more. I might multiply instances by the score, bnt to what good we simply do not know, we can but wait patiently and strive to understand what our mother nature teaches us.

And to those who really mean to study the more easily solved problem of Nature, I would say at once, "Buy a microscope," or rather "*Procure* a microscope." *Buy* it if you can, by hook or by crook afford it; save for it—beg for it, at any rate, *get* a microscope, and if possible, a *good* one; get a steady stand and good lenses, but do not attempt at first to have them of too high a power, these are difficult to work and not necessary for anything but the higher and more elaborate researches of the Physiologist. A 1 inch, ½ inch, and a ¼ inch are sufficient to begin with, though they now make lenses as

high as 1-12 and even 1-25 of an inch. Then what wonders will you behold! Each dew-drop, each withered leaf, becomes a world. We see the very stones of which our houses are built, the chalky cliffs of old England which we love so well, are composed of microscopic forms, the relics of a bye-gone age. Now may we find the "Red Snow," which was formerly considered a portent of awful omen (and of which I have myself seen vast fields in the polar regions), to be merely caused by the growth of a minute plant, *Protococcus Nivalis*, which is reproduced with marvellous rapidity, and spreads immense distances in a single night. We discover "Life within Life," as for example, in the common Aphis, with which our roseries swarm. Inside you will find another insect, nearly perfect, open this carefully and you find another, and again within this last you will discover eggs, which require only time to become perfect insects.

There is one point in Natural History which will, I am sure, commend itself to our Lady Members. I allude to the very poor figure often cut by our sex among the lower forms of animal life, and which they will doubtless argue, extends *upwards* in the scale of creation, though it might be difficult to say how high! They will find that not only are male creatures often inferior to their partners in strength, intelligence, and beauty, but that there actually exists a race of insects *without any males whatever* (I allude to the Apus). True they are only Entomostracæ, allied to the Daphnia or Water Flea, which is, again a sort of poor relation or distant cousin of the shrimp, crab, &c. But then compare the lazy ugly drone with the resplendent and stately Queen Bee. The puny male spider with his fierce and pugnacious lady, who sometimes even goes the length of *eating him up*! And there is even a parasite Lernea, whose husband is merely a parasite to her and actually *lives on her*. Can male depravity go farther than this?

What can be more wonderful than the way a naturalist, such as Professor Owen will take up a piece of fossil bone thousands of years old, and from this imperfect fragment give a correct description of an extinct animal, describing not only its texture of skin, whether scaly, feathery, or smooth, but will tell its food and habits of life, and even make a drawing of its external form and appearance! Indeed even a very humble naturalist may sometimes tell a good deal from a bone. I remember some years ago when I was in Cologne going over the Church of St. Ursula and the 11,000 Virgins, her companions, I was shewn a portion of the scull of St. Ursula, and by the side of it the the scull of St. Elfrida, her especial favorite, "Was she one of the Virgins"? I asked; "of course" said my indignant guide. "But this is

the skull of a man" I replied. "Impossible, perhaps you will tell me this is a man's scull," said the monk taking up another "Virgin." "Yes she was also a man." "But how can you possibly tell?" said my guide, who did not quite know whether to be more outraged or staggered. "Because" I replied, "I can by some points of its structure, such as the frontal sinuses, its thickness, size, &c., tell the difference just as certainly between a male and female scull after death as I can between a man and woman when alive."

Camper, if you remember, formed a very sensible and ingenious theory from the formation of the scull, professing to discover from the different facial angles, not only the distinctions between the sculls of the several species of animals, but also those which exist between different nations. Thus he considered the Negro an intermediate step between the European and the Orang-Utang, and he established a sort of scale graduating from a newt up to the loftiest type of human beauty. Thus birds have the smallest angles, asses an angle of 42, to 50, a Negro and a Calmuck a facial angle of 70, while the average angle of European faces is 80, except in the loftiest or most sublime style of beauty where it amount to 100 degrees. On this difference of 10 degrees, depends the difference in beauty between the Negro and the lovliest of Europeans. But I am sorry to say that, ingenious as this theory undoubtedly is, it is not quite true, indeed it was founded on an error, as the skulls of apes which were used for comparison were those of immature animals, and Professor Owen has clearly proved that in the adult ape the facial angle is far less than stated by Camper, being indeed only 30 to 35, so that the transition is far more abrupt than he imagined, and makes a difference so great that the utmost diversity between any two human races becomes quite insignificant compared to it. I had intended giving a slight Ethnological sketch in my paper this evening, but I found it would unduly extend its limits; I trust however some of you will give us a paper on this subject ere long. It was a subject which first forced itself on my attention when travelling in Iceland and afterwards in Lapland, where I noticed the curious nomadic or wandering habits of the people, apparently so inappropriate to the cold, inhospitable country in which they dwell, and which must have been, as they were, imported from the sunny skies and burning deserts of the far east. In the interior of Iceland you see a scattered people, travelling continually on horseback from place to place, dwelling in tents, subsisting by scanty flocks just as do the Arabs of the desert, practising too, like them, a prodigal hospitality, which is given and

accepted as a sacred right. They are, however, a very different looking people to the degraded Lapps, who are by some classed among the Celtic family. It needs only a glance at their oblique eyes, high cheek bones, low foreheads, bronzed skins, and straight black hair, to detect their Mongolian origin, And this brings us to the fertile field for speculation opened up by modern philosophers, as to the fixity or mutability of species. How sublimely simple and harmonious appears Darwin's theory of the developement of all species from few or even one type, and yet, at first sight how unanswerable seems the objection made by the other school, that if species have not altered during the last 4,000 years, since the time of Pharaoh, they are not likely even to have varied, for, as I daresay you know, the beetles, dogs, cats, and negroes portrayed on the Egyptian obelisks and tombs are identical with the same animals and negroes of the present day, and the black slave who offers the jewelled cup to Pharaoh, is identical with the grinning Sambo, who brings up tiffin in a Peninsular and Oriental steam boat. The reason of this is plain; where like united with like, varieties did not arise, but once introduce a point of divergence,—let two divergences unite and the beginning of a new variety is established. This we see even in our own day, take sheep for an example; what can differ more than the Spanish sheep with large curled horns, long hair, and bushy tails, and the fat-tailed sheep of Syria, with their large pendant ears, and their enormous fat-laden tails? and yet both, together with our own totally different looking sheep are allowed by all sides to be from the same stock. Again how different are the several breeds of dogs; compare the Scottish terrier with the staghound; a Newfoundland with a greyhound, and say if members of different species, such as wolves and jackals, are not more like some dogs than these several breeds are to one another. Then we are tempted to enquire, do the different races of men arise from one common origin, modified by climate, habits, and dispositions? or were they essentially different from the beginning? But this is far too wide a subject to discuss to-night. Let me rather remind you that not only all men, but all animal nature, whether Vertebrate, Articulate, Radiate or Mollusc are precisely alike at one period of their existence, and this is the period when, as some one observes, there is no difference between a frog and a philosopher for all alike arise originally from the developement from a single cell.

A vote of thanks was proposed to Dr. Fitz Gerald, in seconding which the Rev. C. L. Acland remarked that he thought the fact of man, in an embryo state passing through the various metamorphoses of different animals in the sub-kingdoms below him, was often pushed too far in support of the developement theory. We might argue similarly from the fact of his body being composed of the same chemical constituents as those of the inferior creatures.

The President then informed the members that he and all those on the committee now resigned their offices, and it was necessary to elect fresh ones for the ensuing year.

The Rev. C. Parsons said that the late officers had performed their duties so much to the satisfaction of every one, that he thought they could not do better than re-elect them. He therefore proposed that the whole body should be re-elected. This was seconded by A. C. Taylor, Esq., and carried unanimously.

The following paper was then read by the Secretary:

On the REASONING POWERS of ANIMALS.

Before bringing forward any arguments in favour of this opinion, it will be as well to state what I mean by saying that animals possess reasoning powers. This will be best done by stating the opinions of some of the naturalists and philosophers of former years. They believed, as a great many non-naturalists of the present day believe, that "reason" is the peculiar property of man, and that other animals are totally devoid of it, having instead a mysterious faculty, invented by *man* himself, the ignorance of the nature of which is hidden by the term *instinct*. By virtue of this faculty they perform all their actions without "reason or deliberation" (Johnson),—without knowing why they perform them, and in fact, not knowing that they perform them at all. Descartes says that animals cannot possess reason because they have no power of speech, or in his own words, "It is a remarkable thing

that there is no man so stupid, excepting only the insane, who is not capable of arranging divers words, and forming a discourse; but on the contrary, there is no other animal however perfect that can do the like; and this not only proves that beasts have less reason than man, but that they have none at all.' Placed in a logical form the argument runs thus:

Creatures which cannot form a discourse do not possess reason.

Animals cannot do this.

Therefore animals do not possess reason.

The major premiss is, I think doubtful, the minor one can be positively contradicted, and so this argument falls to the ground.

I am not at all disposed to say that reason cannot exist without speech. Buffon again denied to animals the power of thought, reflection, and even of memory. A learned Jesuit, who was a little more enlightened, allowed them all these powers, but got out of the consequences of his heresy by affirming that all the brute creatures were under the dominion of evil spirits. In fine, we may say that most of them believed brutes to be mere machines, as a naturalist has lately expressed it, wound up to go on in one, and only one particular course, for a certain number of years. Doubtless this mysterious faculty does exist in them, and infallibly guides them in many things vitally necessary to their existence; but there can be no doubt in the mind of any unprejudiced person that they have at least some glimmerings of reason—a reason differing from ours to a vast extent in degree, but not at all in kind; that each species possesses an amount of this faculty corresponding to the perfection of its organisation, and that individuals differ from each other, even as men do, according to the opportunities they have had for improvement by associating with other animals or with man. It does not follow from this that we are to consider a horse or dog capable of having his reason improved to such an extent, as make him competent to work out an algebraical problem, or to prove that two sides of a triangle are greater than the third. There is many a human being who cannot be brought up to this pitch, but does that warrant us in saying he is without reason? Now a great write

tells us of two kinds of reasoning, to wit, that concerning matters of fact, which are incapable of strict logical proof; and that concerning the relations of ideas, which latter kind may be carried on independently of all external relations. We reason concerning matters of fact solely by experience, and not from any necessary connection between them: we cannot prove that the sun will rise to-morrow, neither can we by any amount of purely mental exertion prove that London is on the Thames—we must appeal to the *senses*. Of course this kind of argument, known as that by *Induction*, is far below the other. It is this however, which the lower animals share largely with man; whether they share the higher kind with us or not is a question upon which I will not enter, but will simply affirm that they are capable of drawing a conclusion from several inductions. A dog believes that if he goes too near the fire he will get burnt; he believes this because he has experienced it several times: a young one does not know it, —if it were instinct, the fire would be avoided by him from his birth. Without entering any deeper into the metaphysical part of the subject, I will now proceed to two arguments. And first of all concerning the speech of animals: is not this premiss self-evident—that any creature exercising the faculty of speech, does so to transmit its own thoughts, or to make known its wants to another? Where there is speech there must be the power of *thinking*. If we can prove then that the lower animals possess speech, we must acknowledge that they can *think*, and the power of so doing surely is a "reasoning faculty." It is not necessary that their mode of conducting their speech should be the same as ours; if they can make known their wants by words, signs and sounds, or in any way whatever, they possess speech in the broad sense of the word. A deaf and dumb man who makes intelligible signs with his fingers, possesses speech. Now who is prepared to deny such a power to the animals below ourselves? The various calls of the hen to her young, which they perfectly understand; the crossing of antennæ by bees and ants; the different tones of the dog towards his master and towards a stranger—when he is frightened and when he is hurt: numerous anecdotes referring to all these will recur to the mind of every reader of Natural History. We have read of wonderful Viziers of mighty Sultans, who could relate the conversations

of birds. Monstrous and absurd as those stories are, depend upon it they overlie a stratum of truth; for I cannot but believe that a man may become so intimate with his pet animal that he shall understand all the sounds it makes, and that it also shall to some extent understand his speech.

Again, if we see a creature acting consciously from a motive, we believe it to be exercising reasoning faculties; in other words, whenever it performs an action, having a certain end in view, which shall be the result of that action, it is doing so in consequence of a conclusion it has arrived at by some process of reasoning. Now we certainly do see animals sometimes performing actions in such a way that we are morally confident they know what they are doing; and what conclusion can we draw in such a case? The dog whines at the door because he *expects* to be admitted; he lies on the hearth because he knows he will get warm. A very eminent naturalist says that he once saw a species of wasp seize a fly, cut off the abdomen, and then attempt to carry off the body; a breeze, however, acted on the wings of its prey, twisting it round so that it could not proceed. Upon this the wasp alighted, cut off the wings, and then flew away with the fly. This was not instinct; instinct is infallible, and would have led the wasp to cut off the wings of *all* flies, but here it accommodated itself to circumstances. It does not follow from all this that if they do reason, they are therefore conscious of so doing. "Reasoning by induction is constantly practised by the most ignorant clown, and by the most thoughtless schoolboy," and yet they do not know it. In our ordinary daily affairs we do not go through a regular logical process every time we act, but it is pretty certain that these actions result from an argument, either gone through at this time unconsciously, or else on some previous occasion, when the result has been stored up in the memory.

An animated discussion on the subject ensued, from which it appeared that the majority of those present agreed with the writer in the views he had enunciated.

A Gold Coin, lately brought to light in the Warren, was then shown, and a few remarks made thereon by the Rev. C. L. Acland, who stated it to be one belonging to the Iceni; the circumstance of its being found in this neighbourhood, was, therefore, a curious one.

After a short interval, the Rev. C. J. Taylor exhibited some Enlargements under the Lime Light of Microscopic and other objects. These were exquisitely finished, and afforded much instruction to those present. A vote of thanks was warmly accorded to Mr. Taylor, and with this a very successful meeting terminated.

ON LOCAL NATURAL HISTORY SOCIETIES.

On looking through the papers read before the Folkestone Natural History Society during the past year, it appears that though they are of much general interest, they have (with one or two exceptions) but little reference to the Natural History of the neighbourhood, the investigation of which may be considered to be one of the first objects for which our Society has been established; I therefore venture to give a few suggestions to our members as to the course their observations should take. But before proceeding to offer any remarks of my own, I will quote the following from an article which appeared in a recent number of *The Gardeners' Chronicle*, bearing reference more especially to a paper read by Mr. Gulliver before the East Kent Natural History Society:—

"We have lately had occasion to comment on the healthy activity manifested by our local Natural History Societies, such as the Tyneside and the Woolhope Clubs respectively. East Kent does not wish to lag behind, as witnesses the *Kentish Gazette* of a recent date. That journal contains the report of a lecture delivered at Canterbury on 'cell biography in relation to systematic botany,' and comprising a summary of Mr. Gulliver's researches on the forms of pollen grains in various orders, the shapes of cells in newly allied forms, as in *Hymenophyllum tunbridgense* and *H. Wilsoni*, and on the presence or absence of plant crystals or raphides. Most of these topics have from time to time been treated of in these pages, and while earnestly echoing Mr. Gulliver's wish that amateurs and members of local clubs should concentrate

their efforts on some particular subject, instead of rambling discursively and comparatively uselessly over several, we must at the same time add a word of caution, and bid our friends not to lay undue stress on such points as those indicated by Mr. Gulliver's lecture. We began with the East Kent Society; we will now venture to urge upon its members the desirability of preparing a flora of their district, with special reference to the soils and geological features of the county. Few counties are more favourably situated for this purpose than Kent, from the great variety of conditions under which plants grow. The coast line from Margate to Dungeness, so interesting geologically, is hardly less so when considered with relation to the plants growing on its different strata. In some parts, as near Folkestone for instance, it is possible, so to speak, to have immediately on the left hand the flora of one district (gault), on the right that of the chalk, so sharply is the line drawn in some places. The lessons to be learnt by the Naturalist in the district we have indicated ought not to be thrown away upon the agriculturist or the gardener. They must be obtuse indeed who cannot get some hints which may be turned to profitable account in the field or the garden. Our East Kent friends might well take as a model the flora of Northumberland and Durham, lately issued by the Tyneside Naturalists' Club, and in which the distribution of wild plants according to soil, elevation, and other climatic conditions, is entered upon at considerable length, while the corresponding relations in the case of plants cultivated by the farmer and gardener are not overlooked. It is a rare thing now to find a "new" plant in our well-explored English counties, and if such be found the gain is not generally great, either in a scientific or practical point of view. On the other hand, the careful study of the relation between the plants and the conditions under which they grow, the possible range of variation in any given plants, and the inducing causes of those variations open up a field as interesting as it is promising in important results, both in a scientific and in a practical point of view. No persons are more favourably situated for the accomplishment of useful service in this direction, than the members of our local Field Clubs."

The foregoing observations show how much may be done

by Societies like ours to promote investigations of the highest interest and scientific importance. But in addition to the subjects suggested in the remarks just quoted, there is a vast field of interesting research open to the members of our Society. Foremost may be placed marine zoology, for though the sand and mud of our coast is not so favourable to the existence of many forms of animal life as the rocky coasts of the south-west of England, yet much remains for investigation. Folkestone is also well situated for observing the arrival and departure of our summer migrant birds, and many interesting questions in connection with this subject, at present obscure, might thus be cleared up. It is moreover very probable that one or two species of birds which are found in plenty on the opposite coast of France, but which have as yet occurred very sparingly in England, might on further search prove to be more frequent in this district. Entomology also affords a most encouraging subject, as many very rare insects have been found in the immediate neighbourhood of Folkestone, and there only.

In this slight sketch I have endeavoured to point out how much it is in the power of our members to forward the study of Natural History, without going beyond the limits of the locality in which the Society is situated.

C. H. DASHWOOD.

THE MECHANISM OE THE HUMAN VOICE.

Read before the Society, March 17th.

I purpose to-night to give a short description of the Larynx, that most wonderful and complex organ by which the Human Voice is produced. We hear a person speak, or hum a tune, and it appears to be a very simple and easy act, requiring little effort and less thought, while in reality it is a most complicated operation, requiring an instrument of marvellous delicacy and intricate construction to perform it.

All sonorous vibrations may be divided into "*Noises*" and "*Sounds*." Noises are *irregular impulses* communicated

to the ear, such as the report of a gun, the wash of waves on the beach, &c. *Sounds* are produced by *regular* vibration of the elastic air, for example, the note of a musical instrument, of a violin or flute, the sounds of the human voice, &c.

When we hear a note struck, we are able to distinguish three points about it.

1st—Its "Strength" or "Loudness," which depends on the *size* of the waves of vibrating air.

2nd—Its "Height" or "Pitch." This is dependent on the *number* of vibrations performed in a given time. The greater the number of vibrations the higher or sharper the the note, and, of course, *vice versa*, the smaller the number, the graver, or more bass will be the sound; practically 32 vibrations in one second is the smallest number capable of producing sound, and even then the pitch will be so low as hardly to be perceptible—it is in fact a mere "hum."

There is a good deal of talk just now of lowering the pitch of the "A" tuning fork, in our English orchestras, and it would, no doubt, be a most sensible thing to do, and an immense boon to our public singers, whose voices are prematurely worn out by having to sing up to the present high pitch—a pitch which has gradually risen in England until it is now nearly half a tone higher than it was in the time of Handel. The middle A was formerly produced by 417 double vibrations, whereas now the A of the London Philharmonic requires 440 vibrations. The French legislature has very wisely enacted that the same note shall not be higher than 424.

I think I before mentioned that a note is said to be sharper than another when it is produced by a larger, and flatter when it is produced by a smaller number of vibrations in a given time.

There is a vast difference in the capacity of different ears to perceive acute sounds. I know a gentleman who can never hear the sharp hissing sound emitted by the field cricket, and which has been calculated to require no less than 24,000 distinct vibrations in a second to produce it. But some fine and highly educated ears will detect the faint click emitted by 36,000 double vibrations, or (to jump to the other end of the scale) the slight hum produced by 16, the smallest number capable of producing audible sounds.

As we know, all our senses are finite, thus with sight it is the same thing. If I whirl a ball attached to a string round slowly you can perceive clearly both ball and string, and moreover no perceptible sound is produced; but if I increase the momentum beyond a certain point both ball and string become imperceptible and then sound is also produced.

3rdly—Sounds of the same pitch may differ widely in their Timbre or Quality (the Germans call it Tone Colour), thus the same note on a violin and a violincello, a trombone or a piccolo, differ materially in character, and even the same note on the same instrument produced by two different players is often very dissimilar in tone, this is due to the form of the vibrations.

Having now, I hope, arrived at a definite idea of what sound is, I will endeavour to explain the means by which it is produced in the human voice. To understand the mechanism of the human voice, I must ask your attention to these diagrams. The human voice may be roughly compared to a wind instrument, in which air is forced between two vibrating bodies, as for example, the reeds of the clarionet. To produce voice we require a current of air (as from the lungs), a bellows to force it between the vibrating bodies (as the muscles of the chest) and vibrating bodies, capable of delicate adjustment (as the vocal chords).

The vocal chords, are properly speaking not chords at all, but membranes with free edges like the split parchment of a broken drumhead. These chords must be brought parallel to produce sound, in ordinary breathing they are slightly divergent, allowing the breath to pass noiselessly; when we speak they are brought very quickly together by the Posterior Arytenoid muscle and rendered tense by the Cricothyroid. The Thyro Arytenoid re-elevates the Thyroid and relaxes the chords. The greater the degree of tension, the higher the note. And *vice versa*.

The difference of voice in men and women is produced by the difference of length of the vocal chords, which are $\frac{1}{3}$ longer in men than in women and boys The size also of the bronchial tubes, and capacity of the chest also modify the sound of the voice. The range of the voice, depends on the difference of tension which we can give to the vocal chords, and on the control we possess over the muscles which tense

and relax them, and it is for this reason practice is so useful to singers, s it developes the two sets of antagonistic muscles, and gives greater power over both or either, according as we practice more at one or other end of the scale. Accuracy of singing, depends on the precision with which one can voluntarily regulate and adjust the opposing contractions of these two sets of muscles, (the Crico Thyroid and Thyro Arytenoid) this of course can only be attained by careful practice.

The quality of a voice—bass, barytone, tenor or soprano, mezzo-soprano or contralto, depends on the length of the chords and their elasticity, the shape of the larynx, resonance of the chest, &c.

That wonderful invention of modern days, the Laryngiscope has revealed some curious facts about the different actions of the vocal chords in producing different sounds and notes. Thus we see that in making a fair resonant chest note the vocal chords vibrate throughout their entire length and substance. The vibrations become more rapid and ample as the sounds become sharper, and the opening between the chords is rectilinear; the tension is also greater than in falsetto notes. Whereas in falsetto notes the chords vibrate only on their free borders; the parts constituting their base not taking any part in producing the sound. The longitudinal tension is also much feebler than in chest notes, and the opening of the glottis is elliptical instead of rectilinear.

C. E. FITZ-GERALD.

(To be continued.)

OUR ORCHIDS.

We take this opportunity of reminding our readers that June is the month for the flowering of most of the rarer species of this beautiful and interesting family. Kent is particularly famous for them, in fact, one species *Ophrys arachnites* the Late Spider Orchis has hitherto been chronicled only from Folkestone and Sittingbourne. As the East Kent Natural History Society are at present engaged in preparing materials for a new flora of this part of the county, we shall thankfully receive any assistance from our readers in furthering

such a praiseworthy undertaking. The *Orchidaceæ* attract attention at once by their beauty and curious mimicry of various members of the animal kingdom. There are few of our Folkestone readers who will not at once call to mind the Bee Orchis which, may be gathered in the neighbourhood by hundreds. Among others chronicled we may note *Epipactis palustris, E. latifolia, E. grandiflora* (mentioned as having occurred in the Warren, but hunted for lately in vain) *Orchis ustulata, O. viridis, O. fusca, Aceras anthropophora, Ophrys fucifera, &c., &c.* Of these particularly we shall be glad to hear, and still more pleased to have specimens for identification. The date and locality should be affixed in every case.

SHORT NOTICES OF BOOKS.

We hope from time to time, to be able to call the attention of our readers to works likely to interest them, or to be in any way useful to them in the branch of study to which they are devoted. Messrs. Low and Marston, some time ago issued "*The Life and Adventures of John James Audubon, edited, from materials supplied by his widow, by Robert Buchanan.*" There are few, who do not take an interest in Biography, and certainly to a naturalist, the life of one addicted to kindred pursuits, is full of absorbing attraction. The name of Audubon is well known, principally in connection with his magnificent work on the Birds of America. In order to make this collection what it ought to be, he travelled thousands of miles from first to last, that he might see the feathered races in their native haunts, and sketch them from Nature. No one certainly, ever threw himself heart and soul into his work more successfully than Audubon: possessing an ardent love of Nature, and imbued with that courage and endurance, which we now connect so much with such names as Livingstone, Baker, Speke, and Grant, he never allowed any obstacles to stand in his way. Downhearted he was at times, as was but natural; but his elasticity of spirits soon overcame this, and he laughed at disappointments when they were gone. He describes his wanderings with a charming simplicity and freshness; they are full of fact and anecdote,

and we can answer for it, that if any of our readers once commence the book they will finish it.

BOOKS RECEIVED.

The Report of the Rugby School Natural History Society, 1868, contains some very interesting papers read during the past year, and several illustrations. An excellent arrangement of the appearances of different animals and flowers appears at the end.

Quarterly Magazine of the High Wycombe Natural History Society, April, 1869. The members of this Society are admirably doing their work towards making a catalogue of the plants and animals of their district. Mr. Britten gives a list of the Orchids, with notes; and Mr. Sharp does a similar work for the birds. The paper on "Fern Freaks" is very interesting.

"The book, perhaps which turned the tide in favour of Natural History, among the higher classes at least, in the south of England, was White's "History of Selborne." A Hampshire gentleman and sportsman, whom every body knew, had taken the trouble to write a book about the birds and the weeds in his own parish, and the every day things which went on under his eyes, and every one else's. And all gentlemen from the Weald of Kent, to the Vale of Blackmore, shugged their shoulders mysteriously, and said "Poor fellow!" till they opened the book itself, and discovered to their surprise, that it read like any novel. And then came a burst of confused, but honest admiration; from the young Squire's "Bless me! who would have thought there were so many wonderful things to be seen in one's own park!" to the old Squire's more morally valuable "Bless me! why, I have seen that and that a hundred times, and never thought till now how wonderful they were."

KINGSLEY.

Local Names.—It is desired to collect as many as possible of the local names of British plants and the assistance is requested of all who take an interest in the subject, or who may have the opportunity of ascertaining and recording them. Any lists sent to Mr. James Britten, High Wycombe, or to Mr. Robert Holland, Mobberley, Knutsford, will be thankfully received and acknowledged.

NATURALISTS' KALENDAR, 1869.

April 6th—*Sherardia arvensis*, Field Madder in flower.
„ 11th—Cuckoo heard.
„ 16th—*Tussilago Farfara*, Coltsfoot in flower.
„ 23rd—*Helianthemum vulgare*, Rock Rose; *Primula vulgaris*, var. *caulescens*; Nests of larvæ of the Brown Tail Moth *(Porthesia chrysorrhea)* in great abundance on the Warren; Small Cabbage Butterfly *(Pieris rapæ)* appears.
„ 28th—*Colias Edusa* caught on Warren; Swallows *(Hirundo rustica)* appear; Larvæ of Oak Egger *(Bombyx quercus)* out,
May 3rd—Swift appears.
„ 8th—*Deilephila lineata*, the Striped Hawk Moth found on the Warren.
„ 20th—*Orobanche minor*, the lesser Broom Rape in flower on the Warren.
„ 26th—*Lycæna Adonis* out.
„ 30th—Oak Egger spins.
„ 31st—*Cerura vinula* emerges from the chrysalis in captivity. This is very late, as specimens were out a month ago. They generally appear later in captivity.

I have seen the young man of fierce passions and uncontrollable daring, expend healthily that energy which threatened daily to plunge him into recklessness if not into sin, upon hunting out and collecting, through rock and bog, snow and tempest, every bird and egg of the neighbouring forest. I have seen the cultivated man, craving for travel and for success in life, pent up in the drudgery of London work, and yet keeping his spirit calm, and perhaps his morals all the more righteous, by spending over his microscope, evenings which would too probably have gradually been wasted at the theatre. I have seen the young London beauty, amid all the excitement and temptation of luxury and flattery, with her heart pure and her mind occupied in a boudoir full of shells and fossils, flowers and seaweeds, keeping herself unspotted from the world by considering the lilies of the field how they grow. And therefore it is that I hail with thankfulness every fresh book of Natural History, as a fresh boon to the young, a fresh help to those who have to educate them.

C. KINGSLEY.

NOTES AND QUERIES.

A HOLIBUT or Halibut was caught off our shore on the 20th of April, and was doubtless seen by many of our readers, in the shop of Mr. Baker, High Street. This creature belongs to the curious family of the Flat Fishes (*Pleuronectidæ i.e.* swimmers on the side). From the appearance of these fishes (soles and plaice are included in the family), and the different colours presented by the supposed upper and under surfaces, they are commonly thought to lie with the back uppermost: this however is a mistake, they are much compressed in form, and actually lie upon the ground on the side, and when they move they glide over the bed of the sea by a series of graceful undulations. What we take for the sides or rather edges, are in fact the back and abdomen. The bones of the head are curiously modified to allow of the eyes being both placed on one side of the head, viz. that which is uppermost. The specimen caught weighed 94 lbs., which, large as it may seem for a flat fish, is not a great weight for the Holibut, as the creature has been known to reach a length of seven feet, and to weigh 300 lbs.

The term Holibut is a compound of *holy* and *but* or *bot* a Dutch name for the Flounder; in the Norse languages the fish has a similar name.

VIPER ABROAD IN WINTER.—A viper was killed in this neighbourhood on the ninth of January last. As vipers are not generally out at all in winter, I suppose we must attribute the appearance of this one to the mildness of the season.—S. GREENSTREET,

Cheriton.

EARLY FLOWERS—On the thirteenth of February, in company with one or two friends, I found *Viola hirta*, and *Chrysosplenium oppositifolium* out in flower and a profusion of primroses. By-the-bye, I would recommend to the notice of the Society some charming little spots in the neighbourhood of Cheriton and Newington, on the south side of the Railway, as admirably suited for the scene of one of their rambles. There is a great diversity of surface, hill and vale, dingle and dell; there are rocks for the geologist to hammer at, sand martins' perforations for the ornithologist, woods and low thickets, that swarm with lepidoptera in the summer, while many a little babbling brook and still pond await the nets and bottles of those who delight in aquatic life.—Q.

CABBAGE BUTTERFLIES—These appear to me to be scarce this season. At this time last year the gardens swarmed with them, and now scarcely one is to be seen. This is good for the gardener, but does it foretell a bad season for the entomologist? T. S.

THE STRIPED HAWK MOTH (*Deilephila lineata*). A very good specimen of this rare moth was brought to me from the Warren, on the 8th of May. It was found by a boy resting on the grass. A Death's Head Moth was taken in a Similar position on the Warren last year.—HY. ULLYETT.

CLOUDED YELLOW (*Colias Edusa*).—On 28th April, I took a beautiful specimen of *C. Edusa* (female), apparently fresh from the chrysalis, in the Warren. It is the smallest I have seen, measuring only one inch nine lines from tip to tip.—A. H. TAYLOR.

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Those Subscribers who have not yet forwarded their subscriptions, are respectfully requested to do so at once, as this is the last number for the year.

All Communications should be addressed to H. ULLYETT, *Folkestone. We shall be glad to receive notes concerning any of our local plants and animals, times of appearance, abnormal forms and colours, popular names and traditions, &c. These must be authenticated by the writer's name and address, but not necessarily for publication.*

A LIST OF MACRO-LEPIDOPTERA

Occurring in the Neighbourhood of Folkestone.

BY H. GUARD KNAGGS, M.D., F.L.S., Author "Lepidopterist's Guide." Editor (for Macro-Lepidoptera) "Entomologist's Monthly Magazine."

As might be expected from the peculiarity of its geological strata (lower chalk and upper gault to the east, and the various layers of lower greensand to the west of the town), the shelter afforded by hills and valleys with which the neighbourhood is so picturesquely embellished, the varied nature of its Flora, and above all its proximity to the coast of France, Folkestone offers a mine of wealth to the working Entomologist; indeed there are few districts throughout the United Kingdom which have yielded such an imposing array of novel and rare species, as has done this El Dorado of the British Lepidopterist. By way of illustration let us enumerate a few of the delicacies for which this locality is so justly famed.

First and foremost *Sesia chrysidiformis* may be mentioned. This glorious clearwing once based its claim as a Britisher on the authority of a single specimen in the cabinet of Francillon, but not having turned up for many years, was erased from our lists, until Mr. Brewer, a Coleopterist, to whom Lepidopterists have every reason to feel grateful, gladdened our eyes with the sight of a specimen (in 1856) which he had consigned to the undignified depths of his 'bacca box! and thanks to this clue and the practical manner in which collecting is conducted now-a-days, it was not long before the coveted prize found a resting place in most of our collections. The perfect insect flies for a few hours in the morning sun, disappears towards noon, and re-appears on the wing in the afternoon sunshine. It should be sought for in the Warren on scantily covered flowery chalk banks facing the sea. Its flight, when the insect is not disturbed, somewhat resembles that of a Burnet, but being of a small size, it is easily passed over until the eye becomes familiar with its appearance.

The discovery of its larva, which feeds on the roots of sorrel and dock, was made a few years since simultaneously

by Mr. E. G. Meek, in the Warren, and M. P. Mabille, in Corsica. The oblong blackish eggs are deposited on the leaves and stalks of its food plants.

Next we have a Bombyx, or rather Pseudo-bombyx, *Clostera anachoreta*, a handsome addition to our moth fauna, of which I was myself the fortunate discoverer. My first acquaintance with the species was made in the larval state; eleven caterpillars, found feeding on Ontario Poplar in one of the plantations along the Lower Sandgate Road, producing as many moths; a single female of which became literally the "mother of thousands," so that the "Anchorite" is now in every cabinet. Several other collectors have subsequently taken the larvæ.

Then comes a Noctua, *Leucania albipuncta*, discovered here last season by the Messieurs Briggs, of St. John's, Oxon, who were lucky in securing a couple of examples at sugar; the insect may be known from its congener *L. lithargyria*, to which it bears considerable resemblance, by its smaller size, its less concolorous appearance, and the greater conspicuity of its white discoidal dot. It is on the wing early in August.

The fourth Folkestone Moth, *Tapinostola Bondii* a bone-dust-white insect, with wings expanding about an inch and a quarter, presents a curious little histoirette of its own. It is certainly astounding that so conspicuous a species should have been flitting freely, every afternoon towards dusk in the fashionable month of July, under our very noses, and yet have escaped detection up to 1858, and it is still more surprising that in the eleven years following but two fresh localities, namely Lyme Regis and Mount Parnassus, should have been discovered for a fly so locally abundant in its habitats. Of course it was very hard to believe that a Noctua, of which I had secured and distributed some thousand individuals among brother collectors, could possibly be new to science, and it was therefore not to be wondered at that our great authorities should try every means to sink the name which I had bestowed upon it in honour of my esteemed friend, Frederick Bond. First it was proposed that it would prove to be the *Nonagria concolor* of Guenée, then that it might be an aberrant form of *Miana arcuosa*, and lastly that it was the *N. extrema* of Hübner; this latter theory for a time held ground, until Professor Zeller showed that the figure of

extrema, by Hübner, and the description by Treitschke, could not, by any twisting, be made to fit my insect. After that *Bondii* found itself unmolested for a time; recently, however, Colonel Macchio, of the Austrian army, having found the insect on Mount Parnassus, came to the conclusion, after comparing it with the Royal collection at Vienna, that it really was the *extrema* of Hübner after all. Still later, however, Dr. Staudinger, of Dresden, has carefully examined both Hübner's and Treitschke's types, and his unimpeachable decision is that *Bondii* is a good new species; and that it is the *concolor* of Guenée, which is identical with *extrema*; so that at last *Bondii* survives, notwithstanding the severity of the tests which have been applied to it.

The perfect insect appears from the end of June to the end of July, and inhabits the slopes below St. Mary's Church; it is on the wing before dusk, and after a short flight of twenty minutes or half-an-hour, settles down on the leaves and stems of its food plants, where it may be observed by the aid of a lantern, singly and in pairs, and boxed in the usual manner.

The caterpillar feeds in the root end of the stems of a local coast grass, known to botanists as *Festuca arundinacea*, wherein it changes to a chrysalis. The eggs which are pale yellowish, are deposited between the leaf sheaths and stems of the food; the little larvæ are at first hairy, but become smooth after piercing a layer or two of the plant on their way to the pith.

The next is a Noctua, evidently from the very peculiar pectinated form of its antennæ, new to the British list; but unfortunately the only example I secured of it (on the fence near the Junction station early in June, 1861), is in such a dilapidated state, that to identify it is impossible. It appears to belong to the genus *Pachetra*, and from the structure of its antennæ one would suspect it to be a visitor at light. Collectors would therefore do well to be on the look out for it at street lamps, after 11 p.m. in the Autumn, or else after hybernation, early in May.

We now come to a singular slender-bodied moth, *Aplasta ononaria*, the extraordinary larval structure of which is utterly subversive of our notions of a geometric caterpillar. A single specimen of this curious species was discovered by my

friend Mr. Bernard Piffard, in the Warren, amongst *Ononis arvensis*, in August, 1867, On the continent, in the neighbourhood of Paris, the insect is attached to *Ononis spinosa*. It is double-brooded, and ought to be sought for in May as well as in August and September. Its habit is to fly up as we trample through, or disturb with our beating-stick, the Rest harrow. To obtain the larva, which is plump, hairy, and very sluggish, our French friends mow off tufts of the food plant and shake them over a sheet of paper. Two other examples have been secured by Mr. F. Standish in July of the present season, 1869.

Spilodes palealis. Folkestone claims the honour of first yielding this delicately beautiful pearl. Several years ago it was met with rather plentifully in the Warren during June and July, but of late has become rare—indeed seems to have disappeared. The species has also been taken at Herne Bay and other watering-places, and one year a stray specimen actually found its way as far inland as Forest Hill. The larva feeds on the umbels of the wild carrot and *Peucedanum* in August and September.

Lemiodes pulveralis. For the addition of this new British genus and species to the Folkestone list of delicacies, we are indebted to the Messrs Meek, who have this season (1869), secured three examples in the Warren; Mr. Edward Meek had a few weeks previously, however, met with a single individual of the, then, unknown in the Isle of Wight, so that unfortunately our pet locality has not been the first to yield the novelty. Stephens, many years since, gave it as an inhabitant of Great Britain; but, as he ommitted it from his Museum Catalogue, and it has not since "entered in the lists," the present captures must be regarded in the light of a new discovery. The ordinal position of this *Pyralis* in our cabinets will be after the genus *Scopula*. Its time of appearance is August.

Scoparia ingratella is the last novel "Macro" here to be recorded. This species is abundant in the Warren in June and the beginning of July. It may be known from its close ally *S. dubitalis (pyralella)* by its larger size, somewhat broader forewings, and by black markings being faint or altogether absent. It should be killed on the spot of capture, otherwise there will be little left to recognise on reaching our home quarters.

Although it is not intended in the present list to include the Micro-Lepidoptera, it might not be out of place to notice some of the chief novelties and rarities of that section.

Firstly, we have *Nyctegretes achatinella*, one of the *Phycidæ*, an old Folkestone spécialité which has since, or I am much mistaken, occurred in Norfolk.

In the next place *Crambus rorellus* was discovered some ten years since by my friend, Mr. Joseph Sidebotham, of Manchester, on the Lower Sandgate Road, where he secured eight or ten specimens. Previous to these captures a single specimen was said to have occurred, but as no locality had been given for it, and the species did not turn up again, the insect hadbeen eliminated from our lists. This striking Crambus has since been met with, by Mr. E. Meek, in the Warren.—The time of appearance is early in June.

Of Tortrices, the chaste *Sciaphila cinctana*, discovered twelve years ago by the Rev. Tress Beale, near Alkham, is most conspicuous for its beauty. It has not, to my knowledge, ever occurred in any other British locality. Of late years it has been freely bred by London collectors who have been assiduous in their search for the larva which feeds on *Echium vulgare*. The perfect insect emerges in June or July and may be met with in a wood, on the left after passing the village of Alkham, amongst the plant named above as its food. It will be well for Tortrix hunters to bear in mind that the favoured time for the flight of their special group is about 6 p.m.

Catoptria conterminana is another Tortrix which Folkestone bears the credit of being the first to yield. Its discovery fell to the share of my friend, Mr. Bond, who secured it on one of the slopes at the commencement of the Warren. It has since been taken by Mr. Machin, at Stratford-by-Bow. I have met with the insect to the west of the town early in July. Abroad, it is said, to feed on Aster.

Feeding on that singular plant, the *Hippophaë rhamnoides*, in the Warren, is a *Spilonota* allied to *Sp. ocellana*, which I have serious intentions of describing shortly under the name *Sp. hippopaäna*. The species is very abundant.

Referring to the Tineina, it might be remarked that I was fortunate enough to secure, on the Lower Sandgate Road, a little larva on a leaf of *Achillea millifolium*, which duly produced

a Bucculatrix new to the country, *B. artemisiella*. The capture was made early in June, some years since, on one of the most boisterous days I ever remember to have experienced even at Folkestone. Of course, its occurrence on a yarrow leaf was purely accidental; but full-fed Bucculatrix larvæ have the peculiarity of leaving their food plant to spin up their seed like cocoons elsewhere.

Thus, the reader will observe, Folkestone has produced at least a dozen new British species. Beside these, however, many rarities have occurred, and as a taste of the richness of this district, may be gathered from the enumeration of a few of them I purpose taking a special glance before proceeding to the list itself.

Procris globulariæ. To the two habitats already known for this local species, Mr. Ullyett has added Folkestone, he having met with it in some numbers on Castle Hill in June of the present year. At the same time and place he also captured several *Procris geryon*.

Acidalia rubricata was taken in the Warren, beyond the old "Pelter" Brig, by my friend Mr. J. B. Lynch, at a time when only one other locality (York) was recorded for the species. Since then it has been turned up elsewhere by the Hon. Thomas de Grey and Mr. Bond.

Acidalia rusticata. A few years ago I beat a specimen of this local wave out of a maple tree in the Warren, thereby adding a third to its other two localities. The caterpillar generally feeds on whitethorn.

Acidalia ornata. A lovely "wave" occurring abundantly in the Warren. It is double-brooded, and frequents Marjoram and Thyme. The only other locality given for it in Mr. Stainton's Manual is Box Hill.

Acidalia strigilata would seem to be almost peculiar to the hollows in the Warren, for although Darenth Wood and Carlisle have been given as localities for it, the insect was certainly of extreme rarity prior to its discovery in this neighbourhood. The imago emerges in July, and may be either beaten out by day or taken on the wing at dusk in its favourite haunts; in this way a goodly number of captures have rewarded hard work. The larva, as far as my experience goes, feeds on the Traveller's Joy, *Clematis vitalba* (upon

which I have reared the perfect insect from the egg) and not upon *Stachys sylvatica* as generally supposed.*

Eupithecia subciliata. My friend Mr. McLachlan and I once secured a number of examples of this curious and local Pug in the grounds of Saltwood Castle, and also in Sandling Park, amongst lichen-covered maple trees. Notwithstanding the acquisition of ova, the larva still remains a mystery; but we have no doubt, but that it will be found to live upon maple.

Xylophasia scolopacina. Mr. McLachlan captured a fine dark example at Saltwood. The species had never previously been met with so far south.

Agrophila sulphuralis. Mr. Sidebotham some years ago secured a few of this pretty little Noctua on the Lower Sandgate road, where its food plant, the lesser Convolvolus grows in abundance. Hitherto it had only occurred in Suffolk, and, long long ago, near Cambridge.

Odontia dentalis. This quaint looking insect seems confined to Brighton, Deal, and Folkestone. The caterpillar feeds in the stems and roots of *Echium vulgare*, but spins its cocoon among the dead leaves lying on the ground, where it may be detected without much difficulty.

Pionea margaritalis. Cambridge, Ranworth, and Sandown, are its known habitats, but I met with an example in the enclosure beyond the turnpike on the Lower Sandgate road. The caterpillar feeds on the seeds of wild mustard.

Simaëthis vibrana. Ten years ago I took a fine specimen of this sparkling little gem on the Lower Sandgate Road. This was the fourth known British example, and I have not heard of any recent capture. It is said to affect *Inula dysenterica.*

Melissoblaptes bipunctanus (anella). The only locality given for this is Deal, where it used to be taken by the late Peter Bouchard. Mr. Lynch and I have, however, met with a few examples to the west of Folkestone.

Homœosoma sinuella is most abundant in the Lower Sandgate road, although Brighton is the only locality given for it in the Manual. I believe it occurs also in the Isle of Wight.

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* Seeing that this truly local "Wave" has occurred singly in its other two habitats, the species may be set down as a Folkestone spécialité, for there is no other known locality where one would stand even the faintest chance of meeting with it.

Gymnancycla canella. The only places mentioned for this rarity are Hastings and Folkestone.

Pempelia ornatella. This pretty knot-horn is not scarce on the slopes towards Sandgate, in the Warren, and at Alkham. The only other known British locality is Mickleham.

Sericoris euphorbiana. This species was unique until a few specimens were secured in the Warren :—during the last year or two, in consequence of a deeply interesting and suggestive paper in the "Entomologists' Monthly Magazine," by Professor Zeller, of Stettin ; it has been freely bred from Spurge—and it has also been taken in some numbers flying in the sun in the vicinity of its food.

Sericoris fuligana (abscissana). The localities given in the Manual are "near London, in Norfolk, and Folkestone." It is stated to occur amongst flea-bane *(Inula).* The species, in the Warren, frequents thistles.

Stigmonota Leplastriana. Deal, Dover, and Folkestone are apparently the only localities for this local species. It frequents the wild cabbage.

Dicrorampha flavidorsana. This novelty to which I had recently applied the above name, from an examination of specimens captured at Haslemere and Devonshire, appears to be an inhabitant of Folkestone also, an example or two having been captured by my friend, Mr. Howard Vaughan.

Catoptria microgrammana is a curiously marked little Tortrix, recorded as having occurred at Deal, and also doubtfully stated to have been taken on one occasion near London ! It is common enough in June at Folkestone, where it frequents the Rest-harrow, which freely clothes some of the slopes in the Warren, and upon which it doubtless feeds.

Cochylis alternana (gigantana). A tolerably common species amongst knapweed (*Centaurea*), but its distribution is apparently confined to Deal, Dover, and Folkestone.

So that besides the dozen novelties before-mentioned, we possess a score of rarities and species so excessively local as to have only one or two other recorded localities.

Two other points, and we will proceed to the list.

First—it is very singular that several species, whose food plant is absent, or all but absent, should occur in the Warren ; for example *Gonepteryx rhamni*, without buckthorn *(Rhamnus catharticus or frangula); Vanessa polychloros* can find but little

elm near the old lime kilns; *Lycœna argiolus* without holly, but it probably feeds here on ivy; *Acronycta auricoma* and *Phorodesma bajularia* with only a few sprigs of oak to support them; *Cucullia asteris*, with hardly a handful of *Solidago* scattered about its locality; and *Endotrichia flammealis*, where no brake fern that I can find grows.

The other point is the singular richness of the locality in Plume moths; no fewer than eighteen out of the twenty-nine British species inhabiting the neighbourhood of Folkestone. They are as follow:—*Pterophorus Bertrami*, not uncommon amongst yarrow; Lower Sandgate road, June and July. *Pt. trigonodactylus*, amongst coltsfoot; Warren, June. *Pt. acanthodactylus*, not uncommon amongst rest-harrow slopes in the Warren; June and July. *Pt. parvidactylus*, common amongst the hawkweed slopes in the Warren; June and July. *Pt. pilosellæ*, scarce, amongst hawkweed; June. *Pt. phæodactylus*, abundant amongst rest-harrow; June and July. *Pt. bipunctidactylus*, Warren; July. *Pt. fuscus*, abundant in Warren; June and July. *Pt. lithodactylus*, not scarce amongst fleabane; end of June and July. *Pt. pterodactylus*, Sandgate road; August. *Pt. tephradactylus*, Warren, scarce; July. *Pt. osteodactylus*, Warren, rare; July. *Pt. microdactylus*, abundant amongst hemp agrimony; May and June. *Pt. galactodactylus*, not scarce among burdock on slopes below Royal Oak; July. *Pt. baliodactylus*, common in Warren amongst marjoram; July. *Pt. tetradactylus*, not scarce in Warren amongst thyme; July. *Pt. pentadactylus*, common in the outskirts of the town, amongst convolvolus; May, June, and July. *Alucita polydactyla*, common inland, amongst honeysuckles; August, and again after hybernation.

RHOPALOCERA.*

Leucophasia sinapis. The Wood White may be met with not uncommonly at Raindean Wood, about three-and-a-half miles on the road to Canterbury. The spring brood is on the wing in May.

* *Papilio Machaon* has been met with year after year on the East Cliff, Dover, beyond the Castle; but has not, to my knowledge, occurred in the immediate vicinity of Folkestone, though its favourite food (fennel) is not scarce.

Pieris brassicæ, rapæ, and *napi* all occur in the neighbourhood as might be anticipated.

Pieris Daplidice used to be captured towards Dover in the days of Leplastrier; but has not, I believe, put in an appearance of late years.

Anthocaris cardamines. In the Warren during May, but more abundantly inland.

Gonepteryx rhamni. In the Warren, but sparingly, in May; more abundantly inland.

Colias Edusa. Common enough in certain seasons. The variety *Helice* has been captured here on several occasions; August and September.

Colias Hyale. Very abundant on the Lower Sandgate road, in 1868; August.

Argynnis Aglaia. Abundant on the downs which run inland, from the east of Folkestone; July. Black examples are rare.

Argynnis Adippe. A few specimens flying in company with the foregoing.

Argynnis Lathonia. Two or three examples have been secured in the Warren. It used not to be very scarce in some seasons, in lucerne fields, at the back of Dover Castle.

Argynnis Euphrosyne. Taken inland; first brood May and June.

Melitæa Artemis. Raindean Wood; end of May and June.

Melitæa Cinxia. The undercliff, Lower Sandgate road, where its food plant, *Plantago lanceolata*, abounds; June. It has not been observed of late years.

Vanessa polychloros. In the Warren; July and August—first noticed and captured in 1869.

Vanessa urticæ, Io, Atalanta and *cardui* occur in greater or less abundance in the Warren and other places.

Arge Galathea. Very abundant, both to the east and west of the town; July and August.

Satyrus Ægeria. Common inland, borders of woods; May and August.

Satyrus Megœra. Common in lanes inland; May & August.

Satyrus Semele. Common in the Warren and East Downs; August.

Satyrus Janira. Abundant everywhere.

Satyrus Tithonus. Taken inland and in the Warren. July.

Satyrus Hyperanthus. Very abundant on the Warren;

July. Some very curious varieties wanting the ringlets on the under surface have been taken.

Chortobius Pamphilus. Very abundant in the Warren from June to September.

Thecla rubi. On the Warren, near "the long pond;" June.

Polyommatus Phlœas. Common on the Warren and Downs; August.

Lycœna Agestis. Common on the Warren; May and August.

Lycœna Alexis. Common; May and July.

Lycœna Adonis. Abundant on the Downs to the east; May and August.

Lycœna Corydon. Abundant on the Warren; August.

Lycœna Alsus. Warren and East Downs; May and August.

Lycœna Argiolus. Both broods occur sparingly on the Warren, where it, doubtless, feeds on ivy.

Syricthus alveolus. On the Warren; May and August.

Thanaos Tages. Abundant on the Warren; May and August.

Hesperia Sylvanus. Abundant in the Warren; May and August.

Hesperia comma. I have met with this skipper on the cliffs towards Dover.

Hesperia linea. Abundant, chiefly in moist places, in the Warren; June and July.

PROCEEDINGS OF THE SOCIETY.

June 12th. Members met at No 2 Tower, and H. B. Mackeson, Esq., F.G.S., gave an interesting and instructive lecture on the Geology of the locality, illustrated by large diagrams. Shewing a section he explained the formation of each bed, and pointed out where each cropped out—the Chalk, Upper Greensand, Gault, and Lower Greensand. No. 1, Tower, stands nearly at the foot of the Chalk; No. 2, on Upper Greensand; and No. 3, on Gault. By means of another section he showed in what order the formations would appear in travelling westward, and how the clay formed

valleys, and the chalk and greensand elevations. The formation of the Warren itself, and East Wear Bay, was then clearly explained as the Members stood at No. 3 Tower (Copt Point): consisting of gault it had been easily worn by the action of the sea, the slips being occasioned mostly by the land springs, while Copt Point still stood boldly out because of the hard rocks of the lower greensand which crop out in that exact spot, and may be seen still *in situ*.

They then descended to the foot of the cliffs and examined them more in detail. Mr. Mackeson showed that the blocks of greensand scattered about were remarkably deficient in fossils as compared with the Hythe beds, showing among other proofs that they had been formed in a tumultuous sea, not very pregnant with life. Some false bedding, and the fact of some largish pebbles being found mixed up in the stones, were also adduced in support of this view.

A cordial vote of thanks was given to Mr. Mackeson, and the Members then went fossil hunting. Some good specimens of fossil wood bored by worms were found in the Junction bed, also large pieces of selenite.

June 23rd. Evening meeting by invitation at the Rev. C. L. Acland's. Thirty Members present. On the table were:—

A collection of skulls of British Mammalia.

Vertebra of a Whale, found in East Wear Bay.

Several gigantic specimens of *Anodonta cygnæa* from the Military Canal.

Living specimens of *Hyoscyamus niger* (Henbane) from the Warren.

Dried specimens of *Leguminosæ*, &c.,

With several books and microscopes.

The Rev. E. Langdon, M.A., F.G.S., then read the following paper on the skulls above mentioned:—

Mr. President, Ladies, and Gentlemen,

I see I am announced in the notice paper, as about to read a paper on "Comparative Anatomy;" and I would, therefore, wish to say in the first place that I am not prepared to read a paper on so vast a subject as Comparative Anatomy, but rather to talk to you about these skulls that lie on the table before you.

I ought however first of all to make a few remarks on the subject of classification. Classification is of two kinds:—*natural* and *artificial*.

The first, the *natural* classification takes into consideration the general characteristics of every part of the things to be classified; while the *artificial* classification looks only at the variations and modifications of form, shape, colour, and function of some particular *organ* or *organs*.

The student of botany will at once recognise an example of this in what is called the Natural system, and the Linnæan system of the classification of flowers.

In the natural system all the parts of the plant, the root, the stem, the leaves, the flower, the fruit, are taken into consideration. In the Linnæan, the number and arrangement of the stamens and pistils are alone regarded. And the fact that the Linnæan orders very nearly correspond with the natural orders of plants, does not militate against the statement that Linnæus' classification was artificial, but only shows the genius which prompted him to base his arrangement on those organs of plants which have the greatest effect upon the variations of genus and species.

Were our minds perfect, we should have no need of classification, but the horizon of man's finite understanding is so bounded that it is only by dividing the picture by one limit and another, and examining and photographing with our mind, if I may so say, one portion after another, that we ever can realize the beauty order and arrangement of that stupendous whole, which Natural History lays before us; and the variations in the animal and vegetable kingdom may be, if we will, the different expressions of the mind of the Creator, while the links that unite them, the resemblances that exist between one genus and another, one species and another, and the substantial unity of plan that pervades the whole, may, if we will but see it so, exhibit to us the inviolable, yet unfathomable laws of that mind that never varies.

But to turn to the immediate subject before us.

Owen made an artificial classification of animals according to the arrangement and character of their teeth, but was too great a naturalist to overlook the consideration of their other organs. It is, however, to the teeth of the mammalia that I propose to devote *principally* my attention this evening, although

I shall endeavour to point out other distinctions in the skulls before us, and mention incidentally other characteristics which my present specimens do not enable me to illustrate.

The student who wishes to learn how to distinguish between the skull of one animal and another, would do well to begin by learning carefully the names and positions of the principal bones in a human skull, and although I would willingly dispense with long scientific terms, if possible, I fear that I must ask your careful attention while I name to you one by one the bones of this disarticulated human skull before me.

(The lecturer here named the bones of the human skull).

You are now in a position to compare these various bones in the skull of man with the corresponding bones in other animals; but I must warn you of a difficulty that may at first startle you, that in some animals you will find more, and in some less than in man. This discrepancy will entirely vanish if you make yourself master of the circumstances of the developement of each bone. For instance, this Pterygoid or bat-shaped bone that I am holding in my hand is really ten bones; that is to say it is developed from ten different centres or points of ossification, which become united in the latter period of the fœtal state, or otherwise very soon after the birth of an infant; and in comparative anatomy all these bones have names and are in certain instances found distinct.

Again, the parietal and occipital bones which are not united in the infant, producing thereby what you are familiar with as the soft part of a baby's head, are in some animals united at an earlier period of existence, and so grown together that they cannot be separated; the suture or joint having become entirely obliterated.

But to turn to the teeth. All mammals have a definite dental arrangement although in some cases that which is considered the regular formula is apparently violated; nature being a much less rigid systematist than man.

Forty-four is considered the normal number of teeth in the mammalia; three animals alone representing it, viz., the mole, the pig, and the gymnure. They are made up in the following way:—In each half of each jaw there are three *incisors* or cutting teeth, situated in the front of the mouth; one more pointed tooth called the *canine* or dog tooth; four

false molars, or *pre-molars*, corresponding in position with the molars of the first set of teeth, the deciduous, or milk teeth; three *true molars* or grinders.

The whale however has no teeth, but instead, that curious horny elastic substance that we incorrectly call whalebone.

In the ant-eaters, there are no teeth at all, while the armadillo has ninety-six, and some of the dolphins have a hundred and fifty.

I will now call your attention to this diagram, showing Owen's classification of the mammalia; and will, as far as my specimens allow me, go through them class by class.

Subclasses.		Orders.
Archencephala		Bimana.
Gyrencephala	Unguiculata	Quadrumana.
		Carnivora.
	Ungulata	Artiodactyla.
		Perissodactyla.
		Proboscidia.
		Toxodontia. *(fossil.)*
	Mutilata	Sirenia.
		Cetacea.
Lissencephala		Bruta.
		Cheiroptera.
		Insectivora.
		Rodentia.
Lyencephala		Marsupialia.
		Monotremata.

First. The *Bimana* of which man is the only representative. The dental formula in man is written thus:—*

$$I\ \frac{2-2}{2-2}\ C\ \frac{1-1}{1-1}\ PM\ \frac{2-2}{2-2}\ M\ \frac{3-3}{3-3}\ 32$$

Second. The *Quadrumana* which include the *catlarhine* or old world monkeys, which are found in Africa, Asia, and the rock of Gibraltar, have the same number of teeth as man; the number of molars and premolars respectively being reversed. The *platyrrhine* or new world monkeys, which have four more teeth than those of the old world; they have also prehensile

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* I. Stands for Incisors. C. Canines. P.M. Premolars. M. Molars

tails, buccal pouches, and callosities on the buttocks. The *strepsyrrhine* include the Galeopitheci and Lemurs, and in their dental formula vary considerably from the other two classes. We next come to the large class, the *Carnivora*, which is divided into—

1. *Digitigrada*, walking on their toes,
2. *Plantigrada*, walking on the flat of their foot.
3. *Pinnigrada*, walking on fins.

Of the order of *Carnivora* generally, I would make the following observations:-

They are at once distinguished from all other quadrupeds by having four large long well developed canine or dog-teeth, which are well seen in this skull that I have in my hand, the skull of a large dog.

The first tooth after the false molars in the carnivora is called a *lacerator*, being as you see of a larger size than any of the others, and cutting with the opposing tooth in the lower jaw like a pair of shears.

You will see this characteristic in all the *carnivora*, very plainly in this cat, the cats being amongst the most blood-thirsty of the tribe; as we shall realise when we remember that the lions and tigers belong to this cat tribe. The other molars vary very much in the different genera of the carnivora, according as they live more or less entirely upon flesh.

They have also a large *zygomatic arch* leaving room for the passage of the large muscle that moves the lower jaw.

You will observe the *high occipital ridge* on the skull for the attachment of the muscle of the lower jaw, and in the lower jaw the ascending *ramus* of the jaw above the *condyle* or hinge is exceedingly long, giving great power or leverage.

I have here on the table a skull of (1) dog and fox; (2) an otter; and (3) of a cat; giving examples of three different families of the *digitigrada*.

The dogs as you know have not retractile claws.

In their dentition they more nearly approach the typical formula of 44 teeth than any other animal except the three already alluded to.

Their dental formula is

$$I\ \frac{3-3}{3-3}\quad C\ \frac{1-1}{1-1}\quad PM\ \frac{3-3}{4-4}\quad M\ \frac{3-3}{3-3}\qquad 42$$

There is the skull of a dog in the Oxford Museum in which I counted the following formula :-

$$I\ \frac{3-3}{3-3}\ C\ \frac{1-1}{1-1}\ PM\ \frac{4-4}{5-5}\ M\ \frac{3-3}{3-3} \quad 46$$

Two more teeth that the typical formula, four more teeth than that of a dog ordinarily.

On close examination I found that the first pre-molar, which is a double-fanged tooth, had in this particular skull been replaced both in the upper and lower jaw by two single-fanged teeth, immediately following the canine teeth, thus producing the extra and unusual number.

On further inquiring into the history of this skull, it appeared that it came of a race of dogs that had been petted, and fed unnaturally for many generations, and nature had revenged itself, so to speak, by violating her usual laws.

I would mention this as a caution to my lady audience, that pampering pet dogs, and changing their natural habits of life in an excessive degree has been often known to produce anomalies similar to the one that I have mentioned. The dog is a very near relative to that much dreaded animal the wolf, the structure of its skeleton being identical.

The only wild species of the Canis or Dog tribe in this country is the Fox, *Canis Vulpes*, of which I have a skull here upon the table.

The predatory habits of the Fox are too well-known to the farmer's wife to need any comment : the Fox, however, when game and poultry are not to be had, will content itself with other small animals, not even disdaining worms and insects ; when he resides near the coast, he will resort to the beach to feed on sea shells and shell-fish, and some of the older naturalists give a ludicrous account of the Fox putting his tail into the water to catch Crabs, giving us an additional reason for the common proverb, "As cunning as a Fox."

The Otter, whose skull is before me, is as you know distinguished by its aquatic habits. It has 3 false molars in each jaw on either side, and the molars are more tuberculated than those of the dog, to adapt them to their different habits of life.

Their toes are also united by a membrane to fit them for

their aquatic habits, and their tail is horizontally flattened.

The Cats, or *Felidæ*, are as I have already noticed, among the most bloodthirsty of the carnivors.

Their jaws are short, and powerful from the increased leverage, the ascending ramus of the lower jaw being higher in proportion than in the dogs.

Their dental formula is :-

$$I\ \frac{3-3}{3-3}\ C\ \frac{1-1}{1-1}\ PM\ \frac{4-4}{2-2}\ M\ \frac{2-2}{1-1} \quad 34$$

If you pass your finger into this large foramen, or hole through which the spinal cord passes up to the brain, you will feel a projecting bony ridge.

This is an *ossified tentorium*, or bony substitute for the membrane that in all mammalia separates the cerebellum, or back part of the brain, from the cerebral hemispheres or fore-part of the brain, and is found in the carnivorous animals that spring on their prey, to protect the brain from concussion.

The same phenomenon is also to be observed in the long-necked ungulata, the weight of whose head necessitates a similar provision.

You all are familiar with the arrangement, common to all the cats, whereby they are able to withdraw their claws, thus keeping them always sharp and making their tread noiseless when creeping stealthily towards their prey.

I would also wish to call your attention to this large bladder-like protuberance called the tympanic bone, or ear bone, which is very large, almost absolutely as large as that in the skull of this dog although the size of the skull is so much smaller.

This marks its nocturnal habits. And here I would mention the common saying that "cats can see in the dark;" this is untrue ; their eyes are adapted for seeing in twilight and dusk better than other animals that prey by day, from their power of dilating the pupils of their eyes, so as to have the fullest use of any light there may be; but as to seeing when there is no light, they can no more do so than we can. Much of that acuteness of the cat, which is commonly attributed to its powers of vision, is due to the greater power of hearing with which it is endued.

I can show you the same thing in this skull of an owl whose habits are nocturnal ; and in this skull of a mole, whose vision

is so feeble that some of the earlier naturalists doubted the fact of its seeing at all.

Notice it also remarkably developed in this bat.

(2.) I have here a skull of one of the *Plantigrade Carnivora*, which it will be well not to pass over.

This that I hold in my hand is the skull of a badger.

You will notice how much blunter the molars are than in those which are strictly carnivorous.

The different species of the family differ much in the number of their pre-molars; some having

$$\frac{2-2}{3-3} \quad \text{or} \quad \frac{3-3}{3-3} \quad \text{or} \quad \frac{3-3}{4-4}$$

They all, however, have a uniform number of molars.

I would call your attention to the hinge arrangement of the jaw. The cavity for the reception of the convex articulating condyle of the lower jaw is hollowed out deeply, and in the adult grows round the condyle in such a way as to clasp it, and render it impossible entirely to separate the two jaws without breaking away some portion of the temporal bone. Dislocation of the jaw in the badger is therefore impossible. This arrangement obtains in no other animal.

To the *Plantigrada* belong also the Bears and the Racoons.

(3.) The *Pinnigrada*, including only the Seals and the Walrus, are at once distinguished from all other mammals by their peculiar extremities.

The toes of all the feet are united by an integument, whereby they are converted in use and appearance almost into fins.

In the Morses there are neither incisors nor canines in the lower jaw, but two enormous canine teeth or tusks grow from the upper jaw and project downwards, whose use seems to be to detach from the ground the substances on which the animal feeds, and to help him to lift himself up on to the rocks on which he sleeps.

We next come to the *Ungulata*

I have here specimens of skulls illustrating the *Artiodactyla* or even-toed ungulates; and the *Perisso dactyla* or odd-toed ungulates. The Pig, the Sheep, and the Fawn, belong to the former. This large skull, that of an Ass, or, as for all practical purposes we may call it that of a Horse (the distinctions

between the two, except in the matter of size being trifling), belongs to the latter.

And here (as from want of specimens I shall be obliged to pass over the *Proboscidia* and *Toxodontia*,) I will endeavour to point out with some minuteness the distinctions that mark the *Artiodactyla* and *Perissodactyla*.

In the Sheep there are no incisors in the upper jaw, its formula being—

$$\mathrm{I}\ \frac{0-0}{3-3}\ \mathrm{PM}\ \frac{3-3}{3-3}\ \mathrm{M}\ \frac{3-3}{3\ 3}\qquad 30$$

In the Pig as I have already stated the typical number of 44 is attained—

$$\mathrm{I}\ \frac{3-3}{3-3}\ \mathrm{C}\ \frac{1-1}{1-1}\ \mathrm{PM}\ \frac{4-4}{4-4}\ \mathrm{M}\ \frac{3-3}{3-3}\qquad 44$$

If, however, you will attentively examine these three skulls, the Sheep, the Pig, the Fawn, you will notice the following characteristics common to them all.

The pre-molars are only half as complex as the molars, that is have one fang while the molars have two.

The last molar does not project beyond the palatal bones.

They have their nasal bones of equal width throughout their length.

They have no foramen penetrating lengthways the ectopterygoid bone.

We will now examine this skull of an Ass or Horse, and we shall see that the pre-molars are equally complex with the molars.

The last molar projects beyond the palatal bone. Its nasal bones expand posteriorly.

The ectopterygoid bone is penetrated lengthways, as you will see by the direction that this bristle takes, when inserted in this small foramen.

Any one of these characteristics in the skull of an *ungulate* animal would be sufficient to enable you to decide whether it belonged to the class *Artiodactyla* or *Perissodactyla;* you would also be able to infer other peculiarities in its skeleton.

The following is a tabular arrangement of these distinctive points:-

ARTIO-DACTYLA.	PERISSODACTYLA.
1. Having an even number of toes.	1. Having an odd number of toes.
2. Having no third trochanter in the femur.	2. Having a third trochanter in the femur.
3. The astragalus divided into two almost equal facets.	3. The astragalus divided into two very unequal facets.
4. The pre-molar teeth half as complex as the molars.	4. The premolar teeth as complex as the molars.
5. The last molar not projecting beyond the palatal bones.	5. The last molar projecting beyond the palatal bones.
6. The nasal bones not expanding.	6. The nasal bones expanding posteriorly.
7. The ectopterygoid bone not penetrated lengthways.	7. The ectopterygoid bone penetrated lengthways.

I will call attention in this Ass's skull to this black cavity in the incisors, which corresponds with what is called the mark in the Horse's tooth.

In the Horse it disappears in early life.

In the Ass it continues throughout life.

It is formed by the alternate layers of dentine and enamel in the tooth structure being turned in as in the finger of a glove.

In the Horse, not being turned in very deeply, it becomes soon worn away.

I draw your attention to this, as it is the most important anatomical distinction that exists between the Horse and the Ass, showing how careful the naturalist should be not to overlook any characteristic however minute.

I pass over the *Mutilata*, among which are the whales and dolphins, as I have no specimens to illustrate them.

The next class the *Bruta* consists of the armadillos, ant-eaters and sloths, and their dental formula is very irregular.

The *Cheiroptera*, or Bats, are of two kinds. The *Frugivora* or vegetable feeding Bats, and the *Insectivora* or insect feeding Bats. The teeth of these latter resemble the true *insectivora*, but vary in number much in the different species.

The *Insectivora* consist of the

Talpidæ, Moles
Erinacidæ, Hedgehogs.
Soricidæ, Shrews.

The dentition of the Mole is that of the typical formula ; small as this skull is, it contains 44 teeth.

Notice the large tympanic bones, indicating its acuteness of hearing, its powers of vision being very feeble.

The Rodents are divided in the table into two classes

Non-claviculata

Claviculata.

The most striking characteristic, as you may see in this squirrel's skull, is the peculiar formation of the incisor teeth.

They are made like a chisel, having a hard plate of enamel in front, which is kept constantly sharp by use.

As these teeth would soon wear away, if not renewed, they keep continually growing from the roots throughout life.

As a consequence of this, if a rodent receives an injury misplacing one of its incisors, the opposing tooth continues growing in a circular direction until it penetrates the skull into the brain and causes death ; showing us the way in which nature provides for the termination of the existence of an animal, whose powers of feeding are considerably impaired.

Instances of rabbits and hares that have thus perished are by no means uncommon.

The two succeeding classes the *Marsupialia* and *Monotremata*, I will pass over, as they are entirely unrepresented in Great Britain, and I have no specimens to show you.

And now I beg to hand over to the custody of the society this small but fairly representative series of mammalian skulls, hoping that the members of our rapidly increasing body will add to its number more specimens to fill up the gaps and render the collection more complete.

Above all things, I hope that these specimens may be placed in a museum, so that they may be accessible to all for the purposes of study.

I hope that, if I have been unable to avoid technical language, I have yet made clear to all of you the broad distinctions wherein one class of animals differ from another.

The subject may seem at first to be dry bones, but when we begin to realise how much those dry bones tell us ; the mill of the horse grinding the corn ; the incisor of the squirrel drilling a hole in the nut ; the tusk of the boar tearing up the ground for food ; the tuberculated teeth of the mole piercing the insect ; the scissorlike teeth of the cat

and lion scrunching up their victims; when we become familiar with facts like these, each animal adapted in every modification of its structure for the parts it is destined to play in the animal creation, and for NO OTHER; then we become struck with wonder and amazement that we ever looked on uninterested, while such marvellous episodes of natural history were being acted round us.

Thus may we from good observers become good naturalists, and may I add at the risk of sermonizing, begin to realise that man has a work in nature, like all these lesser creatures of God, "to do his duty in that state of life unto which it shall please God to call him."

FIELD DAY, JUNE 26th.

One of the many charming spots to be found between Newington and the sea was selected for the meeting place. A small brook here runs through a little gorge, spreading out in one spot into a still pond, which though not of any size, abounds in varied species of aquatic beings. Hence it runs swiftly down a slope and winds about among osier beds, and flowery banks, which are favourite resorts for many species of *Lepidoptera*. The banks on either side of the stream near its source are clothed with ferns, flowers, and trees to the top, which are not so unpleasantly close, and so interwoven as to prevent any one getting among them, and many a handsome bouquet was made up from them by the lady members.

The place being three or four miles from Folkestone, conveyances were provided for the members, of whom nearly sixty were present, including those of Sandgate and Hythe. Arriving on the ground about half-past three, nets and bottles immediately made an appearance, and the water was well examined, if we might judge by the number of bottles that were filled. The President read an interesting paper on the Aquarium, with special notice of the history and habits of the Stickleback. This was supplemented by a few remarks from Rev. C. L. Acland and Mr. Ullyett, and a vote of thanks was given. Tea was then provided in the field, and after a few glees and songs by some of the members, the party broke up and returned to Folkestone.

NOTICES OF BOOKS.

The Lepidopterist's Guide, by H. G. KNAGGS, M.D., F.L.S. We have very great pleasure in bringing a book like this before the notice of our readers, and strongly recommend every one of them, who takes an interest in entomological pursuits, to provide himself with a copy. It is written by a master hand, and is full of most valuable and practical suggestions.

The Quarterly Magazine of the High Wycombe Natural History Society, Vol. II, No. 5. There is a capital paper in this number on the Prominent Moths of Bucks. The list of the Birds of Cookham is continued by Mr. Sharpe, and Mr. Britten gives some additional notes on the Flora of the County.

NOTES AND QUERIES.

WE take this opportunity of calling the attention of members to the Prizes offered at page 41 in No. II of the Magazine, and to the conditions annexed. All collections must be sent in to the Secretary by December 1st.

CAPTURES IN 1869.—I am glad to be able to give Folkestone as another locality for the scarce Forester moth *(Procris globulariæ)*. I took several on the 25th June on the slopes of the Downs. There are only two other recorded localities for it in England. I also took *Procris Geryon*, the Cistus Forester in company with the foregoing species, and of course *Procris statices*.

In Lady Wood I met with the Wood Tiger *(Nemeophila plantaginis)* which had not hitherto been recorded from Folkestone.

My greatest prize of all was, of course, *Deilephila lineata*, of which there is a note in No. II.

Many of the butterflies commonly plentiful here have been scarce this year, notably *C. Edusa*, *V. Cardui* and *L. Corydon*. *Adonis* has been by no means so plentiful as usual; and *Hyale*, which visited us last year, has not been seen.—HY. ULLYETT.

POISONING FROM BERRIES.—A case of poisoning, which had well nigh terminated fatally has just occurred here. A little boy searching for "haws" in the Tramroad, partook rather freely of the tempting berries of the Woody Nightshade *(Solanum dulcamara)*. On reaching home he became sick, and for several hours was in a wild and violent delirium, although the stomach had been emptied of its contents, but the poison had had time to extend itself completely through the blood. The pupils of the eyes were very much dilated, and the symptoms closely resembled those attendant on poisoning by the Deadly Nightshade *(Atropa Belladonna)*, which plant as far as we know, does not grow anywhere in our immediate neighbourhood. Ice in large quantities was applied to the head, and we are happy to be able to state that the boy is doing well now.

S. dulcamara is generally stated not to be dangerous unless taken in very large quantities; it is not known exactly how many the boy ate, but the case may serve as a warning to all against tasting anything of the nature of which they are ignorant.